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Editorial

Dear authors, reviewers, and readers

It has been a month since I was given the privilege to serve as the Chief Editor of the International Journal for Innovation Education and Research (IJIER). It is a great pleasure for me to shoulder this duty and to welcome you to **THE VOL-7, ISSUE-4 of IJIER** which is scheduled to be published on **30th April 2019**.

International Journal for Innovation Education and Research (IJIER) is an open access, peer-reviewed and refereed multidisciplinary journal which is published by the International Educative Research Foundation and Publisher (IERFP). IJIER aims to promote academic interchange and attempts to sustain a closer cooperation among academics, researchers, policy makers and practitioners from a wide range of disciplines, which contribute to state of the art in science, education, and humanities. It provides a forum for the exchange of information in the fields mentioned above by welcoming original research papers, survey papers, and work-in-progress reports on promising developments, case studies, and best practice papers. The journal will continue to publish high-quality papers and will also ensure that the published papers achieve broad international credibility.

The Chief Editor, appointed by the Associate Editors and the Editorial Board, is in charge for every task for publication and other editorial issues related to the Journal. All submitted manuscripts are first screened by the editorial board. Those papers judged by the editors to be of insufficient general interest or otherwise inappropriate are rejected promptly without external review. Those papers that seem most likely to meet our editorial criteria are sent to experts for formal review, typically to one reviewer, but sometimes more if special advice is needed. The chief editor and the editors then make a decision based on the reviewers' advice.

We wish to encourage more contributions from the scientific community to ensure a continued success of the journal. We also welcome comments and suggestions that could improve the quality of the journal.

I would like to express my gratitude to all members of the editorial board for their courageous attempt, to authors and readers who have supported the journal and to those who are going to be with us on our journey to the journal to the higher level.

Thanks,

Dr Eleni Griva

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FACTORS INFLUENCING STUDENTS' ACADEMIC PERFORMANCE IN KENYA CERTIFICATE OF SECONDARY EDUCATION IN KIRINYAGA CENTRAL SUB-COUNTY, KIRINYAGA COUNTY, KENYA

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ABSTRACT

This paper is on factors students' academic performance in Kenya Certificate of Secondary Education in Kirinyaga Central Sub-county of Kirinyaga County, Kenya. Literature review dwelt on global examination of academic performance, Africa review and regional including Kenya case. The study was guided by five objectives including but not limited to: factors that influence KCSE performance that include students-teachers ratio, peer pressure, school resources, student's motivation and family background. The study used descriptive survey research design. The sample comprised of 136 respondents of whom 68 were Heads of department, 34 deans of studies and 34 school captains from all the 34 schools in Kirinyaga Central Sub-county. Results on teacher-students ratio was seen to be highly influencing students' performance. All the respondents (100%) agreed that high teacher-student ratio influence KCSE performance by either leading to low physical contact between teachers and students hence poor understanding of concepts and poor individual attention to every students. Peer influence influences students' academic performance. 67.6% of the respondents agreed that some learners might not be interested in academic excellence hence dragging others behind. Peers also influence each other on drug and substance abuse, premarital indecency, dressing indecently, coupling and laziness. It was observed that 94.1% of the respondents agreed that school resources influence students' performance. These include enough teachers, textbooks, buildings, revision materials etc. on students motivation it was found that attitude of students influence academic performance by 73.3%. It was also noted that 86.7% of the respondents agreed that family background had influence on academic performance.

Keywords: Absenteeism, Academic performance, Adult literacy, KCSE, Parallel programme, peer pressure, school based, school resources, teacher student's ratio, staffing.

INTRODUCTION

Education is a leading instrument for economic growth. The cognitive skill of the population rather than mere school attainment is related to economic growth (Elsiever, 2010). Education and training are the tools to develop the country and therefore exam performance cannot be overlooked. KCSE in Kenya was first

held in 1989 and had at least 10 subjects that were reviewed twice to seven. Candidates are graded using mathematics, at least two sciences, at least two languages, humanity and a technical.

Academic performance determines whether the students will proceed to the university and other tertiary institutions (Lezotte, 2002). This therefore dictates a student's academic life to some extent. Secondary education has been included as basic. The government provides teachers, textbooks and other learning materials. Kenya hopes to provide a globally competitive quality education training, research and development. The overall goal of 2012 was to do away with illiteracy and make education accessible, increase the number of transition from primary to secondary and raise the quality and relevance of education. KCSE performance in Kirinyaga Central sub-county is influenced by many factors and it is dismal at secondary school level. The secondary school stakeholders may be concerned about the poor results posted in KCSE exam despite the same county taking a leading position in KCPE as illustrated by the table below for the last seven years.

Table 1.1 KCPE/KCSE Performances

YEAR	KCPE POS	NO OF SCHOOLS IN TOP 100 (IN KCSE) PER SUBCOUNTY				
		Kirinyaga Central	Kirinyag west	Kirinyaga East	Mwea East	Mwea West
2010	1	0	1	0	0	0
2011	1	0	0	0	0	0
2012	1	1	1	2	0	0
2013	1	0	0	0	0	0
2014	1	0	0	0	0	0
2015	1	0	0	0	1	0
2016	1	0	0	1	0	0

The aim of this study is to examine factors that influence KCSE performance in Kirinyaga Central sub-county. Most of the students who join secondary school do not transit to university.

Significant Terms

Academic performance - Attainment of KCSE grades that allow a student Proceed to University

Kenya Certificate of Secondary Education– is the final examination taken by secondary Students in order to determine who qualifies for University entry

School Resources - These are physical and human inputs in a school meant for Learning

Peers Pressure - Influence of agemates either positively or negatively Within students that can influence academic performance.

Teacher students' ratio - Number of students to be taught in a class by a single Teacher

Statement of the problem

The Kenyan government is investing a lot of resources through free primary and free day secondary schooling which was rolled out in 2008. Under this programme, each student is allocated shs 10,625 per year with 1.7 million students benefitting from the programme in the year 2011. Education ministry takes the lions share in the Kenyan budget. Kirinyaga Central Sub-county in Kirinyaga County is accredited for exemplary performance in Kenya Certificate of Primary Education but the performance in Kenya Certificate of Secondary Education is dismal, as illustrated in table 1.1 above. The trend is also worrying in other sub counties in Kirinyaga. Vision 2030 aims to provide a globally competitive quality education training research and development. With this background in mind the study investigated the factors that influence Kenya Certificate of Secondary Education performance in Kirinyaga Central.

Objectives of the study

The study was guided by the following objectives;

- i. To determine the influence of teacher-students ratio on students' academic performance in KCSE in Kirinyaga Central Sub-county.
- ii. To determine the influence of peer pressure on students' academic performance in Kirinyaga Central Sub-county.
- iii. To establish how availability of school resources influence students' academic performance in KCSE in Kirinyaga Central Sub-county.
- iv. To establish how students motivation influence students' academic performance in KCSE in Kirinyaga Central Sub-county.
- v. To determine how family background influence students' academic performance in KCSE in Kirinyaga Central Sub-county.

LITERATURE REVIEW

The study reviewed literature based on academic performance of students locally, in Africa and in global perspective. Areas reviewed included teachers students ratio, peer pressure, school resources, motivation of students and family background.

Teacher Students Ratio

Smaller classes are always perceived as allowing teachers to focus more on needs of individual students and reducing the amount of time needed to deal with disruptions. Smaller classes allow greater flexibility for innovation in classroom, improved teacher morale and job satisfaction (Hattle 2009: OECD 2009). The ratio of teachers to students also dictates how resources are to be shared. Researchers have found that class reduction has narrowed the achievement gap as the cost of reform has hindered the implementation of smaller classes over the years (Adams, 2014).

It has been noted that students learn better in smaller groups and are able to learn from each other, share knowledge, build better personal relationship with their peers and teachers and stay enlightened. There are also differences in achievement variability between small and large classes. (Black 2001) notes that smaller teachers students ratio often have always been weighed against higher salaries for teachers, increased

professional development greater teacher training and greater investment in teaching technology and widespread use of assistant teachers.

Many countries are considering class reduction with the objective of improving academic performance (Krueger 1999) indicate that the average student achievement in small class (15 students) was significantly higher in smaller classes. Reducing class size is a promising intervention that will increase academic achievement on average of all students.

Peer Pressure

A peer group is a group of similarly aged fairly close friends sharing the same activities. Peers can influence positively or negatively in an adolescent life. In adolescence, this is the stage of development where one's state of identity is so unstable (Castrogiavani, 2002). Peers play a strong influence in academic achievement. Their effect is independent of other factors such as race, ethnicity, gender income and other background variables.

Peer perception is seen to appear stronger in females than males. The peak of peer influence is at adolescence between the ages of 11 to 13 and is prominent in risky and antisocial behaviours (Ryan, 2000). At this time individuals make important decisions about their commitment to academics family and perhaps religion. They question if school is really important to them. They make choices on motivation, engagement and achievement in school.

Peer groups are also influential regarding to changes in students intrinsic values for school as far as liking, enjoying and achievement. Associating with friends who have positive motivation towards school enhances students' satisfaction with school while associating with those with negative motivation reduces it (Biddle, bank & Martin 2001). Many adolescents parents are not actively involved in their lives, they do not provide appropriate supervision and are unlikely to clearly communicate their values. This exposes adolescents greatly to peer pressure. Separating students according to their achievement abilities in school is another drawback. They may end up forming a groups own peer culture Alderman (2000).

School Resources

Educational resources play a significant role in order to provide equal opportunities to students by diminishing the effects of social economic factors on social development.

Several factors including instructional resources, if scarce, constrain educational system from responding more fully to meeting crises in educational demands. To meet crises in education, education systems will need real resources that can buy a fuller share of nation's manpower and raise its quality, efficiency and productivity.

Guthnie, (2013) stresses the importance of having appropriate personnel plan and adequate physical facilities to support educational effort. Environment that is not conducive for learning can lead to poor performance (Juma 2011), links performance in examination to the state of teaching and learning resources in the school. According to him human resource as a factor of production is affected by inadequacy as well as it's reflected by the level of teaching and motivation.

It is important to have sufficient and adequate human resource in terms of teacher quality. Without teachers as the implementing factor the goal of education cannot be achieved.

Lack of basic facilities like laboratory compromises the teaching of science subjects. Topics meant to be covered practically might end up being covered theoretically (Mayama 2012). Provision of adequate learning facilities at all levels including equipment's and learning resources enhance the quality and relevance of imparted skills of learners (Grubb, 2009).

Students Motivation

A relationship exists between parental involvement, student motivation and academic performance. A student who is motivated to do well in school is likely to make effort and achieve high scores. Kusurkar, Croiser and Cate (2012) there are several factors that motivate a student to engage in a lesson activity, example teacher's creativity and competency to use textbook encourages student's participation in classroom activities.

Ells (2002) a student's most powerful motivation to learn comes from his/her prior success in that subject. (Levi 2004) motivation affects students' attitude by causing them to have more positive attitude and confidence in themselves. Students that lack motivation put in less effort which in turn leads to poor academic performance. Motivation influences performance through its effects on self-regulatory behaviours and study strategies (Killian 2005).

It is important for students to be actively engaged in their learning for success. Motivation affect attitude by causing students to have more positive attitude and confidence in themselves. Students attitude to reading when they are children produce adults who continue to read in their life.

Family Background

Economic, cultural and parenting styles are indicators of family background. There are interrelationships that connect family background to students' academic achievement. Cultural capital indicators to measure are parents' educational level, parents' frequency in reading books, using internet and attention to current affairs. There are many factors that contribute to a child's level of academic success but the most important unit of a child's academic success is family. This is because it is the first source of informal education to a child. Parenting style, discipline techniques, involvement with children and home environment are shown to affect a child's ability to academically achieve (Ferlazzo, 2015).

Studies on negative effects of alcohol use on children by Mcwey and Herdrson (2010) shows that fathers who abuse alcohol are unlikely to engage with children hence lack of academics follow-up. Parents demonstrating tolerant ideas related to not only their own use of alcohol but alcohol use in general are more likely to have adolescents who engage in excessive drinking or have alcohol related behavior (Mares.et.al.2011).

Parental alcohol use is linked to maladaptive outcomes in children development, health behaviour and academic success. With no proper education, children will encounter hardships such as illiteracy, unemployment and shame. (James, Jurich& Estes 2001) Family cohesion also affects students' academic

performance students who reside in low income neighborhoods are more likely to perform poorly in schools as compared to those who reside in affluent neighborhood.

METHODOLOGY

Study Design

The study employed descriptive survey design. The design was ideal since it describes a situation or an area of study factually and accurately. Descriptive research describes areas like possible behavior attitudes, values and characteristics. The results of KCPE and KCSE from county education office schools offered the necessary information needed for study. Schindles and Coopers (2003) state that descriptive studies are structured with clearly investigative questions Variables used included teacher-students ratio, peer pressure, school resources, students' motivation and family background.

Target Population

The target population was 34 secondary schools all from Kirinyaga Central Sub-county. The information was sort from 34 school captains, 68 teachers who are heads of departments and 34 deans of studies.

Sample Size and Sampling Technique

This study adopted census survey where each and every member of the target population comprising of 34 school captains, 34 heads of departments and 68 school captains were used in the study. Census survey was adopted since the target population was deemed not large enough.

Instruments Validity

The researcher used the supervisor who is an expert to fine tune the questionnaire. The researcher pre tested the questionnaire using representative from target audience in three schools whereby a few respondents were chosen later the researcher adjusted the questionnaire as per the suggestions given by the respondents during pretesting.

Reliability of the Instrument

This research study used test retest method that involved administering the same scale or measure to the groups of respondents at two separate times. The study assessed the consistency of the responses to make judgment on their reliability.

Data Collection Procedure

Three sets of questionnaire were used to collect data i.e. from school captain, head of department and dean of studies. The questionnaires gave respondents adequate time to express their views and opinions and make suggestions due to their descriptive nature, their use was more economical and provided a safe basis of generalization (Kaothari, 2014).

The study used semi structural questions with a mixture of focused and response items to enable researcher to collect qualitative data from open ended question and quantitative data close ended question. A letter of

introduction from University of Nairobi was issued. The principal of the participating schools were contacted before administering the questionnaire. Respondents were assured strict confidentiality of their responses. The respondents were also informed the significance of the study.

Correlational analysis of responses

A correlation of factors influenced KCSE performance in Kirinyaga Central. These were run under SPSS to establish their strength

	Teacher student ratio	academic performance
Pearson product-moment correlation	1000	r = 0.985
Sig. (2Tiled)		0.002.
N	5	5
Teacher student ratio		
academic performance	r = 0.985	1000
	0.002	
	5	5

*****Correlational significant at the 0.005

A Pearson product-moment correlation coefficient was computed to assess the relationship between the amount of Teacher-student ratio and academic performance. There was a positive correlation between the two variables, $r = 0.985$, $n = 5$, $p = 0.002$. Overall, there was a strong, positive correlation Teacher-student ratio and academic performance. Increases in Resource allocation and Teaching time and decreases in class size were correlated with increases in academic performance.

	Peer pressure	academic performance
Pearson product-moment correlation	784	r = 0.644
Sig. (2Tiled)		0.012.
N	7	7
Peer pressure		
academic performance	r = 0.644	784
	0.012	
	7	7

*****Correlational significant at the 0.005

A Pearson product-moment correlation coefficient was computed to assess the relationship between the amount of Peer pressure and academic performance. There was a positive correlation between

the two variables, $r = 0.644$, $n = 7$, $p = 0.012$. Overall, there was a strong, positive correlation between Peer pressure and academic performance. Increases in Peer pressure were correlated with increases in academic performance.

	school resources	academic performance
Pearson product-moment correlation	990	$r = 0.780$
Sig. (2Tiled)		0.029.
N	15	15
school resources		
academic performance	$r = 0.780$	990
	0.029	
	15	15

****Correlational significant at the 0.005

A Pearson product-moment correlation coefficient was computed to assess the relationship between the amount of school resources and academic performance. There was a positive correlation between the two variables, $r = 0.780$, $n = 15$, $p = 0.029$. Overall, there was a strong, positive correlation between school resources and academic performance. Increases in school resources were correlated with increases in academic performance.

	students motivation	academic performance
Pearson product-moment correlation	920	$r = 0.805$
Sig. (2Tiled)		0.044.
N	4	4
students motivation		
academic performance	$r = 0.805$	920
	0.044	
	4	4

****Correlational significant at the 0.005

A Pearson product-moment correlation coefficient was computed to assess the relationship between the amount of student's motivation and academic performance. There was a positive correlation between the two variables, $r = 0.805$, $n = 4$, $p = 0.044$. Overall, there was a strong, positive correlation between student's motivation and academic performance. Increases in student's motivation were correlated with increases in academic performance.

	family background	academic performance
Pearson product-moment correlation	720	$r = -0.882$
Sig. (2Tiled)		0.044.

	N	4	4
family background			
academic performance	$r = -0.882$	720	
	0.044		
		4	4
*****Correlational significant at the 0.005			

A Pearson product-moment correlation coefficient was computed to assess the relationship between the amount of family background and academic performance. There was a negative correlation between the two variables, $r = -0.882$, $n = 4$, $p = 0.044$. Overall, there was a strong, positive correlation between family background and academic performance. Increases in family background were correlated with increases in academic performance.

SUMMARY OF THE FINDINGS AND CONCLUSION

The findings revealed that many respondents established that there is an influence of teachers-students ratio on students' academic performance. The findings reviewed by the deans of students that teacher student's ratio affect academic performance. 53.5% of the respondents indicated that there is good contact time between teachers' time to teach being diverted to other duties and lack of creativity among students.

The study reviewed also that 94.1% of the respondents said peer pressure affects students' academic performance in various ways; some not being interested in academic excellence hence pulling others down, (67.6%) following friends in what they do and students copying the people they associate with. Most students are influenced by peers to drugs premarital sex and indecent dressing. 40% of the students are influenced by peers as compares to laziness, dressing and premarital sex.

School resources influenced academic performance by 100%. These are teachers, textbooks, buildings labs, revision materials and ICT support materials 53.3% felt that the government need to avail funds to enable schools get the needed resources e.g. CDF. It was also found that 1 textbook was shared by four students in some school and in others three students. 68.8% of the respondents stated that motivation of students influences students' academic performance. The attitudes of the students in the following ways: students work hard in the subjects they like and if they like the student. Students cannot perform well if they are not ready to learn.

Negative attitude affects performance; students having positive attitude perform better than those thinking negative. Positive attitude bring positive academic performance. A student doesn't like his school is unlikely to perform poorly in academics. Motivation and confidence influence students attitude; those who do extra work on their own perform well in school.

On family background, the respondents 867% agreed that family background influences academic performance. Parents may fail to pay school fees student is sent home hence not taught. Students from well nurtured and organized families carry themselves with good behaviours and traits that influence positive performance. Proper family background gives a student a stable emotional foundation and when study materials are not bought a student will not study well.

Parental level of education had high impact on academic performance. The study showed that in most parents, the income was low while few were high. In addition some parents follow up their children's academic performance while others do not. Poor reading culture was also present among many students.

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ASSESSMENT OF MODEL FIT FOR 2016 AND 2017 BIOLOGY MULTIPLE CHOICE TEST ITEMS OF THE NATIONAL BUSINESS AND TECHNICAL EXAMINATION BOARD

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Abstract

This study was based on the assessment of model fit for 2016 and 2017 Biology multiple choice test items of the National Business and Technical Examination Board. It aimed at empirically investigating the model fit of the 1, 2, and 3 Parameter Logistic Models (PLM) of the examinations using Item Response Theory. Three research questions were raised with two hypotheses formulated and tested. The expo-facto research design was adopted for this study. The population for the study was 5,115 and 4600 candidates in public and private schools in south-south geo-political zone in Nigeria for 2016 and 2017 respectively. A total of 2000 students were sampled using Simple random sampling technique. The instruments for data collection was the NABTEB 2016 and 2017 Biology multiple choice question papers. The instruments are said to be valid and reliable as they were developed by a standard examination body. The responses from the instruments were used for data analysis. The results obtained from the study revealed that the 1, 2 and 3 PLM fit the 2017 and 2016 NABTEB May/June Biology multiple choice test items. However, the 1PLM provided a better fit to the data than other models. Based on the findings of the study, it was recommended among others that the examining bodies should make sure that model fit the data well before they are used to make inferences regarding the data.

Key words; Item Response Theory, Biology multiple choice test items, model fit and unidimensionality

Background to the Study

Researchers in the field of educational assessment are continually developing new approaches to improve efficiency of assessments. They are often concerned with methodologies that can extract the most useful and accurate information from students' responses to test items. Psychometric theory is the statistical framework for measurement in many fields of psychology and education. These measurements may concern abilities, personality traits, attitudes, opinions, and achievement.

Item Response Theory (IRT) models play a prominent role in psychometric theory. In these models, the properties of a measurement instrument are completely described in terms of the properties of the items, and the responses are modeled as functions of item and person parameters. While many of the technical challenges that arise when applying IRT models have been resolved (example, Model Parameter Estimation), the assessment of model fit remains a major hurdle for effective IRT model implementation (Hambleton & Han, 2005).

The assessment of the IRT model fit to item response data is one of the crucial steps before an IRT model can be applied with confidence to estimate proficiency or ability levels of examinee (Stone & Zhang, 2003). The assessment of fit of IRT models usually involves the collection of a wide variety of diagnostic evidences for model fit and then making an informed judgment about model fit and usefulness of a model with a particular set of data (Hambleton & Han, 2005). Model data misfit can be attributed to violation of model assumptions or the specific parameterization for the IRT model (number of parameters). That is, exclusion of relevant item or ability parameters may influence the appropriateness of IRT model.

The model should be able to explain aspects of the data that influences the inferences made using the IRT model otherwise, the conclusions obtained using the model might not be relevant. IRT models are based on explicit assumptions; therefore, the methods for evaluation of model fit focus on these assumptions. IRT models are based on a number of explicit assumptions, so the method for the evaluation of model fit focus on these assumptions. The most important assumptions underlying these models are the unidimensionality of the items, the form of the Item Characteristic Curve (ICC), local stochastic independence, and item score pattern. Researchers have proposed significant number of fit statistics for assessing fit of IRT models. These statistics were developed to be sensitive to specific model violations (Jansen & Glas, 2005; Glas & Suárez-Falcón, 2003; Maydeu-Olivares & Joe, 2005).

Once an IRT has been applied to a set of data, its appropriateness should be investigated with data-model fit analysis otherwise, the researcher is under the risk of drawing incorrect conclusion regarding the scientific problem of interest. Substantial lack of fit should result in the replacement or extension of the model if possible (Sinharay, 2005). Traditional methods are most widely used to assess model fit; especially, the likelihood ratio, chi square goodness of fit statistics and these are provided in the most popular current software packages, such as BILOG, BILOG-MG and PARSCALE (Zhao, 2008). The most common criticism about the chi-square statistics is that they are sensitive to sample size (Hambleton & Swaminathan, 1985). An essential feature of these statistics is that they are based on information that is aggregated over persons; therefore they will be referred to as aggregate test statistics. Hence, to measure the underlying traits or abilities of examinees such as intelligence, mathematical prowess or stochastic aptitudes, these characteristics cannot be quantified directly as one would measure height or eye colour.

Instruments in the form of examination or questionnaire are commonly used to assess the desired latent variables.

There have been arguments among researchers about the appropriateness of some models among the dichotomous models of IRT to be used in assessing multiple choice examinations conducted by examining bodies. However, IRT model fit studies have not received the attention they deserve among test practitioners. Possible reasons for this neglect are the complexity of assessing fit, the lack of understanding of the fit statistics and the absence of comprehensive model fit software (Zhao, 2008). An important part of any modeling process is assessing or checking the fit of a model before using the model to make inferences regarding the data. This is because, it is important to establish that the model fits the data well enough due to some criteria. Researches in assessment of model fit have been carried out across different countries. For example, Kose (2014) carried out the study on assessing model fit of unidimensional Item Response Theory model in simulated data, using the IRT software (BILOG) for the assessment of the fit of the model through the analyses it was revealed that the 2PL IRT model fits significantly better than the 3PL IRT model. Adedoyin and Mokobi (2015) carried out a study using IRT Psychometric analysis in examining the quality of Botswana 2010 Junior Certificate Mathematics multiple choice examinations in Botswana, using dichotomous IRT models with IRT software – MULTILOG 3.0 and BILOG MG through the analyses, it was found that out of the twenty three (23) item that fitted the 3PL IRT model, twelve (12) items were classified as poor test items, ten (10) items were classified as fairly good test items which could be revised or improved on and one (1) item was considered to be good test item.

Kyong, Won, and Timothy (2007) carried out a study on the assessment of IRT model data fit for mixed item format test of the IOWA tests of basic skills of IOWA City, U.S.A. They examined the various model combination and calibration procedures for mixed item format test (multiple choice items and constructed response test items) under different IRT models (dichotomous and polytomous models), the analyses revealed that the 3PLM combined with the generalized partial credit model among various IRT model combinations led to the best fit to the given data sets. Psychometric Quality of the Common Educational Proficiency Assessment (CEPA) – English test in school of Pittsburgh in the United Arab Emirates was investigated by Salma (2009) with dichotomous models of IRT, using the IRT software BILOG-MG and MULTILOG, the analyses revealed that the CEPA – English test demonstrated good psychometric properties and the test developer may want to evaluate items that misfit the 3PL model.

Statement of the Problem

One of the main emphases of the Nigerian education policy is that citizens must acquire scientific and technological education. Biology is one of the science subjects and has links with other science subjects. It is the general field of knowledge concerned with the study of all aspects of living organisms. According to Parker (1992), Biology embraces those principles of widest application to the origin, growth and development, structure, function, evolution and distribution of plants and animals. It is also the bedrock upon which some science subjects derive their being (origin). The students' poor performance in Biology has drawn attention of researchers and curriculum planners towards Biology as a subject (Kareem, 2003). In spite of popularity and importance of Biology among Nigerian Students, performance in Biology at

Senior Secondary School level has been poor (Ahmed, 2008). Specifically, Auwalu, Mohd and Muhammad (2014) noted that in Kano State, Nigeria, 25.5%, 32.6%, 29.6%, 23.4% and 24.1% were the percentage passes of students with credit and above grades in Biology WAEC certificate examinations from 2007 to 2011 respectively.

Sakiyo and Badau (2015) also gave the average academic performance of students in WAEC examinations from 2008-2012 in Science subjects and Mathematics and English Language. According to them, Physics recorded the best average academic performance with mean of 56.01%, followed by English Language with 52.52% then, Mathematics with 47.44%, Chemistry 46.30% and the least was in Biology with 37.27%. It was also found that Biology had the highest failure rate of 28.66% followed by Mathematics with 24.39%, Chemistry with 22.52%, English Language with 21.89% and the least rate was in Physics with 13.08%. The desire to know the causes of the poor performance in Biology has been the focus of researchers for some time now. Researchers attributed the poor performance in Biology to some factors like teachers' laxity, poor study habit, parents' poor attitude to their children education and so on without much consideration of the quality of the assessment tools used for assessing the subject.

National Business and Technical Examination Board (NABTEB) is a specialized assessment and certification body in Nigeria that combines professional and general education, specially designed its test methods to meet the twin needs of education and the requirements of the world of work and in line with international best practices. The body without doubt, employs modern psychometric method (IRT model) for the calibration of test items. Since there are various arguments among researchers according to Chernysheko, Stark, Chan and Williams (2001) about the best model among the dichotomous models of IRT for assessing multiple choice examination conducted by examining bodies, this study sought to assess the model that fit the 2016 and 2017 Biology multiple choice test items of the National Business and Technical Examination Board.

Research Questions

To successfully attain the set objectives of this study, the following research questions were raised to guide this study.

1. How do the NABTEB May/June NBC/NTC 2016 and 2017 Biology Multiple choice test items fit into the 1PL, 2PL, and 3PL (dichotomous) IRT models?
2. Is there a difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June NBC/NTC 2016 Biology objective test items?
3. Is there a difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June NBC/NTC 2017 Biology objective test items?

Hypotheses

Research questions 2 and 3 were hypothesized for the study:

1. There is no significant difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June NBC/NTC 2016 Biology objective test items.

2. There is no significant difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June NBC/NTC 2017 Biology objective test items.

Methods

The expo-facto research design was adopted for the study. The population of the study comprised all senior secondary school (SS3) Biology students who sat for NABTEB certificate examination in south-south geo political zone of Nigeria. According to the statistics from NABTEB statistical (2017) A total number of five thousand, one hundred and fifteen (5,115) and Four thousand six hundred (4600) students' responses in south-south geo-political zone in Nigeria for 2016 and 2017 NABTEB Biology examination were used for the study. A sample size of 2000 students which consisted of 1000 males and 1000 females were randomly selected for the study. The instrument for data collection is a 50-item multiple choice question paper of NABTEB for 2016 and 2017 examinations.

The scores of 2016 and 2017 May/June NBC/NTC Biology Examinations of NABTEB were obtained from the board. A Principal Component Factor Analysis was used to assess the most important assumption common to IRT models (unidimensionality) with the help of SPSS statistical software. The examinees responses were analyzed using IRT statistical software EIRT Item Response Theory Assistant for Excel (Germain, Valois & Abdous, 2007) to determine item parameters based on IRT framework. EIRT estimates coincides satisfactorily with those from BILOG-MG (Galdin & Laurencelle, 2010). The output include: Item parameter estimates, test of fit, and Item characteristics curves. The result from this analysis was used to answer research questions 1 while Cochran's Chi-square test statistics was used to test hypotheses 1 and 2 at 0.05 significant level.

The unidimensionality of the instruments that were used for data collection in this study are presented below.

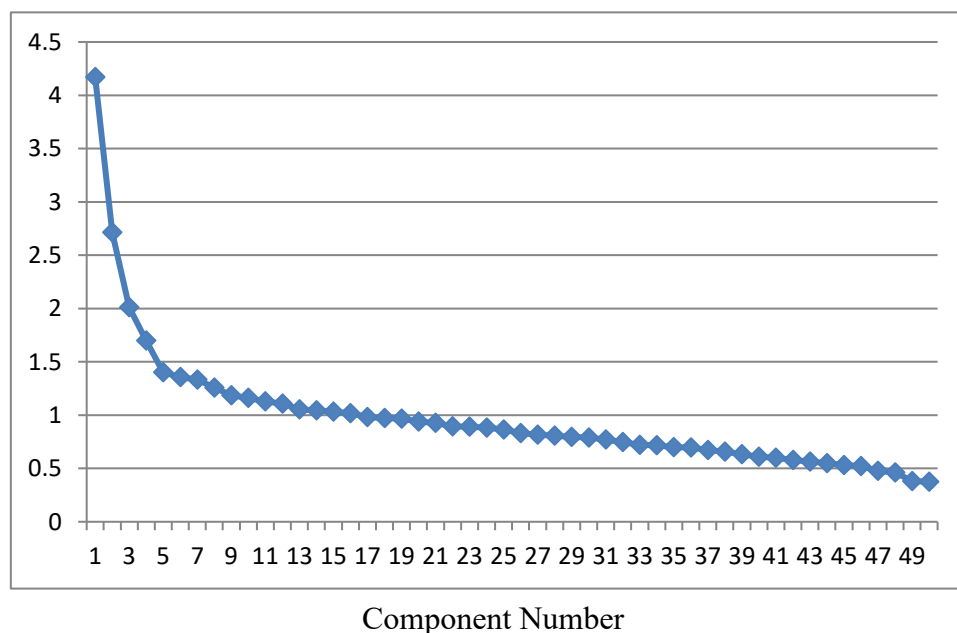


Fig. 1: The Eigen Value Scree Plots of the Component Factor Analysis for 2016 NABTEB May/June, 2016 Biology Multiple Choice Test Items.

The Figure 1 shows the principal component accounts for a maximum percentage of total variance and the variance is used as index of unidimensionality hence a knee point emerged after the first factors, this is a sign of unidimensionality. Also it could be seen that in 2016 that the first Eigen value 4.22 is greater than the next Eigen value 2.21, which showed that there is a dominant factor in the scree plot for the year 2016, thus the instruments satisfied one of the most important assumption necessary for IRT analysis.

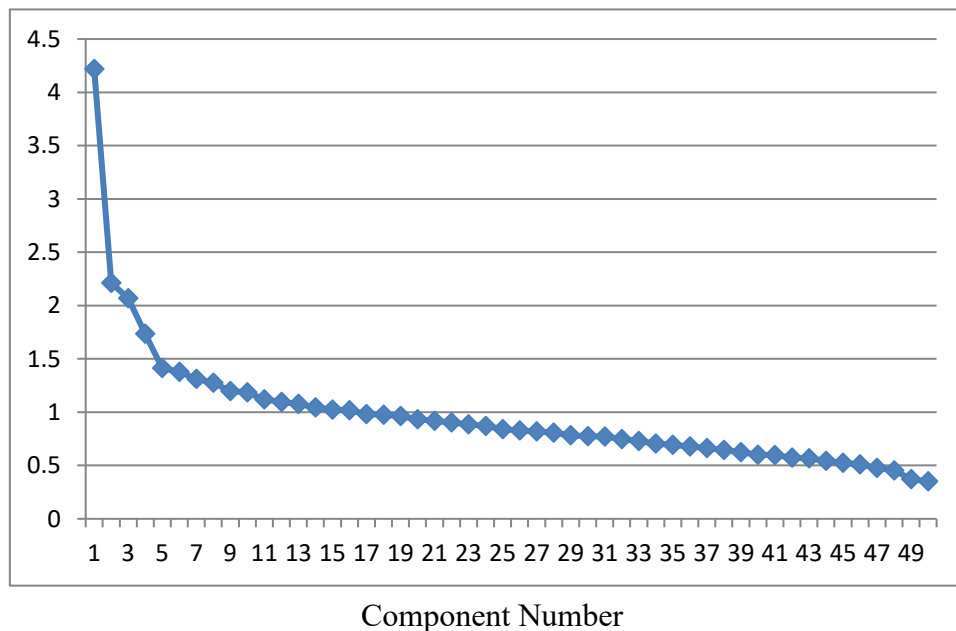


Fig. 2: The Eigen Value Scree Plot of the Component Factor Analysis for 2016 NABTEB May/June, 2017 Biology Multiple Choice Test Items.

The Figure 2 shows a knee point emerged after the first factors, therefore it could be seen that in 2017 that the first Eigen value 4.17 is greater than the next Eigen value 2.71, which showed that there is a dominant factor in the scree plot for the year 2017, thus the instruments satisfied one of the most important assumption necessary for IRT analysis. This concurred with the submission of Udom (2004); Wiberg (2004) who affirmed that a dominant factor is a confirmation of unidimensionality.

Research Question 1: How do NABTEB May/June NBC/NTC 2016 and 2017 Biology Multiple choice test items fit into the 1PL, 2PL, and 3PL(dichotomous) IRT models?

Table 1: NABTEB May/June 2016 and 2017 NBC/NTC Biology multiple-Choice Test Items Fit Analysis

IRT Models	No of Fitted Items (2016)	No of Non Fitted Items (2016)	No Of Fitted Items (2017)	No Of Non Fitted Items (2017)
1PL	44(88%)	6(12%)	23(46%)	27(54%)
2PL	29(58%)	2(4%)	29(58%)	21(42%)
3PL	35(70%)	15(30%)	32(64%)	18(36%)

The Table 1 shows that 44, 29 and 35 items representing 88%, 58% and 70% items that fitted 1PL, 2PL and 3PL IRT models for NABTEB 2016 Biology multiple choice items while 6, 2 and 15 items representing 12%, 4% and 30% did not fit into the IRT (dichotomous) IRT models used for its analysis, hence the table also showed that 1PL IRT model is the model that showed a better fit of the items for the NABTEB May/June, 2017 NTC/NBC Biology multiple choice test items while 27, 21 and 18 items representing 54%, 42% and 36% items did not fit into the IRT dichotomous models. Hence most of the NABTEB May/June 2017 Biology multiple choice items fitted the dichotomous models used for its analysis without a significant difference.

Hypotheses Testing

Hypothesis 1: There is no significant difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June NBC/NTC 2016 Biology objective test.

Table 2: Cochran Test of 1PL, 2PL, 3PL Model Fit of 2016 NABTEB Biology Multiple Choice Test Items.

Logistic Model	Value		Cochran Q Asymp. Significance	
	0	1		
1PL	6	44	11.793	0.003
2PL	21	29		
3PL	15	35		

$N=50, \alpha = 0.05$.

Table 2, shows the Cochran's Q of 11.793^a with the P-Value of 0.003, tested at the Alpha level of 0.05, thus since the P-value is less than the Alpha level of 0.05, the null hypothesis which states that there is no significant difference in the fit of 1pl, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June 2016 Biology multiple choice test items is rejected. Therefore there is a significance difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June 2016 Biology multiple choice test items.

Table 3: Cochran Test of 2PL and 3PL Model Fit of 2016 NABTEB Biology Multiple Choice Test Items.

Logistic Model	Value		Cochran Q	Asymp. Significance
	0	1		
2PL	21	29	1.385 ^a	0.239
3PL	15	35		

$N=50, \alpha = 0.05$

As the result of the significance difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June 2016 Biology multiple choice test items, further comparison of the 2PL and 3PL IRT

model was done. Thus, Table 3 showed that there was no difference between the 2PL and the 3PL IRT models, hence the significant difference lies in the 1PL. This is because the number of fitted items in the 1PL IRT model is greater than that of the 2PL and 3PL IRT models.

Hypothesis 2: There is no significant difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June NBC/NTC 2017 Biology objective test items.

Table 4: Cochran Test of 1PL, 2PL, 3PL Model Fit of 2017 NABTEB Biology Multiple Choice Test Items.

Logistic Model	Value		Cochran Q	Asymp. Significance
	0	1		
1PL	27	23	4.50	.105
2PL	21	29		
3PL	18	32		

$N=50, \alpha = 0.05$.

Table 4 shows the Cochran's Q OF 4.500^a and P-level of 0.105 tested at the alpha level of 0.05. Hence since the value of the P-value is greater than the Alpha level of 0.05, therefore the null hypothesis which states that there is no significant difference in the fit of 1PL, 2PL and 3PL (dichotomous) IRT models in NABTEB May/June 2016 Biology multiple choice test items is retained. It shows there is no disparity among any of the 3 models in the model fit.

Discussion of Findings/Results

The result revealed that 44, 29 and 35 items representing 88%, 58%, and 70% items fitted 1PL, 2PL and 3PL IRT models for NABTEB Biology multiple choice items while 6, 2 and 15 items representing 12%, 4% and 30% did not fit into the IRT (dichotomous) IRT models used for its analysis. It was also found that 1PL IRT model is the model that showed a better fit of the items for the NABTEB May/June, 2016 NTC/NBC Biology multiple choice test items. Hence 23, 29 and 32 items representing 46%, 58% and 64% fitted the IRT dichotomous models while 27, 21 and 18 items representing 54%, 42% and 36% items did not fit into the IRT dichotomous models for NABTEB **May/June, 2016** NTC/NBC Biology multiple choice test items. Most of the NABTEB May/June 2017 Biology multiple choice items fitted the dichotomous models used for its analysis without a significant difference.

Findings revealed that there is a significant difference between the dichotomous IRT models in NABTEB May/June 2016 Biology test items, which was in favour of the 1PL (dichotomous) IRT model. The findings of this study is in line with that of Leeson and Fletcher (2003); Si, (2002), and Kose (2014) who claimed that the 1PLM and 2PLM respectively is superior to others. Contrary to the finding of this study, Chon, Lee and Arisley (2007) claimed that the 1PLM had the largest misfit in items.

It was also revealed that there is no significant difference among the 1, 2 and 3 parameter logistic model fits in NABTEB May/June 2017 Biology test items which shows that the 1, 2 and 3PLM fit the 2017

data. The implication of this empirical finding that supports the IRT theoretical claim is that, for data to be amenable to the IRT analysis there should be a fit of the model to the data set, in other words the data available must be, such that, allows the item to be modeled with an ICC that is derived from an Item Response Function otherwise, the conclusion obtained using the model might not be relevant. However, this finding is in disagreement with Chon, Lee, and Arisley (2007), who claimed that the 1PLM had the largest misfit in items.

Conclusion

It is concluded that the estimated ability in the 1, 2 and 3PL Models are not the same and that there is a significant difference between the 1, 2 and 3 parameter IRT models in NABTEB May/June 2016 Biology test items, which is in favour of 1PL(dichotomous) IRT models but no significant difference was found in NABTEB May/June 2017 Biology test items. Therefore, all the parameter logistic models fits the data for NABTEB May/June 2017 Biology multiple choice test items hence non is empirical superior to others.

Recommendations

The following recommendations are made based on the finding of this study;

1. The examining bodies should make sure that model fits the data well before they are used to make inferences regarding the data
2. Examination bodies should embrace IRT in item generation, assessment of candidates and analysis of results.
3. Examining bodies should engage the services of trained Psychometricians (measurement experts) who are proficient in Item Response Theory in order to ensure objectivity in assessment of examinees.
4. Items diagnosed misfit with any models should not be discarded instead it may be removed from that test form and rewritten or replaced in future test forms

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Experience in Teaching Science in Virtual Environment

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Rockenbach Tarouco**

Abstract

Labs are needed in science education, and schools usually lack appropriate conditions to provide active learning activities with experience. In schools, the lack of labs for science education is usual. The new technologies of 3D virtual worlds allow the user, through immersive virtual worlds, or metaverses, to experience situations similar to those possible in a real environment. A solution to the lack of labs is the virtual labs, which consist of virtual representations that reproduce the environment of a real lab. These are applications based on simulations, offering computational representations of reality. The simulation of concrete and real situations gives the student the opportunity to experiment, actively participating in the learning process by performing experiments that would otherwise not be possible due to safety issues (possible damage to students or the environment) or economy (cost of components involved and derived from the creation and operation of the lab). These virtual labs can be implemented on personal computers that exist in schools or even in the student's home. Users can work in the virtual lab, through their avatars, using experiments provided there, as well as acting collaboratively.

Keywords: Experience; Science Teaching; Real Labs; Virtual Worlds; Virtual Labs;

1. Teaching Sciences

As we investigate the teaching of science in schools, we can see that there are still tendencies of teaching based on an exposition of programmatic contents, in a fragmented and decontextualized way. Although the National Curricular Common Base (BRASIL, 2017) prioritizes the teaching of science through an articulated view of the various fields of knowledge, allowing students access to diverse knowledge, practices, and procedures of scientific research.

On the other hand, there is consensus about the importance of experimentation in science teaching and its presence in natural science classes, for teachers and even students. In this context, Kapici et al. (2019) states that the use of laboratories is essential for scientific education, since it enables science to be taught by students, based on the practical experiences that can be realized.

Research related to this teaching has been growing in recent years, discussing the most diverse methodologies and pedagogical practices, among them the use of experimental activities as a teaching strategy for the construction and understanding of concepts in science (Moreira, 2018). González et al. (2018) the literature has presented different ideas for the teaching of Science, so that an advanced way with the use of different dynamics for the education in this discipline is traced.

The National Curriculum Parameters state that learning Biology in basic school allows broadening the understanding of the living world. Playful teaching, marked by direct interaction with phenomena, facts, and objects favors learning in a general way by developing skills and competences (BRASIL, 2000).

To achieve these objectives, experimentation can be an interesting tool, since it promotes and favors student interaction, teamwork, raises questions, generates hypotheses and allows abstract explanations. Experimental activities allow students to exercise their skills, concentration, organization, and experience the steps of the hypothetical-deductive method. Through such experiences it may be possible for the student to re-sign theoretical concepts and learn how to develop solutions to complex problems, and to be able to control and manipulate different variables to test possible hypotheses.

In addition, students have the opportunity to build their knowledge by experimenting, which is not an easy task, since it requires time and also adequate facilities (Kapici et al., 2019). In results already acquired, it was possible to perceive that the students when they have the opportunity to explore experimental activities are able to obtain more success in the development of concepts, develop investigative attitudes and have a better engagement in carrying out these activities (Deboer et al., 2017). The authors also noted that the conceptual understanding of the students was supported in view of the possibility of manipulating the materials and of learning actively.

Mikeska et al. (2018) observed that investigating makes students have access to high-quality science teaching because they can make sense of real-world phenomena by engaging in activities that need to be investigated, analyze and interpret data while also building their knowledge and understanding. During the experimental activities, students have the opportunity to answer questions that can be tested. These can start from data collection, analysis of secondary data or even from research (Mikeska et al., 2018).

In general, it is perceived that providing students with their previous knowledge, concrete materials and that can perceive the occurrence of certain phenomena, can favor the process of knowledge construction and understanding about concepts that are often abstract in relation to the level of understanding of the students.

The teaching of science has been worked in different ways and with the most varied methodologies, such as: experimentation activities, videos, lectures, reading science books, however, it is proven that activities in which students can “put the hand in the mass” also allow teachers to interact with students and to incorporate themselves into the context in which activities take place (Mikeska et al., 2018).

Although experimental activities have an excellent methodological strategy, it is still little used in teaching, with a large number of variables as obstacles to its use. Experimenting requires time for students to engage in experimental activities, which have now been seen as a hindrance, as well as having adequate space, materials, products, and the responsibility of using this equipment during classes in one laboratory.

Kapici et al. (2019) point out that chemicals pose susceptible and costly hazards, as well as the lab equipment and materials required to carry out the activities. The number of students in the class usually constitutes an important factor that makes difficult the use of experimentation due to the lack of conditions to provide the opportunity of each student's individual performance in the experiment.

As highlighted by Moreira (2018) several situations are perceived:

- The teaching of Sciences must have the experimentation so that there is an understanding of what happens in the sciences;
- Expand the horizons of the student in such a way, that the experiment refers to future classes;
- In experimental teaching, both correctness and error contribute to the process of knowledge construction;
- The practice in teaching science is fundamental in the structuring of learning;
- The short time and sometimes a large number of students in the class makes it difficult to carry out many activities.

However, despite these difficulties, it is agreed that the experimental activity, influences the teaching-learning process since it modifies the action and reflection of those involved.

2. Science Labs

Science labs have a central role in teaching because in order for students to actually understand certain activities it is necessary that they can experiment, visualize, understand and reflect on the experimentation activities carried out. Kapici et al. (2019) support this argues that to learn science through research and the use of labs is still one of the most effective ways of learning since it allows the student to build his/her knowledge by experimenting.

The use of labs allows learning to occur through experimentation and research so that scientific knowledge is delineated. To develop activities in the lab is not trivial, because it requires that both teacher and student are engaged and that they can develop strategies for the activities to generate the hypothesis, the interpretation of data, reflections and also conclusions from the results obtained.

In addition, the previous knowledge presented and the collaborative work developed by the students can also favor the development of these activities since they imply directly in the discoveries and the creative thinking of them (Grobmann & Wilde, 2018).

Although experimental activities are of great relevance for the construction of learning, the lab (hands-on or virtual) environments still present some disagreements regarding the use in the school context. On the other hand, real labs (hands-on) allow students to observe events during activities, as well as understand certain concepts that for students can be abstract.

In the same way, these experiments do not always bring clear and objective answers to the students, which in turn can generate more doubts or confuse them in relation to the observed situation, making it difficult to generate a hypothesis, to extract data and to obtain conclusions from the results obtained during the experimentation (Kapici et al., 2019).

Other factors that may be responsible for restricting the use of labs in schools refer to costs, time, expensive equipment and the need to apply activities to small groups (Estriegana et al., 2019), which causes difficulties in the planning of classes and the development of activities by the teacher.

Expanding ideas about the use of laboratory experimentation, Kapici et al. (2019) report that the use of virtual labs also begin to be part of schools, either by using them from their capacities and individually or even for the development of sequenced activities where the use of real and virtual labs are used in combination.

Gunawan et al. (2018), the use of virtual labs can solve the problem of students' conceptual understanding and increase the interest in learning in the classroom, providing better learning outcomes. The authors also point out that the use of virtual labs is essential for learning, especially physics because, through experimental activities, students can become more curious and practice their scientific attitudes, as well as observing concepts about the content studied and so understand it easily.

The use of virtual labs can also be used by the student remotely through the access of an experiment interface and thus has the opportunity to experiment and contemplate the expected educational objectives (Syssas & Dimitris, 2018).

2.1 Experiment activity

Developing activities aimed at the use of experimentation can help students to build their knowledge since the process starts with an experiment and then examines what happened. Kolb (2015) argues that the activities of experimentation allow learning also with the life experience since the student is in direct contact with the reality of study. For this, the emphasis is on direct experience, along with the senses and also actions in the context.

Although there are opposing ideas to experimentation activities, Metcalf et al. (2018) affirm that in experimental activities students can generate a large number of evidences, allowing to construct concepts so that they can better promote learning. In addition, the authors emphasize that the involvement of students in scientific activities contributes to the construction of explanations, phenomena, as well as the development of cooperative work.

Enable students to develop activities with experiments, allow them to seek evidence for the explanation of phenomena, analyze, reflect, verify the concepts involved and then take advantage of them partially, totally or even have subsidies to create and develop a new experience.

In experiencing and realizing an experience, you can act to develop it because it refers to a particular situation. Aiming to achieve this, it is necessary to evolve perceptual acts and anticipate concepts, which by the way involves both knowledge and evaluation of objects used, the steps that will be developed and also the situation itself.

During a trial activity, all modes of the Kolb Learning Cycle (2015) are present, from the Concrete Experimentation to the Active Experimentation and for this reason, it is important for the process of knowledge construction by the student.

2.2 Kolb Learning Cycle

In Kolb's view (2015), learning happens in an experiential way, that is, from experimentation to the context of learning and is defined by a transformation that occurs in an experience, and from which knowledge is created.

Experiential learning theory offers a fundamentally different view of the learning process from that of the behavioral theories of learning based on an empirical epistemology or the more implicit theories of learning that underlie traditional educational methods, methods that for the most part are based on a rational, idealist epistemology. From this different perspective emerge some very different

prescriptions for the conduct of education; the proper relationships among learning, work, and other life activities; and the creation of knowledge itself.

This perspective on learning is called “experiential” for two reasons. The first is to tie it clearly to its intellectual origins in the work of Dewey, Lewin, and Piaget. The second reason is to emphasize the central role that experience plays in the learning process. This differentiates experiential learning theory from rationalist and other cognitive theories of learning that tend to give primary emphasis to acquisition, manipulation, and recall of abstract symbols, and from behavioral learning theories that deny any role for consciousness and subjective experience in the learning process. It should be emphasized, however, that the aim of this work is not to pose experiential learning theory as a third alternative to behavioral and cognitive learning theories, but rather to suggest through experiential learning theory a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior (Kolb, 2015, p. 31).

In this model of learning, Kolb highlights the importance of “concrete experience”. Learning is described as a process whereby concepts are derived from and continuously modified by experience. The fact that learning is a continuous process grounded in experience has important educational implications.

New knowledge, skills, or attitudes are achieved through confrontation among four modes of experiential learning. Learners, if they are to be effective, need four different kinds of abilities: concrete experience abilities (CE), reflective observation abilities (RO), abstract conceptualization abilities (AC), and active experimentation (AE) abilities. In experiential learning theory, there is a transactional relationship between the person and the environment. Learning is the process whereby knowledge is created through the transformation of experience.

3. Virtual Labs

Currently, computer and communication technology allows the creation of digital educational material using interactive multimedia that makes teaching-learning environments more effective in Information and Communication Technology (ICT).

The increasing availability of computer labs in schools contrasts with the lack of labs to support teaching-learning activities in Science and Mathematics in schools. According to the latest School Census in Brazil, only 11.5% of schools have a science lab and in secondary education, 44% of schools have this type of resource. The availability of IT labs is higher: 44.1% in elementary education and 78.1% in secondary education (INEP 2019). These data show that developing and deploying virtual labs that can be used to simulate real labs is an alternative solution to alleviate the much needed real lab lability in science teaching.

Virtual labs using immersive environments and mobile devices begin to emerge and ready-made solutions or authoring tools for creating virtual labs, using both commercial software and free software become available both internationally and nationally.

The development of solutions in terms of virtual labs, focused on the context of education in the country needs to take advantage of existing strategies using them as a leverage element for the design and

construction of new solutions that allow to make available not only a new set of solutions in terms of virtual labs, as well as to promote training for the development of virtual labs focused on science education.

These labs should be able to be created by teachers and by the students themselves using authoring tools that do not imply extensive knowledge of computer languages. A path currently used involves the use of visual block-based programming languages such as Scratch and App Inventor developed by MIT.

In addition, it should be noted that the construction project of virtual labs should aim to use laboratory activity not only as an element of demonstration of concepts and theories as it is usually done in real labs. It is necessary to plan and provide learning interactions to be carried out in the virtual lab capable of promoting the development of high-level thinking because as the young people reach the teenage age they become able and able to use structures of formal thought.

Figure 1 illustrates the relevant elements of a virtual lab where the student represented by an avatar traverses the environment and has the opportunity to observe and interact with interactive multimedia resources (panels with static images, animations, videos, tests) as well as artificial characters that are included in the virtual world and are controlled by specific scripts that govern their interaction with users.

In this sense, virtual labs should offer a context in which challenges are presented and lead to experimentation activities aimed at testing hypotheses and that are capable of promoting the necessary reflection, capable of exercising and instigating high-level thinking activities. Implementing a virtual lab in an immersive virtual world can take advantage of important and relevant features that favor learning. Figure 1 shows the relevant aspects of an immersive virtual world with 3D elements in the context of virtual lab deployment.

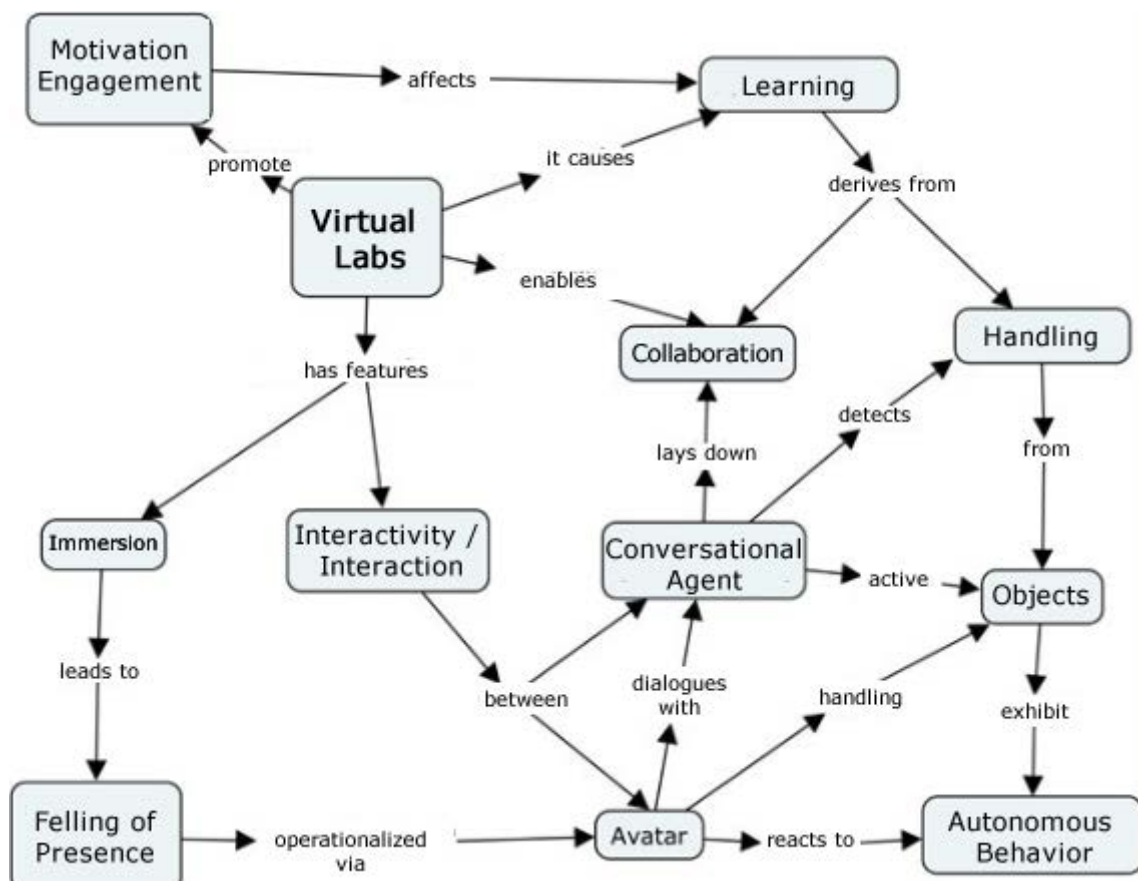


Figure 1. Conceptual map with relevant elements of a Virtual Lab.

An Immersive Virtual World (IVW) environment such as OpenSim offers numerous possibilities for adding multimedia features such as still and animated images, videos, and audio. Multimedia resources are 3D objects that can be embedded in the immersive virtual world and therefore be present in a virtual lab offering various forms of manipulation:

- Visualization without interaction - the user watches videos, animations and observes images and panels with text;
- Visualization with control - the user can use commands that approximate the 3D virtual object to be observed, also allowing diverse points of view for its inspection;
- Provide data that controls the behavior of certain objects in the environment (position, speed, etc);
- Ask questions about the concepts involved in the experiment, which will be answered by a chatbot that uses a knowledge base specifically built for the area in question;
- Modifications and construction of new objects with a view to modifying or expanding the experiment;
- Demonstrate to other students the outcome of such activities.

Each 3D object included in the immersive virtual world can have a behavior, controlled by scripts associated with them and that are triggered from user actions like clicking on the object or from a mere approximation of it. The objects have the possibility of communication with each other so that a manipulation of a given object by the user can result in sending a signaling to another object and trigger behavior that modifies the environment or that sends messages to other systems that will result in recording actions of users (activity log) or query to external systems, such as chatbots, that will return information relevant to the experience activity being performed by the user. This information can be of the announcement of possible interactions with the experiment, orientation on how to proceed, answer to questions received from users, instigation to reflection from the activities carried out by the user, through his avatar.

4. Strategy for the creation of Virtual Educational Lab using IVW

The creation of a virtual lab set in the Immersive Virtual World is based on the understanding of the desired lab model. In this text, the Virtual Educational Labs (VEL) are understood as educational labs, which aim to perform practical activities to fix theoretical contents of Science, Mathematics, Physics and other subjects, and are made available in a virtual way, where presentation and behavior of digital objects is similar to objects in the physical world, as well as allowing the representation of situations or conditions that are impossible to be experienced in a physical lab, such as manipulating an atom in large proportions, compared to their actual size (Tibola, 2018).

In order to investigate the effectiveness of the use of virtual labs, in substitution of real labs, a project was developed called AVATAR (Virtual Environment of Learning and Remote Academic Work - acronym in Portuguese), which contemplated the implantation and configuration of an immersive virtual worlds service based in free software, that allows to create an immersive virtual environment capable of giving the

realization of virtual experiments. In the immersive virtual environment created, students / users find areas or rooms where they have the opportunity to manipulate virtual artifacts and experiments, triggering experiments simulating real experiments. They can observe, annotate and intervene, changing settings that govern the behavior of the experiment and interact with other users, also represented by avatars, to discuss the experience and collaborative reflection.

The AVATAR project has an OpenSimulator server, composed of several regions, in which the virtual educational labs are made available. These labs can be accessed remotely through compatible viewers. Furthermore, WWW and database servers are part of the structure of the AVATAR project, so that the data of the student movement in the regions and their interaction with the objects that are part of the scenario of the virtual world and, especially, those objects about which were built the virtual educational labs, can be stored and analyzed later.

In addition to providing remote access, the AVATAR project contemplated the creation of a structure that could receive virtual educational labs without the need for online access to the Internet. A Standalone version was made available, with a structure composed of the servers: Sim-on-a-Stick - portable version of OpenSim (Simona, 2017), WWW, databases, and PHP interpreter. This structure also allows the collection of information regarding the movement and interaction of the student in the virtual world and in the virtual educational lab. The creation and availability of the Standalone version of the labs are justified by the existence of schools that do not have access to the Internet or the access speed is insufficient for the execution of the remote structure.

The AVATAR project is a multidisciplinary and comprehensive domain, using various resources to achieve its objectives: immersion, realism, and interaction - present in immersive virtual worlds; virtual tutors - through Non Players Characters (NPC) and chatterbots resources; augmented reality - through markers and reading devices; ontology - for the representation of students' interactions in immersive virtual worlds.

Also, they are used of diverse approaches for the construction of environments with educative and motivating educational labs, that allow to register the actions of the students in their experiences, allowing to identify if the experiences proposed and the activities realized by the student propitiated the acquisition of knowledge and of this one validation of the proposal of the virtual educational labs. For this, the creation of labs can use strategies such as gamification, Flow State, Learning Paths, Mastery Learning, digital conversational support, among others. These strategies can be used according to the purpose of the lab; the decisions of the programmer and the graphic designer; of the public to be reached, of the multidisciplinary team involved in the construction of the lab and directing the research itself.

Figure 2 exemplifies a scenario found in the immersive virtual world that implements the relevant elements. In this environment is the avatar of the user accompanied by a conversational agent with which dialogue (textual) can be established.



Figure 2. User avatar (left) and a conversational agent (right).

The pedagogical approach used in the implementation of the labs is supported by the Kolb Cycle (1984) which proposes to be the experience the motto for a process of reflection that should lead to the consolidation of abstract learning and conceptualization, which will create conditions for the student to make the transfer (translation of knowledge) to other contexts becoming able to realize new experiences.

5. Analysis of results achieved with the use of Virtual Educational Lab

5.1 Virtual Educational Lab description

This work presents an experiment carried out in a virtual educational lab in the immersive virtual world, delivered in Standalone mode. The equipment used for the experiment had the following configurations: Intel Core i5, 6 Gb RAM, 500 Gb hard disk, GeForce GT430 2GB video card, 22-inch LCD monitor and Windows 7 Professional 64-bit.

Due to the Windows permissions, some firewall and proxy security parameters were initially reconfigured from the computers in the computer lab where the virtual educational lab was installed. On all the computers were installed portable versions of OpenSim, from a WWW server, from a database server. Figure 3 shows the contact electrification experiment (A) and the induction experiment in the VEL used by the students.

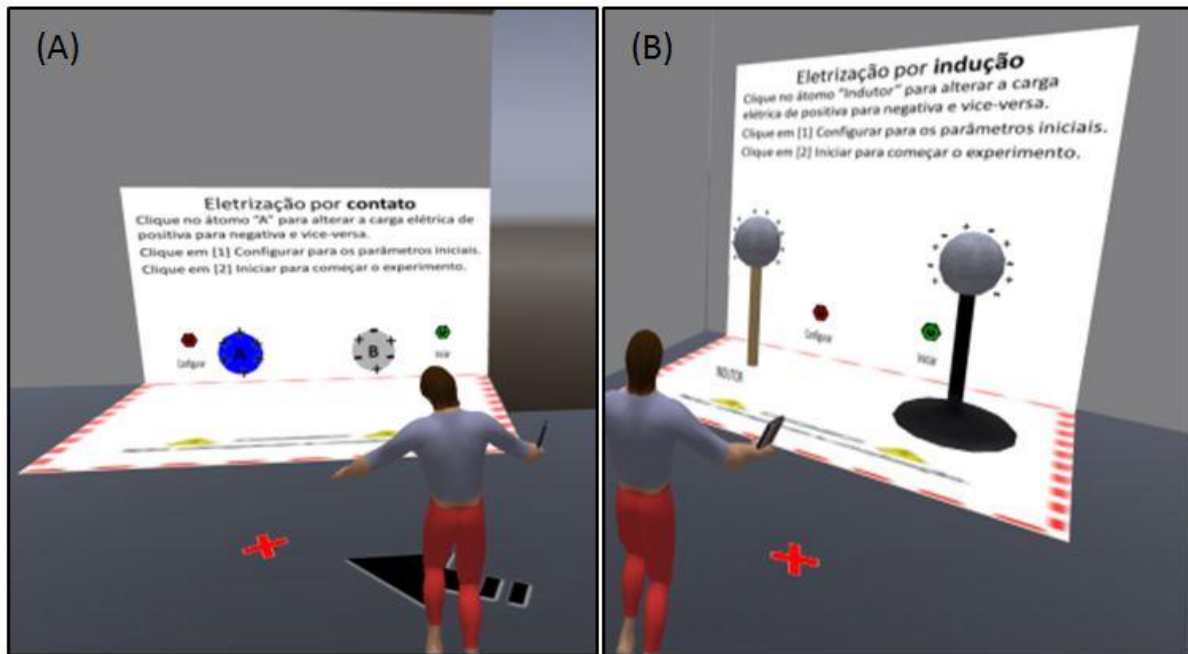


Figure 3. Virtual Educational Lab experiment

5.2 Demographic description of the population

The students participating in the study studied in the 1st Year of High School (1AEM), 2nd Year of High School (2AEM) and 2nd Semester of the course of Computer Science (2SCC) of a university in the Rio Grande do Sul - Brazil. The students' participation was voluntary and without reward or financial, academic or other remuneration. All the legal authorizations of the participants and/or those responsible for conducting the research were collected and the research was approved by the Research Ethics Committee. The choice of these classes is due to the reason that the professors of the subjects of Mathematics and Physics in High School and in the course of Computer Science were the same and they observed that the students of the High School were not yet familiar with the contents in your classes. Already for the students of Computer Science, there was interest in identifying the level of knowledge of these students on the content.

In the 1AEM class, all 24 students accepted to participate. The class had 11 men and 13 women with ages ranging from 15 to 17 years, with an average of 15.5 years. In the 2AEM class, 12 of the 12 students took part in the activity, being 3 men and 9 women, aged 16 and 17 years, in an average of 16.1 years.

Finally, 13 of the 17 students from the 2SCC committed to participate in the experiment, all of whom were men ranging in age from 17 to 20 years, with a mean of 18.4 years. Thus, 49 individuals, 27 men, and 12 women, with an average age of 16.4 years, accepted to participate in the evaluation of the Virtual Educational Lab.

5.3 Methodology

The present article reports a case study that addressed the construction of an educational lab in the immersive virtual world OpenSim, offering practical experiences in the field of Physics, specifically the

Electrostatic area, for the following contents: Introduction to Electricity, Electric Charge, Conductors and Insulators, Body electrification and Experiments with electrification.

The use of the immersive virtual world was done as follows: (1) reception of the students (1AEM at 08:00 AM, 2AM to 3:00 PM and 2:00 PM to 7:00 PM); (2) presentation and explanation of the use of the immersive virtual world upon receipt; (3) delivery of the card with the avatar and password for each student, after choosing a computer by the student; (4) completion of the Student Profile, after the explanations and confirmation that everyone had understood the procedures; (5) completion of the Pre-Test, after delivery of the Student Profile; (6) use of the Virtual Educational Lab, after all the students delivered the Student Profile and the Pre-Test; (7) the Flow Questionnaire was signed, as the student finished using the Virtual Educational Lab, he would raise his hand and receive the questionnaire; (8) completion of the Post-Test, after delivery of the Flow Questionnaire; (9) completion of the Evaluation of the Experience, after delivery of the Post-Test; (10) release, upon delivery of the Experience Assessment; (11) preparation of the lab, before each session of the experiment.

After each hour of use of the VEL, the questionnaires, unidentified, were gathered by class and by type. Subsequently, the questionnaires were tabulated and analyzed. Several variables should be considered in order to identify the advantages and disadvantages of using a virtual educational lab. This study focused on the Virtual Educational Lab Assessment Questionnaire. The analysis of this questionnaire is presented in the following sections.

5.4 Assessment tool used

The VEL Assessment Questionnaire aimed to identify students' opinions about the use of the environment. Ten objective questions and two descriptive questions were elaborated, which the student was free to complete or not. Objective issues followed the Likert Scale, scoring from 1 to 5 for the "Strongly Disagree", "Disagree", "Neutral", "Strongly Agree" and "Strongly Agree" options respectively. Following the text shows the values tabulated based on the answers provided by the students and in the next section will be presented the results of the questionnaire Evaluation of the Virtual Educational Labs.

5.5 Discussion of the results

From the tabulation and analysis of the LEV Assessment Questionnaires, the following interpretations were obtained, reported by the question:

1. Was the information I received prior to using the environment sufficient to enable me to accomplish all the activities in the Virtual Educational Lab?

Before the interaction of the students with the Virtual Educational Lab, all the aspects related to the VEL were clarified, as well as the students' instruction on the operation of OpenSim (eg construction, movement, characteristics) and on the day of the experiments. of the Virtual Educational Lab environment (eg beginning and end of the course, intermediate activities, interaction). The "Agree" (45%) and "Strongly Agree" (43%) indices for the total number of students show that the students received the necessary

information about the VEL to carry out the activities foreseen in the Virtual Educational Lab and to interact with the experiments education. The students' opinions about the information received to carry out activities in the VEL can be seen in Table 1.

Table 1. Students' perception of the information received about the VEL.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	8%	13%	38%	42%
2AEM	0%	0%	10%	70%	20%
2ACC	0%	0%	0%	38%	62%
Total	0%	4%	9%	45%	43%

2. In the Virtual Educational Lab, were the task indications clear?

The objective of this question was to verify if the virtual world had instructions of any format (text, image, video, etc.), indicating how the student should proceed in the activities. In addition to instructions, the very construction of the scenario and 3D objects could be intuitive to the point where the student can perform the task without problems. Table 2 demonstrates the answers to this question. In all, the 45% markup for "Agree" and 36% for "Strongly Agree" demonstrates that students received enough information to perform the activities proposed in the experiment.

Table 2. Students' perception about the clarity of the indications about the tasks in the VEL.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	4%	17%	46%	33%
2AEM	0%	0%	0%	50%	50%
2SCC	0%	0%	31%	38%	31%
Total	0%	2%	17%	45%	36%

3. In Virtual Educational Lab, was there feedback for the tasks performed?

According to Zichermann & Cunningham (2011) immediate feedback is one of the principles of gamification, so it was important to know if the student had received the feedback information soon after performing a task. For all respondents, 51% "Agree" and 30% "Agree strongly", that there was enough feedback when doing the tasks. Table 3 presents the selection of students' options for this questioning.

Table 3. Students' perception about the availability of feedback in tasks in the VEL.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	4%	25%	46%	25%
2AEM	0%	0%	0%	60%	40%
2SCC	0%	8%	8%	54%	31%
Total	0%	4%	15%	51%	30%

4. Did experiments, such as Attraction and Repulsion, have sufficient information for their correct execution?

This question sought to identify if the interactions with the objects in the practical activities had information or its construction allowed the correct execution of that activity. Figure 8 shows student responses. It can be observed that the students indicated “Agree” (60%) and “Strongly agree” (26%) with the presence of sufficient information in the experiments for their correct execution.

Table 4. Students’ perception about the experiments and if they had sufficient information for their correct execution.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	4%	21%	50%	25%
2AEM	0%	0%	0%	70%	30%
2SCC	0%	0%	8%	69%	23%
Total	0%	2%	13%	60%	26%

5. Were the objects present in the experiments, such as Attraction and Repulsion, are easy to operate?

Interaction is an important feature in the construction of environments involving gamification and are educational (Zichermann & Cunningham, 2011; Yilmaz et al., 2015, Tibola & Tarouco, 2015). As the interaction was one of the principles sought with great intensity in the development of the Virtual Educational Lab, its measurement is important to analyze its presence. Table 5 reports student responses.

Table 5. Students’ perception about the ease of operation of experiments.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	13%	33%	42%	8%
2AEM	0%	0%	10%	60%	30%
2SCC	0%	8%	23%	46%	23%
Total	0%	9%	26%	47%	17%

Regarding the ease of operation of the experiments, most students demonstrated that they were easy to operate (47% agree and 17% strongly agree - 64% of the total). On the other hand, 26% of the students did

not agree or disagree, which suggests that the first group (they Agreed and Strongly Agreed) perceived the experiments as easy to operate and the second group (did not agree or disagree) understood the experiments are sufficient easy to operate, as is commonly expressed when there is no understanding that the activity is not considered easy, but it was possible to do so. From the indications of the students described above and since only 9% of the students declare that the operation of the experiments was not easy, it is believed that the experiments are generally easy to operate but can still be improved.

6. Starting the experiments, such as Attraction and Repulsion, did the objects perform what was expected of them?

The objects present in the Virtual Educational Lab were developed to perform certain operations on themselves and/or other objects (move, appear/disappear, change color, etc.), when the student performed an action (touch, or collide with an object, for example). Here we consider the three-dimensional object, for example, a cube in yellow that, when detecting the student's presence, changed to green or a start button, which when touched approaches or distances two other objects. This question wants to check if the objects started the actions as caused by the avatar. Table 6 demonstrates students' understanding of this question.

Table 6. Students' perception about the experiments and whether they were executed as expected.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	4%	4%	21%	46%	25%
2AEM	0%	0%	20%	40%	40%
2SCC	0%	8%	0%	62%	31%
Total	2%	4%	15%	49%	30%

In this question, we can see that, in general, most of the students “Agree” (49%) or “Strongly Agree” (30%), while 15% “Did not Agree or Disagree”. However, 4% of students “Disagree” and 2% “Strongly Disagree”. These opinions lead to the understanding that for 79% of the students the objects presented the correct execution of the activities, which students who “did not agree or disagree” may have faced some unexpected situations, but the execution of the actions of the object was close to that of the was previewed. Students who “Disagreed” or “Strongly Disagreed” the objects did not perform the expected actions, which may have been caused by: (A) misuse by the user, since the student could press a button and due to processing, the student did not notice the action; pressing one or more times a button, causing the action to be repeated or even stopped; (B) with the dependence on the local computational capacity and connections with external servers, the environment could slow down in a few moments, leading the student to believe that it was no longer working; (C) still, exception handling in object programming, since unexpected situations can happen and object programming script was not prepared to treat this condition.

Observing these considerations, in general, the students realized that the objects executed as they were expected to do (79%), and for 6% the actions of the objects do not occur correctly. It is noted that, through the students' responses, the objects functioned properly; but there is a need to improve the programming

of objects in relation to the state of execution of the object and the clear visualization of this object for the user, as well as to review and reinforce the repetitive pushing of buttons or out of order.

7. At the end of their execution, such as Attraction and Repulsion, did the experiments “as a whole” accomplish what was expected of them?

In the Virtual Educational Lab, the equipment or devices can be constructed with single objects or with the grouping of two or more objects. For example: three circles, in the colors green, yellow and red, plus a three-dimensional square can be joined to form a semaphore; so when the avatar approached the traffic light and the light was red, a danger message was displayed, if the signal was yellow, it would send a warning message and if the signal was green, the message would be to proceed. In a simple way, the semaphore process comprises the establishment of constant times for the signals and with the detection of the avatar, the message visualization corresponding to the color of the signal. Failure to view the message or display an incorrect message is the unsuccessful completion. Thus, in addition to the individual behavior of the object, it was sought to verify the integration of objects in the experiment “as a whole”: the communication of the object with its parts and with other objects, the activation of objects and messages for the avatar, and reaction to user actions. This question wants to check if the objects started the actions as triggered by the avatar. Table 7 shows the student markings for this question.

Table 7. Students’ perception about if the experiments performed what was expected of them “as a whole”.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	4%	4%	0%	71%	21%
2AEM	0%	0%	10%	50%	40%
2SCC	0%	0%	8%	85%	8%
Total	2%	2%	4%	70%	21%

Generally examining the 47 participants, 70% “Agree”, 21% “Strongly agree” and 4% did not agree or disagree with the closure of executions according to what was expected of them. However, 2% of these students “Disagree” and another 2% “Strongly Disagree”. Unlike when asked to “begin experiments, objects performed what was expected of them” in which 79% of the students responded positively, now 91% of the students confirmed the complete execution of the experiment and its correct functioning “as a whole”. Based on the percentage of affirmative answers, it is understood that the objects that compose the experiments presented the expected result, having had a satisfactory execution to the presets of its creation.

8. What is your assessment of the Virtual Educational Lab presented here?

In this question, we wanted to discover how the student qualifies the VEL in general, evaluating the resources present in the environment. In Table 8 it is possible to visualize the students’ choices. The indication that 94% of the students evaluated the positively Virtual Educational Lab is a confirmation that

the construction of the environment presented resources, such as movement, information visualization, and experiments, interaction, challenge, and feedback, that met the students' expectations regarding the VEL.

Table 8. General students' perception of the VEL.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	0%	4%	50%	46%
2AEM	0%	0%	0%	30%	70%
2SCC	0%	0%	15%	46%	38%
Total	0%	0%	6%	45%	49%

9. How much did you enjoy using the Virtual Educational Lab?

Student satisfaction and approval in using the environment is one of the points of interest of this research. So it was asked how much the student had enjoyed the experience. Students' choices are tabulated in Table 9. This question is approved by 96% of the respondents ("Strongly Agree" with 36% and "Agree" with 60%) and is reinforced by the result of the "virtual world" question. It is confirmed that the environment provided satisfaction and pleasure in its use; certainly promoted by the interaction capacity, realism, and immersion provided by the 3D structure available in the Virtual Educational Lab and by the strategy of building and arranging the objects in the available activities.

Table 9. Students' perception of satisfaction in using the VEL..

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	0%	0%	75%	25%
2AEM	0%	0%	0%	30%	70%
2SCC	0%	0%	15%	54%	31%
Total	0%	0%	4%	60%	36%

10. How much use Virtual Educational Lab was fun?

In addition to the correct operation of the objects, enough instructions and satisfaction with the Virtual Educational Lab, the student was also asked if the use of the 3D virtual world was fun. These responses are shown in Table 10.

Table 10. Opiniões sobre quanto a utilização do VEL foi divertida.

Class / Answers	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1AEM	0%	0%	4%	75%	21%
2AEM	0%	0%	0%	40%	60%
2SCC	0%	0%	0%	62%	38%
Total	0%	0%	2%	64%	34%

Taking into account the judgment of the students who completed the evaluation questionnaire, it is noticed that 98% of these students considered the Virtual Lab environment fun. This result indicates that the environment allows the student's involvement, attracts his attention and his dedication, necessary for the accomplishment of the activities. In harmony with the manifestation of the students, it can be said that this is a fun environment.

Another important result is related to attention levels achieved during the student interactions in Virtual Educational Lab resources. In order to ascertain the levels of attention achieved, three students were equipped with an encephalogram sensor capable of measuring the level of attention during the interaction of the students with the Virtual Educational Lab, a sensor called MindWave Mobile 2¹ by Neurosky. The Mindful Metrics app² was used to record the levels of attention achieved. Additionally, scripts in the OSSL language were developed in the VEL to record the types of interactions performed by the students, which were compared with the results recorded by the Mindful Metrics app and presented in categories for each multimedia resource (Table 11).

Table 11. Students attention level during interaction with VEL multimedia resources

	Texts	Videos	Web Pages	Quizzes	3D Objects	Simulations
Student 1	35	48	39	46	55	62
Student 2	47	63	51	55	69	77
Student 3	26	34	28	33	43	58
Average	36,0	48,3	39,3	44,7	55,7	65,7

Table 11 shows the average attendance recorded for each student during their interactions with the different types of multimedia resources available in LEV. Through the data provided by the encephalogram sensor and recorded by the Mindful Metrics app and the LEV scripts, it was possible to establish relationships between the levels of attention and the type of multimedia resource used by the student at a given time.

This result highlights the importance of interactivity in Virtual Educational Labs, since Table 11 demonstrates that the greater the perception of interactivity provided by the multimedia resource to students in the VEL, the higher their level of attention was achieved, observed observation based on the averages

¹ Official Neurosky web page: <http://neurosky.com/2018/06/mindwave-mobile-2-available-now-improved-comfort/>

² Official Mindful Metrics web page: [blind-review](#).

of multimedia resources involving Simulations (average 65.7), 3D Objects (average 55.7), Videos (average 48.3), and Quizzes (average 44.7). Texts (average 36.0) and Web Pages (average 39.3) show lower focus than other multimedia resources because they do not offer so much interactivity to the student. For future research, the intention of the authors is to build an algorithm capable of identifying the elements that promote attention in multimedia resources in VEL, by crossing the data obtained by the EEG headset in conjunction with the logs captured by the scripts implemented in the VEL.

6. Conclusion

Teaching labs are essential for students to make concrete theoretical concepts received in the classroom. Because physical labs have some restrictions: limited usability, high cost, and danger to human life, Virtual Educational Labs offer an alternative to these limitations.

The Virtual Educational Labs, developed in immersive virtual worlds, allow to offer experiences that can be carried out by the student, so that he reflects on it and the results achieved, arriving at his own conclusions, which allows the student to look for new variations of these experiences and achieve the results that prove or refute their proposed assumptions.

This study presented a case study in which 49 students used a virtual educational lab in the field of physics and evaluated several aspects of the teaching-learning process and described the students' perceptions regarding the experiences proposed. The evaluation questionnaire of the virtual educational lab generally identified that the students received enough information to conduct the experiments, that the tasks were clear and there was feedback at the end of the experiments. Also, the virtual instruments and resources present in the experiments were easy to operate and when the experiment started, it ended in the way that was expected. Also, the evaluation of VEL as positive by the students, the level of appreciation and the degree of satisfaction demonstrate that the virtual lab and the experiments proposed to meet the expectations of the students of the Millennial generation.

It was observed that the virtual labs offered in immersive virtual environments increase the student's interest in the experience since these environments have technological characteristics similar to those used by young people in their day to day life. They also increase engagement, through the playfulness and the presence of challenges, common in the electronic games practiced by students. It also allows simulated practical experience, individual reflection and the exchange of results, conclusions and questions as colleagues, enabling teamwork, confrontation of ideas and the exchange of knowledge online. Therefore, it is concluded that the Virtual Educational Lab presents technological and educational resources that arouse the student's interest and engagement in performing practical activities in the virtual lab.

As future perspectives, the recording of the student's movements and interactions with the objects of the experiment and with the immersive virtual world are stored in a database and can be analyzed using data analysis tools, allowing a better understanding of the preferences of the students. students and about which multimedia resources present greater efficiency in the teaching-learning process, as well as to investigate the relationship of these resources with the awakening of students' attention.

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COMEBACK OF MEASLES THROUGH THE BORDER WITH VENEZUELA: CONTROVERSIES BETWEEN RESISTANCE AND ACCEPTABILITY

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ABSTRACT:

The comeback of measles in Brazil through the border with Venezuela has become a social issue. This article makes interdisciplinary reflections about the respective health systems and the polynomial vulnerability/violation/resistance/acceptability within the context of the border region in question. Among the considerations, it is highlighted the success of the Immunization National Program to eradicate measles in Brazil and the fragility of the political and health systems from both countries under analysis regarding border regions mainly in crisis situations. Finally, it is argued that education is the coherent way for the construction of a nation aware of its individual rights and collective duties and that appreciates social policies as they must be respected and valued by the government itself. Thus, herein is an alert on how anti-vaccination movements contribute adversely in the eradication of diseases that can be controlled through more efficacy of vaccination campaigns.

Key words: vaccination; measles; public health policy; social policy.

Vaccination coverage against measles is a tragedy, says the substitute coordinator
[of the National Immunization Program].

Lígia Formenti. *O Estado de São Paulo* 3/06/2018.

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On March 6, 2018, the newspaper *O Estado de São Paulo* reported news about the vaccination coverage against measles in Brazil and emphasized the concern of the Brazilian government with the cases recently registered in Roraima.

Upon conceptualizing the vaccination coverage against this disease as “a tragedy”, the substitute coordinator of the National Immunization Program (NIP) of the Health Ministry (HM) supported her assertion on two arguments, one of historical nature and another of contextual nature, that is, the need of improving the coverage in the Country and the presence of the Venezuelan newcomers. She highlighted that until March 6, six cases have been confirmed in Roraima, after three years without any record in the national territory. These cases occurred among Venezuelan children and Venezuela already faces an epidemic outbreak of measles.

With this background, the HM decided for a vaccine blockade and sent a group of professionals to work on the prevention of the disease in the region.

The coordinator emphasized that in general the vaccination coverage is low in Brazil. She introduced four explanatory hypotheses: a) the vaccination became less relevant for the families and health professionals from the moment when there was a reduction of the contingent of people affected with diseases targeted for vaccination; b) the primary health centers are open at the same time when people are working; c) the eventual lack of vaccines in the health centers; and, d) opposition to vaccination

Yet, according to the coordinator, to face this scenario, the Health Ministry “*wants to launch a program towards enhancing immunization*”, based on strategies such as to create mobile health posts and to foster the municipalities to open the vaccination posts in a time schedule alternate to the regular working hours.

The first outbreak of measles, that is taking place in the State of Roraima, on the border with Venezuela, had been identified in the previous month. The case was imported from Venezuela, where an outbreak of the disease occurred in July 2017 mainly in the State of Bolívar, on the border with Roraima. This episode was due to the absence of cross-border health barrier, what allowed the comeback of the disease from Venezuelan immigrants who have low vaccination coverage and hold the measles outbreak (Brazil, 2018).

It is estimated that at present there are more than 50,000 Venezuelans in the city of Boa Vista, capital of Roraima, a number that surpasses 10% of the total population. However, this figure may increase even more since almost 700 people cross the border daily. This strong migratory movement has affected the State of Roraima directly in such a way that it does not manage to facilitate the proper humanitarian support to these migrants, since it is undergoing difficulties with the increase in the demand of public services as a collateral effect (Campos, 2018). The sanitary issue has given reasons for a big concern. The World Health Organization (WHO) warned about the spread of the measles outbreak in the region and it is making a follow-up together with the Pan-American Health Organization (PAHO) and giving its contribution to minimize this hazard (PAHO, 2018).

In order to respond to the hazard, the HM started a campaign of selective vaccination against measles for approximately 400 thousand people, 300 thousand out of which are Brazilians not covered by the vaccine and 100 thousand are Venezuelans already in the country, in the six months-49 age group in all

municipalities of Roraima. This selective campaign was initially carried out in the period from March 10 to April 10 with vaccination block-up of their contacts too within 72 hours and monitoring them for 21 days (Brazil, 2018).

On April 9, 2018, the Health Secretariat of Roraima reported that 79 cases of measles have already been confirmed in Roraima, and two cases of death have been registered since the beginning of 2018, correspondent to two Venezuelan children. Recent data point to 316 suspected cases, being 213 in Roraima and 103 in the state of Amazonas, what configures a situation of Measles Epidemic, with the virus coming from the neighbor country (Brazil, 2018).

In this article, we make a few considerations on the binomial health/social health public policy and the polynomial vulnerability/violation/resistance/acceptability as categories from the field of applied ethics that interpenetrate in the development of the specific scenario of measles comeback in Roraima. The objective here is to identify probable controversies that apply on our daily lives regarding people, foreigners or not, through actions that impact the life of an entire society. There is no intent to reflect on international relations, national laws and immigration policies but rather to promote a discussion addressed to the complex question in a moment of political and economic crisis in both countries although of different orders.

The text is an interdisciplinary product, generated in the development of the discipline “Ethics, Dialectics and Politics” of the Master’s Program on Health and Labor Management of *Universidade do Itajaí*, SC, in the first semester of 2018. It is organized in three topics. In the first topic, the authors introduce a national scene of the vaccination phenomena and of vaccination against measles in Brazil. Next, they describe a perspective of the relation between health public policy and social health by contextualizing the health public systems from Brazil and Venezuela. Finally, they outline a few reflections on vulnerability, violation, resistance and acceptability within the context of the border situation under discussion.

Vaccination in Brazil and Measles

Brazil has several policies and public programs to guarantee the health of the population. The Immunization National Program (INP) of the Health Ministry is certainly a highlight within this context, with worldwide recognition. It was instituted by means of Law no. 6.259 of October 30, 1975 that disposes about the organization of Epidemic Vigilance actions and establishes the standards regarding compulsory notice of diseases and vaccination all over the national territory (Brasil, 1975). This Program completed 45 years, but its history goes back to more than two centuries of conquests.

One hundred years after the introduction of the vaccine in the national territory and in view of a smallpox epidemic plaguing Rio de Janeiro, the law concerning obligation of vaccination was approved in 1904, through government enforcement on the part of hygienists, driven by the great number of existing morbidities. The measure of authoritarian nature and guided by Oswaldo Cruz was not accepted by the population who denied receiving the vaccine for fear and suspicion as to the efficacy what generated policy confrontation towards the population. The outcome was a violent week when the armed forces conflicted with the population who did not understand the objective of the government with the body invasive procedure of vaccination. Known as the Vaccine Rebellion, the episode was a milestone that marked the

beginning of government policies to control epidemic diseases. The obligation to vaccinate by the Health Council at that time exhibited an important issue: the certainty of the vaccination rational grounds and the connection between social and scientific relationship (Moulin, 2003).

The mechanism whereby vaccination acts in the human body reproduces a contact with a fragment of a pathogenic microorganism (antigen) or with the attenuated antigen itself, by searching an adaptive immune response and stimulating the production of antibodies, preparing and immunizing the subject to reduce a possible pathological response upon a second contact with this same antigen. Thus, it minimizes the reproduction and circulation of such pathogenic microorganisms among human beings of a certain population.

Within this context, it has been observed a valuable potential to prevent infectious and contagious diseases within populations, so that vaccination began to be understood as a health policy. Nowadays, Brazil is one of the countries that offers for free the highest number of vaccines to its population. Estimates calculate that over 300 million doses are yearly distributed among vaccines, sera and immunoglobulins (Brazil, 2014)

Vaccination has enabled the dissemination control, the combat and elimination of several infectious diseases. This is due to the fact that the procedure not only protects those who receive the vaccine, but also the community as a whole. To summarize, the higher the number the people protected by the vaccine, the smaller will be the odds that any subject in a community – vaccinated or not – be contaminated.

The NIP establishment has consolidated vaccination as an important intervention of public health of universal approach that strengthened the role of the Health Ministry in the coordination of immunization actions thereby contributing in a significant way for the reduction of morbidity and mortality due to communicable diseases in the country. The NIP program has been continuously updated in the search to develop actions that are feasible economically and to implement strategies that can guarantee and expand the population access to the recommended vaccines, especially for the people that are more vulnerable (Silva Júnior, 2013).

One of the greatest conquests regarding the NIP is the control of measles, an acute infectious disease of viral nature, severe and extremely contagious, quite common in childhood, whose vaccine is composed of an attenuated live virus and is conjugated with rubella and mumps. Measles has universal distribution and presents a seasonal variation, being its endemic behavior directly related between the immunization degree and the population susceptibility besides the circulation of the virus in the area. Although it has been eliminated in Brazil since 2001, measles persists endemic in other countries of Latin America and Europe (Brasil, 2017).

The vaccine against measles was introduced in Brazil in the 1960 decade but only in the years 1973 and 1974 the first vaccination campaigns were carried out in urban areas from several states. In 1976, a decree determined the national compulsory notice of measles cases what marked the start of more reliable records of this disease. In the beginning of the 1980's, vaccination campaigns were made in places of low vaccinal coverage, and in the years 1987 and 1988, the states of São Paulo, Paraná and Mato Grosso do Sul held mass vaccination campaigns. However, only in the beginning of the 1990's, plans to eradicate measles started in the country (Santos, 1998).

In Brazil, thanks to the performed control over successive vaccination campaigns and to epidemiologic vigilance programs, the lethality rate has not reached 0.5% in spite of the fact that the virus is highly contagious and presents high mortality rate with indexes that vary from 5 to 10% in peoples from the third world. The first great national vaccination campaign against measles took place in 1992 when approximately 42 million children and adolescents under 15 were immunized, covering a vaccinal coverage of 95%, what was the starting point for the creation of the Measles Control and Elimination Program (Brasil, 2011)

Since 2001, there is no record of the disease cases with origin inside the country itself. Between the years 2013 and 2015, in the states of Pernambuco and Ceará, there were outbreaks related to the importation of the virus and, after the implementation of prevention and control measures like intensification of vaccinal campaigns, vaccinal blockades, screening and quick monitoring of vaccinal coverage, the transmission was interrupted. Due to the commitment with the control of this morbidity, in the second semester of 2016, Brazil received the certification of measles elimination from PAHO for its intense vaccinal vigilance and coverage (Brasil, 2017).

Health Policies and Social Health: historical-conceptual and conjunctural aspects

In recent years, the WHO has advocated the importance of the global community to join forces to reach the eight Millennium Development Goals (MDGs) launched by the United Nations Millennium Declaration, signed in 2000, with the approval of 191 Member States. The goals are: to eradicate extreme poverty and hunger; to achieve universal primary education; to promote gender equality and empower women; to reduce child mortality; to improve maternal health; to combat HIV/AIDS, malaria, and other diseases; to ensure environmental sustainability; and to develop a global partnership for development (World Health Organization, 2018).

Even based on a preliminary reading of these goals, we understand that the great challenge lies in the absolute necessity that the health sector of each nation compromise with the social health of its people, aiming to overcome the health condition as a privilege by the health condition as a right so that from such overcoming it makes efforts to strengthen its health systems and programs. It is a provocation for the global community, since the devastating “unfair, avoidable and remedial inequalities” (Berlinguer, 2012, p. 224) of conditions, opportunities and results (Whitehead, 1992), historically imposed to peoples by economical choices (Berlinguer, 2012), define different starting points for each nation. The venture requires political willingness to carry out the 8th MDG, the most challenging of all – to establish a world partnership for the development -, whereby developed and illuminated countries would give technical support to countries with less place in the sun, that long for the creation and/or organization of health systems within the due specificities of human and financial resources. Far from easy in times of seduction for walls and barriers to protect borders.

In its Interim Report with the title “Global strategy on people-centered and integrated health services”, published in 2015, the WHO introduced to global community a position about the health of the population: “an approach to care that consciously adopts the perspectives of individuals, families and communities, and sees them as participants as well as beneficiaries of trusted health systems that respond to their needs and preferences in humane and holistic ways” (World Health Organization, 2015, p. 7).

Upon observing that WHO began to consider the global need of health systems to respond to the needs of individuals, families and communities, and considering that the health needs are not limited to biological demands (Breilh, 1991), we refer to the Welfare State model, disseminated from the XIX century on within most of the developed countries. According to this model, the creation of any health system should foresee the overlapping of three S *sanità-salubrità-sicurezza*¹ to the three M of the Hippocratic triangle *malato-medico-malattia*² (Canguilhem, 1998). *Sanità* corresponded to the set of provisions and initiatives, both individual and collective, that allowed to resist to an eventual disease. *Salubrità* pointed to the absence of disease in a given environment. *Sicurezza* was equivalent to the elimination of several pathologies and proclaimed the possibility of not knowing the disease in fact in the future (Fantini 2012 apud Berlinguer, 2012).

However, health policies change. Nowadays, a progressive displacement in the conceptual and practical dimensions of the three S can be noted. The health sector of a State becomes the task of health professionals within health structures aiming at the cure and prevention of diseases. Salubrity has taken over a global target in a displacement from the medical domain into the biopolitical one by defending the intervention in life and labor environments. Maximum safety becomes an imperative of investment even though breaking individual freedoms might be needed.

The populations from Brazil and Venezuela have not enjoyed the *Welfare State* yet.

In the case of republican Brazil, after a long historical period marked by movements of democratization, dictatorships and re-democratization, the Federal Constitution of 1988 foresaw a Chapter for the groundings of the right to health as everyone's right and duty of the State. This constitutional framework gave support to the creation of the Brazilian Unique Health System (SUS). The System has been conceived to integrate health actions and services within a regional and hierarchic network from levels of growing complexity, that is: primary healthcare, mean complexity and high complexity. Since then, the SUS has been a process of social construction fed by governmental choices, democratic ups and downs and ruled by a wide and complex regulatory framework. At the current historical moment, many challenges – a few persistent ones, other emerging – menace its sustainability, such as: the recent contingency and rationalization reforms; the Brazilian political system; the federalism controversial model; the historical lack of precision in the health concept; the management of supply and demand for the primary care; the failure of its regionalization; the opening of its operationalization to health social organizations; the

¹ Health sector of a national service of health-salubrity-safety.

² Sick - medical doctor - disease.

growing judicialization of health; the education of workers for the System; and, above all, its (under) financing and respective logic of incentives.

In the scope of financing, the actions and public services of health that compose the SUS are guaranteed mainly by the product of collection of taxes and funds transferred by the State. Upon analyzing the percentage of participation of the tax revenue in the total revenue of Boa Vista capital vis-à-vis the percentage of participation of São Paulo capital, for example, based in the System of Information about Public Budget in Health (SIOPS), taking as reference the second bimester of 2017, one can notice that while the participation of Boa Vista was of 9.07%, the participation of the tax revenue in the total revenue of São Paulo was of 57.44%. The total expenditure with health, in R\$/inhab, under the responsibility of Boa Vista was of R\$139,37 while that one of São Paulo was of R\$246,91, in the same period (Brasil, 2018). These data exhibit a portrait of the geographic heterogeneity *per capita* of the expenditure with health: for the citizens of Boa Vista, the expenditure corresponds almost to 50% of the expenditure for the citizens from São Paulo. Yet, the SUS survives and it is an immaterial patrimony of its society.

In the case of Venezuela, the Bolivarian Republic with its area organized in 23 states, a capital district and 335 municipalities, the health system was the product of the Bolivarian movement and likewise it happened in Brazil, it was conquered via Constitution. The Bolivarian Constitution of Venezuela, of 1999, recognized the National Public Health System (SPNS), in its Art. 84, based on the principles of gratuity, universality, integrality, equity, social integration and solidarity (Venezuela, 2000). The SPNS was organized through the addition of existing physical structures financed by the State and it was operationalized by means of health networks anchored by a conception integral health, capacity of resolution and technological of social territories. The primary health care was fostered starting from the Misión Barrio Adentro I, that took over the role of central axis of the SPNS (Organización Panamericana De La Salud, 2006).

However, this Misión ended up performing like a parallel health system since the constitutional conquest of the Public System had not been the object of subsequent specific legislation. The fifteen years that followed without regulation of the System finally led it to a “silent process of privatization” (Roa, 2018, p. 12).

In 2011, with a total population of almost 30 million inhabitants, Venezuela showed good demographic indexes, as well as of mortality, coverage and social and economic ones, among which it is worth telling: birth rate of 20.2 births per thousand inhabitants, life expectancy of 74.5% at birth; infantile mortality rate of 15.8 per a thousand of live births; measles coverage of 79%; 95% of the population under 15 years old or more was literate; and, 93.6% of the population was organized in urban areas (Organización Panamericana De La Salud, 2011).

The deep economic crisis that ravaged the Country and undermined the Rule of Law intensified the tacit privatization of the health system that was taking place in the last years. The population has been submitted to the highest inflation rate in the world: according to the International Monetary Fund, the inflation shall reach 13,000% still this year (Organización Panamericana De La Salud, 2018).

The effects have not been few: increase of poverty levels, social fracture, increase of social conflicts, expressive lack of food and degradation of the nutrition condition of society, high rate of homicides, among

others. Within the health system, the collapse seems a reality: The State no longer gave priority to the fiscal budget of the health sector; consequently, its funding was privatized, while half of the Venezuelan population depends exclusively on the public system. Health professionals are migrating due to the deterioration of the working conditions: medical doctors are lacking; waiting lists for surgeries are endless; hospital beds per inhabitant are diminishing fast; medicines lack in the public and private networks; diagnosis services are not operating; maternal and infantile mortality is increasing; and, there is regression in the coverage of vaccination (Roa, 2018).

Vulnerability, violation, resistance and acceptability: reflections of the applied ethics

The comeback of measles to the Brazilian territory through the border of Venezuela, after years of eradication of the disease places us before a complex situation. They are neighboring countries whose populations are mutually submitted to increasing vulnerability and/or violation and inserted in a hidden or explicit way into two extremes of the same logic, present in dialogues about health: vulnerability/violation and resistance/acceptability. For this reason, it is opportune to question this issue.

Vulnerability in its semantic meaning refers to the possibility of being hurt considering that the word derivates from Latin – *Vulnus* (wound). That is, an individual is vulnerable when susceptible to danger, to wound. Vulnerability is a possibility of life, since all of us are susceptible to accidents, diseases or evils. However, some ways of living, social classes and population experience higher degree of vulnerability (Sotero, 2011). This higher degree of vulnerability can reach such a point that besides the possibility of risk, the individual or social group that previously had potential condition to suffer, becomes subject to the concrete condition of such risk. At this stage, there is no longer vulnerability but, instead, violation as a social product generated in the displacement of risk as a possibility for the risk as a “virtual reality”, in the words of Beck (2011, p. 328).

From the context of above understanding, it is possible to infer that the population of Roraima, resident on the border with Venezuela, was vulnerable to a measles episode since there is an epidemic in the neighbor country and measles is of quick infection, there is potential condition for the occurrence of this disease in Roraima. With the imminence of the risk of outbreak/epidemic of measles, mainly the inhabitants of the state of Roraima transit from a state of vulnerability related to measles to a state of violation. This condition raises enquiries from the field of individual liberties, collective well-being and resistance. Within a context where individual liberties are respected, what would be the role of the State in a region of violation? Within a larger context, with the perspective of measles coming back to entire Brazil, how far can one define individual right and collective well-being? The individuals who are resistant to vaccination, upon facing the condition of being vulnerable, do they pass to the condition of acceptability?

Schramm (2008, p.1537) defends that “the protection of Public Health legitimates some kind of restriction to the exercise of individual autonomy” and it also expresses that is the managing sanitary agent is responsible to take over the actions to be met for the well-being of the Public Health. One collides then with a quite complex issue for our Country, mainly in the current times: in uncertain times, with tiny public funding in health and education and with the SUS suffering from decree to decree, where is democracy, regarding this issue, to mediate individual rights aiming at the collective well-being?

The vaccination strategy, widely spread in Brazil, with campaigns and results considered a success even worldwide, is undergoing a delicate moment, already mentioned by the coordinator of the National Immunization Program: the discredit of the population regarding the efficacy and the importance of the vaccine. Moved by the most varied feelings, it is common to find groups of parents, elderly and youngsters, including in the social networks, in common thinking regarding movements in opposition to vaccination. In this historical moment, when information is shared instantly from all parts of the world, reaching a countless number of persons, the search for the veracity of information is not always the main concern. Rumors and fake news supported by a language that seems to contain a scientific bias lead these movements to grow worldwide exponentially.

The interlocution between the category resistance and vaccination contains several temporalities. Long before the episode of the Vaccine Rebellion in Brazil for example, Prussia created the medical police in the beginning of the XVIII century with the intention of improving the health level of the population through the obligatory intervention of the State (Schramm, 2008).

Among other world populations, cases of resistance against vaccination procedures have been also observed. In Italy, for instance, it has been observed a reduction of the vaccinal coverage in 2015 of children born in 2013 in almost all Regions and Autonomous Provinces. In the case of vaccine against measles, which is considered non-obligatory by the Italian Health Ministry, though recommended, the coverage signaled a fall of 90.4% to 85.3%, between 2013 and 2015. This reality, besides being nationally worrisome, resulted also by “deteriorating the international credibility” of the Country that had invested in 2003 in a global Plan to eliminate measles before the European Regional Office of the OMS (Italy, 2018). New efforts have been endeavored in the Sanitarian Plan of Vaccinal Prevention 2017-2019 (Italy, 2017).

According to the Italian Health Ministry, contextualized studies are needed to exploit the motivations for the low adhesion of vaccination in general. However, the Ministry itself signals a few actions that could stop this trend to the reduction of adhesion: increased initiatives of communication between State, Regions and Provinces to defend the vaccination; the progressive development of computerized regional vaccination centers; and, confrontation against resistance movements based on scientific disinformation (Italy, 2018).

This scenario where information and disinformation are still an issue of the agenda from the health system of a Country far from ours regarding the cultural capital (Lima et al, 2009) revives the Brazilian historical debate about the quality of information. In so far as society began to access information more easily, either by means of vaccination campaigns widely divulged or by larger access of the citizen to data and facts related to diseases that have been fought by means of this practice, it was expected that the polarization resistance/acceptability would be object of reflections and/or discussions by the common sense. After all, the efficacy of the national vaccination programs reached results more and more higher, so that it became one of the best in the world. However, according to own words of the PNI coordinator, that opened this text, resistance is still a reality in Brazil.

The categories resistance and acceptability can be determined by many factors that change according to the society model, historical moment, economy, access to social rights, culture of a certain region. In our perspective, the efforts to overcome the resistance to vaccination must consider the

peculiarities of the cyclic movements resistance/acceptability/resistance visited by countries with national health systems. Thus, the transit from one category (resistance) to the other (acceptability) does not go straight ahead neither one-way. Each new procedure, plan, program, campaign or disease that reaches the population goes through a path that is cyclically offered as an opportunity by the conditions of the historical moment and travelled by means of consensuses, dissents, tensions and détente.

Through information, yes, it is possible to outline a common social target once the individualities have been respected. This is why terms like “medical police” sound somewhat strange to the standards of contemporaneous societies. However, in the age of data velocity and instantaneous communication, in times of easy access to means of communication and internet in a country where the culture of reading has not been established yet and one headline only summarizes a whole complex context, what kind of information are we talking about? There is resistance to a certain practice when it is founded by its architects without the help from a strategy of information of quality capable to go into the people’s homes and question them about “common well-being”, based on an accessible pedagogy. It is worth pointing out that when we refer to the vaccine, it can be thought in an individual ambit – in the sense of not contracting a determined pathology and, in a collective ambit, in the sense of eradication of a certain disease.

Resistance, from the individual point of view, regarding a biomedical intervention, is according with the UNESCO Universal Declaration on Bioethics and Human Rights which in its Art. 3rd disposes that: “The interests and welfare of the individual should have priority over the sole interest of science or society” (UNESCO, 2005, p.06). Herein, another issue is raised: the individual denial to vaccination may lead to outbreaks or epidemics of lethal diseases that have already been eradicated. Therefore, would the vaccination (or its denial) be an individual right or a collective duty?

From other perspective, it would also be possible to inquire: who are the vulnerable ones and/or the violated ones at this moment? Are the Brazilians from the borderline with Venezuela who suffer? Or are the sick Venezuelans who run away from their national reality?

Such different ways of inquiring the situation are possible because the appointed phenomenon navigates in a very subtle manner through other two situations that are quite one-off, by making a coordinated movement between them, but not definitive, depending on the point of view of whom analyses the situation. Also, in this line of reasoning, the movement goes through vulnerability, resistance and acceptability but in this exact order and not necessarily from one side only, i.e. Brazilian or Venezuelan. And why?

From the Brazilian point of view, there is the vulnerability of a needy border people, living in one of the regions of the country that suffer the most with the deprivation of fundamental means for social life, work, food, health, housing and who are faced with the situation of sick immigrants entering their country to share the little of the almost nothing they have.

In 2010, when the population of Roraima comprised 450,479 inhabitants, the percentage of the vulnerable ones to poverty, that is, of individuals living in permanent private domiciles in the state, with per capita income equal or less than R\$255,00 was of 45.72% while the percentage of people being 18 years old or more without complete elementary school and on informal occupation was of 35.56%. Yet, about 2010, the Brazilian Human Development Atlas unveils that 65.84% of the children between 0 and 5

years old were out of school and that the percentage of mothers who are household heads without elementary school and with minor child, out of the total of mother household heads was of 22.84% (Brazil, 2018).

Now, it is understandable why, as Brazilian citizens, the people from Roraima experience the phenomenon of resistance in its higher connotation, by rejecting any possibility of receiving these immigrants and in addition bearing the costs of the situation. But, also as Brazilians, it is probable that they do not resist and with the heart moved by humanity, they slide onto acceptability and welcome these immigrants by allowing them to share the few that the locals still own and to share the few of almost nothing that they still have.

Yes, this movement reflects a Brazil that we do not see every day, maybe a constitutional Brazil outlined in the Preamble of the Federal Constitution of 1988 where it is beautifully provided that: “We, the representatives of the Brazilian People, convened in the National Constituent Assembly to institute a democratic state for the purpose of ensuring the exercise of social and individual rights, liberty, security, well-being, development, equality and justice as supreme values of a fraternal, pluralist and unprejudiced society, founded on social harmony and committed, in the internal and international orders, to the peaceful settlement of disputes, promulgate, under the protection of God, this CONSTITUTION OF THE FEDERATIVE REPUBLIC OF BRAZIL.”

Many Brazilians do not even know about the existence of such a dense, serious and deep text, but, specifically within this situation of Venezuelan immigration, it is clearly seen the commitment of the Brazilian people to maintain social harmony and order.

In addition, we can affirm that the introduced issue of vulnerability finds a democratic consciousness in Melkevik's words (2017, p. 657), that reflects the outlined situation exactly: “Democracy consists in the capacity that different consciousnesses have to develop in reciprocity through adequate processes and to select in cooperation, as we have noticed, the rules, rights, institutions, worth of them. Every democratic cooperation is therefore dependent on the individuals' vulnerability.”

In the light of this, it is possible to see the movement of reciprocal cooperation between national and foreign peoples before this tragic health situation that also detects the vulnerability of the local system that has deep difficulties to help the people who live there and nowadays find themselves obliged to give support to sick people quite beyond from the forecasts or from their limits.

The situation of inequality reflects the position that each subject takes before what comes ahead of him/her, by considering that each one has the same freedom but who is also susceptible to see himself/herself contaminated by a disease already eradicated in Brazil and that comes back to trigger the vaccinal movements aiming at to diminish its proliferation.

The reflection of this movement of vulnerability, resistance and acceptability as a continuous chain also reflects directly in the issues of public policies because the border city with Venezuela needs to take a position as to the frequent exodus of the immigrants. Considering that there are cooperation policies among Latin American countries, it becomes difficult to adopt attitudes that do not have xenophobic connotation, but that, at the same time, expose Brazilian citizens to situations like a measles comeback that obliges the Country to act vigorously.

A few considerations

Although it can be conceived as a tragedy, the National Immunization Program of Brazil is one of the major social and health policies of the country, that has been instituted even before the Objectives of the Millennium. It has been a great ally for the control of diseases and infantile mortality in the last decades being configured as an international example of strategies and conquests like the case of measles eradication. Even though it has been conceived as something imposed to the population, nowadays the National Immunization Program recommends and organizes the vaccination calendar and it is available through the public health system, the SUS.

The comeback of Measles to Brazil through the border of Venezuela evidences the fragilities of the political and health systems of both countries, from one side Brazil that is not totally prepared to deal with the arrival of foreign people under critical situations and, on the other side, that of Venezuela that is undermined by an intense political and social crisis. Both nations revealed populations vulnerable to measles thereby exhibiting not only the danger due to the limitations of the vaccination coverage but also the risks that the resistance and the low adhesion to vaccination that is increasing worldwide, may expose to the populations.

It is undeniable to think on the resistance to vaccination as the exercise of autonomy for an individual right but upon the acceptability and adhesion to vaccination there is also the conception and the exercise of the duty to protect the collective. Such dichotomy is the reflection of the fast movements where the news circulates, of the paradigm between defending the right and the individual merit and the thought of collective duties and conquests, and of forces and weaknesses that the State has before its political and social relations, either the domestic ones or the international ones.

Education and access to coherent information combined is the way for the construction of a nation aware of its individual rights, that respect the collective rights and appreciate social policies, just as they must be respected and valued by the government itself. A self-conscious nation and a present government are able to elaborate together the strategies to keep themselves strong and to cooperate with those who need help.

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Economic Feasibility Study for The Installation of a Cogeneration System in A Timber Industry of Lages-Sc

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Abstract

This research thematic is the Economic Viability Study, in order to implement a cogeneration system, in a logging company, located in the Santa Catarina highland plateau region. Thus, reducing its production cost, since much of it is due electricity purchase. Data collection of both production, consumption and expenses with electricity purchase and billing were carried out together with the company. Descriptive method was used, with case study. For the economic analysis, both net present value (NPV), internal rate of return (IRR) and payback period were used. With this information and crossing the data, the economic viability for this project became evident, as it can be visualized throughout of this article.

Keywords: Electrical energy; cogeneration; investment; biomass.

1. Introduction

With the economic instability that is devastating the Brazil in recent years and with the dynamics of the world stage, companies seek differentials, which become more competitive and thus can lower production

costs to survive in a globalized market.

Brazil has 163,848,441 kW of installed power 63.76% come from hydroelectric plants, however, despite the Brazilian energy matrix come from largely a generation of lower cost, the final price of the electric energy is still high, which raises the cost of production (ANEEL, 2019).

According to the DIEESE in 2014 (Department of Statistics and Socio-economic Studies) the rate of electricity presented opposite trend observed in 2013, positively and gradually from the second half of the year. The year ended with an increase of approximately 17.0%. As we all know, 2014 was marked by the deepening of unfavorable hydrological conditions, which dried up not only shells of the plants, but also some important reservoirs for water supply, as the largest city in the country. The low level of the reservoirs of power plants has caused the generation of hydroelectric energy stayed well below installed capacity, which required the full and continuous drive of power plants, more expensive sources of generation (DIEESE, 2015).

Due to skyrocketing energy prices, which has taken place since the year 2015, the industry seeks alternatives such as more efficient consumption and cogeneration. Being this second alternative the case study of this project. "Energy has a strategic position in society, and may be regarded as an essential input to the implementation of practically all human activities and economic development." (LORA, 2004).

For this case study will be used by the company, information such as power consumption, of waste in the production line (biomass), steam consumption in wood drying kiln and your billing.

The high cost of production today facing timber makes these companies seek a better economic efficiency. In this context, improving energy efficiency is considerable, and reduce the amount spent on purchase of electric energy is the determining factor for lower production costs, making them more competitive.

According to the LPF/Ibama (forest products laboratory), the approximately 50 million cubic metres of timber logs extracted per year in the Amazon region produce only 20 million cubic meters of sawn timber. Of the total, approximately 60% is wasted in sawmills during primary processing. In General, over 20% are wasted on secondary processing, generating a huge amount of waste (SANTA CATARINA, 2015).

2. Methodology

This research paper requires the use of descriptive methods, because it is a case study, making an analysis of the electric energy self-production, using the system of cogeneration and also your economic viability. We used qualitative methods using documentary data provided by the company to perform the work and a bibliographical research.

To check whether it is economically viable for the company, the investment in cogeneration, it will be necessary to study the indicators associated with the return and the associated risk indicators, such as net present value (NPV), internal rate of return (IRR) and Investment recovery period (PAYBACK).

3. Bibliographic Review

3.1 Cogeneration

cogeneration is the combined utilization of steam to generate electricity for motive power and heating, i.e.

the steam generated in the boiler passes through a turbine which is coupled to a generator, then steam the resulting proceeds to industrial process given the other uses and driving heat, for example, in wood drying kilns (PATUSCO, 1993). Figure 1 shows the representation of a cogeneration system.

According to the Clemente (2003), cogeneration is synonymous with cost reduction, with reduction of energy dependence. For companies that are able to co-generate in their facilities, this can be the most economical way to meet the internal needs of steam and electricity, reduce operating costs and increase the reliability of supply.

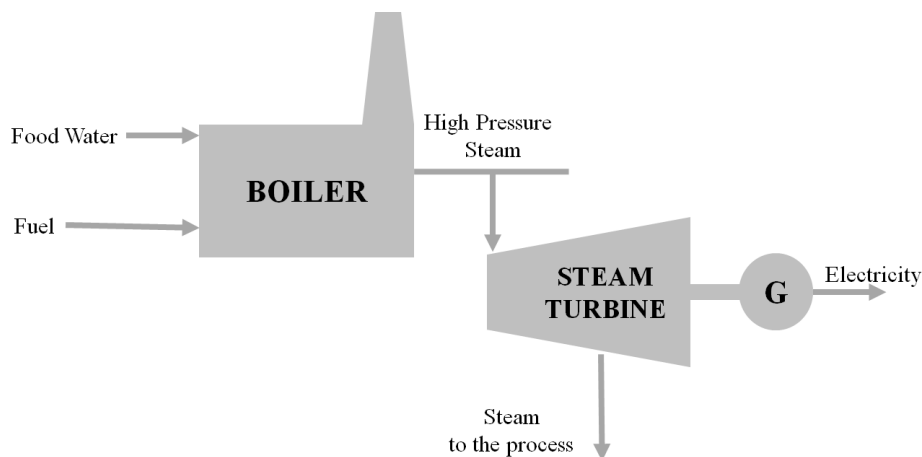


Figure 1. Cogeneration system.

3.2 Steam boiler

Steam boilers (Figure 2) are equipment to produce steam under pressure above a space, using any source of energy, except for the reference and decorative materials used in process units (BRASIL, 1978).

The boiler is a water fed by a pump with pressure higher than the work of the boiler, which is directed to a bank of tubes and is one of the gases that most contribute to the burning of the biomass. After that, the water goes to the steam pipe, it is not tubing that is separated from the water vapor.

At the bottom of the pipe, the pipes, in turn, are separated by water and furnace from the boiler, returning as vapor to the top of the pipe. Steam to the superheater and proceed to the process.



Figure 2. Steam Boiler of Biomass (ENGECASS, 2017).

3.3 Steam Turbine

The steam turbine is a device that harnesses the power of steam to calorifica turns it into mechanical energy of rotation. Figure 3 shows an illustration of the main elements consisting of a steam turbine.

The high pressure steam enters the nozzles, which are the passages formed by the stationary blades, these direct the steam shovels to shovels. The steam flow changes direction as it passes on the canals between the stationary blades, this change of direction generates a force under the paddles that will move the turbine shaft (YANAGIHARA, 2016).

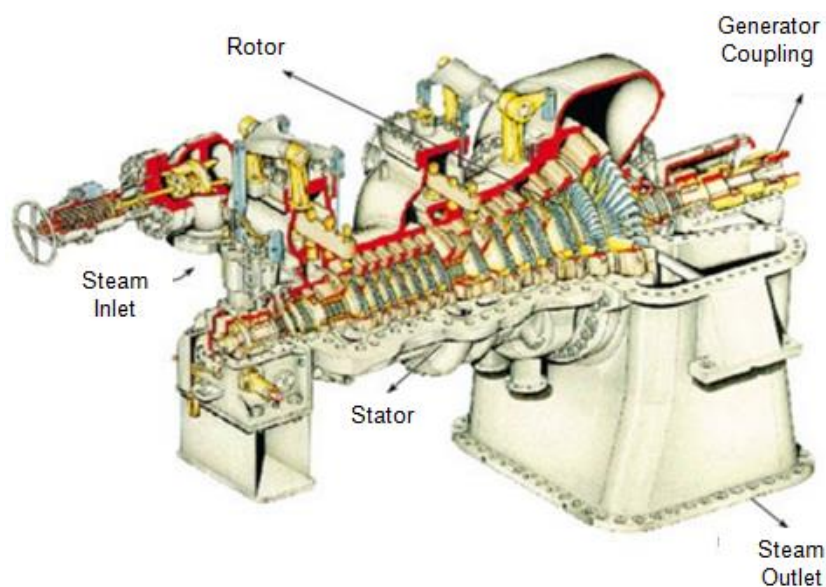


Figure 3. Component parts of a steam turbine (RENOVE TECNOLOGÍA, 2009).

For use in this case, the turbine indicated is back (escape with higher pressure than atmospheric), where the steam enters the admission 22 Kgf/cm², temperature 385°C and in the exhaust comes out with 8 Kgf/cm² and 291°C (Engecass, 2017).

3.4 Generator

The generator is a machine that converts mechanical energy of rotation into electrical energy. The mechanical energy can be supplied by the steam turbine, by wind, by a drop d ' water among others.

A simple generator consists of a strong magnetic field and constant; drivers who rotate through the magnetic field; and some way to keep an electrical contact keep drivers as they rotate.

The magnetic field is produced by the current that traverses the stationary field coil (stator). The excitement for the field coil is supplied by a battery or any DC source. The rotor, also called the rotor turns within the magnetic field. For a single coil of wire around the rotor, each end is connected to separate collector rings, isolated from the axis. Each time the rotor turns completing a rotation occurs a complete cycle of alternating current.

In practice a generator contains hundreds of coiled coils in rotor slots. Two brushes are pressed through Springs against the rings collectors, so as to maintain a continuous electric contact between the alternating current induced in the rotor and the external circuits (GUSSOW, 2009).

3.5 Biomass

The energy point of view, to order granting industry enterprises electric, biomass is every renewable resource originating from organic matter (of animal or vegetable origin) that can be used in the production of energy. As well as hydropower and other renewable energy sources, biomass is an indirect form of solar energy. Solar energy is converted into chemical energy through photosynthesis, base of the biological processes of all living beings (ANEEL, 2005).

In Figure 4 shows the schematic diagram of energy conversion of biomass. Direct combustion is the transformation of the chemical energy of the fuel into heat, through the reactions of the components with the oxygen provided. For energy purposes, the direct combustion occurs primarily in stoves (food cooking), ovens (metallurgy, for example) and boilers (steam generation, for example) (ANEEL, 2005). In the company, arrive in your patio fence of 8,000 tons/month of logs to be benefited, however, only 50% of this total will turn the finished product on the production line. Therefore, 4,000 tons/month is generated in this process residue, i.e. biomass.

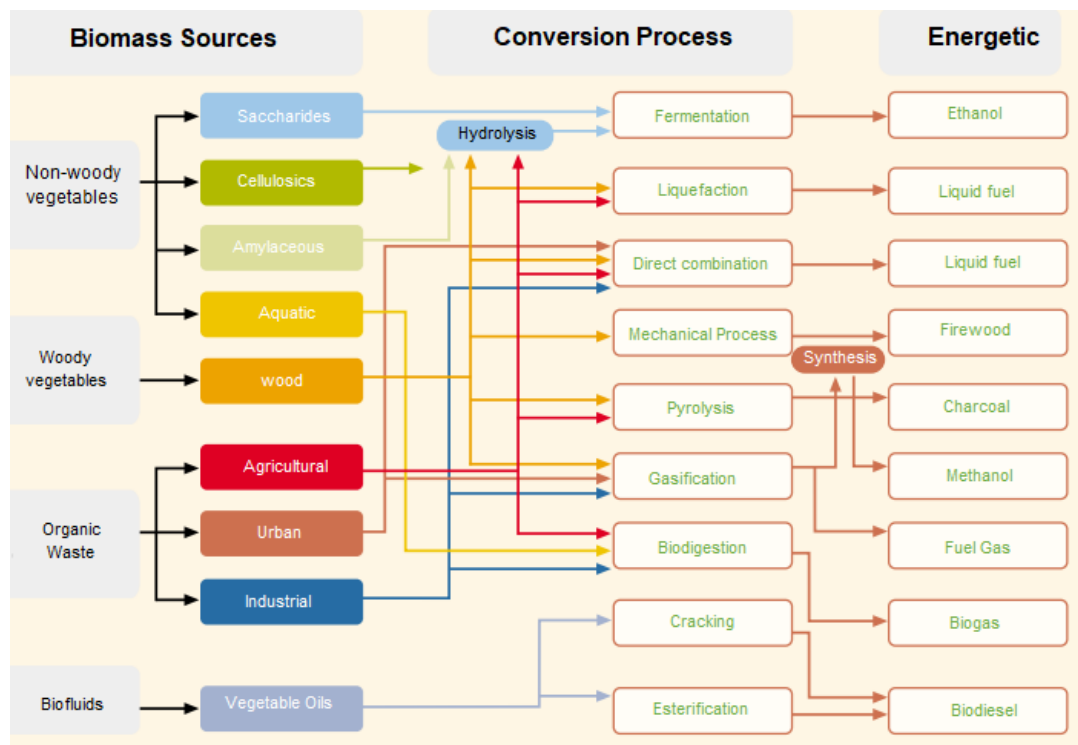


Figure 4. Diagram of the processes of energy conversion of biomass (adapted from ANEEL, 2005).

3.6 Net Present Value (NPV)

Net present value is a technique of analysis of investment cash cash flows of the company at a specified rate, using as a discount rate the TMA company. The NPV is the concentration of all the expected values of a cash flow in zero date. The NPV is obtained subtracting from the initial investment of the project of the present value of cash entries, discounting the opportunity cost rates used in the project itself. Both the entries as the outflows are translated into monetary values current (SOUZA & CLEMENTE, 2001).

According to Sanvicente (1996, p. 118) if the NPV is greater than zero, that means the company will get a return greater than your cost of capital, so you accept the project if NPV is less than zero, reject the project because, in this case, the return is less than the cost of capital used by the company in project.

3.7 Internal Rate Of Return (IRR)

Is defined as the discount rate that equates the present value of cash entries to the initial investment and a project, that is, is the discount rate that makes the NPV of an investment opportunity match-if the zero. The criterion of the TIR decision making has the following reasoning: when the IRR is greater than the TMA, so is adding value, therefore, accepted the project, if the IRR is smaller than the TMA, rejects the project (SOUZA & CLEMENTE, 2001).

3.8 Investment Recovery Period (Payback)

The Payback period refers to the number of periods needed for the flow of benefits exceed the invested capital and is usually expressed in number of years (HOJI, 2000). For Sousa (2007), the payback represents an important flag, associated with the time factor, the investor would be deposited to assume.

There are two approaches: the simple Payback, who works with cash entries for the dates that are expected

to occur without the application of any discount rate. And the discounted Payback, where the future cash entries, to end if amortization of initial investment, are presented in present values (SOUSA, 2007).

3.9 Pressure Reducing Valve

According to Ramos, Covas e Araújo (2004), the pressure reducing valves reduce a high pressure to an adjustable value after the valve. A spring holds the open valve that closes with increased pressure.

In the project under study this pressure reduction occurs on steam turbine, but if necessary the installation in parallel the turbine, a pressure reducing valve, thus stopping any plant when the need for maintenance in turbogenerators.

3.10 The Company

A logging company studied is an exporter and importer of lumber products, began its activities in the field of sawn wood in October 2007 in the mountainous region of the State of Santa Catarina, Brazil. Benefit products such as fences, handrails, stakes and lumber of various sizes. Currently, about 80% of the production of the company is committed to export, especially to the United States. With annual sales of around R\$ 20,195,448.93 for the year 2016, generating a total of 108 direct jobs and 50 indirect.

4. Search Results

In the specific case of this case study reach logging an average of 8,000 tons of log/month, however, only 50% reach the end of the process as a finished product, the other 50% generate waste as sawdust and chips. In 18 months the consumption of electricity purchased from the dealership generated a total cost of R\$ 1,804,274.12 (array + Branch), an average of R\$ 102,703.65 per month.

The best project after this study is the cogeneration using a back-pressure turbine, so the steam generated in the boiler of biomass will pass by the turbine, which will be coupled to a three-phase generator, providing electricity to the company and the surplus This generation will be directed to the concessionaire. After passing by the steam turbine is used for drying of wood in the kiln and after the steam heat exchange becomes condensed and back to the process, data presented in Figure 5.

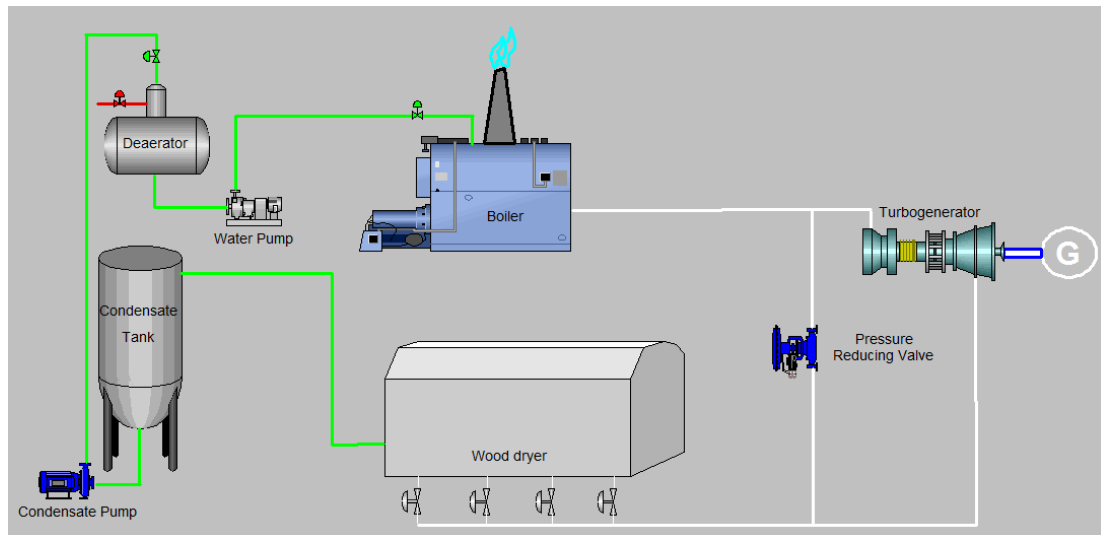


Figure 5. Schema of the cogeneration plant (Author, 2018).

4.1 Data Survey

The data in table 1 presents the data of cogeneration equipment. In the table 2 are listed the cost of the investment to be realized. The value required for the execution of the project are R \$3,300,000.00.

Table 1: Data of the equipment

	Pressure (Kgf/cm ²)	Temperature (°C)	Consumption (ton/h)		Generation	
			Biomass	Steam	kW/h	ton/h
Turbo generator	20	385		6	1000	
Pressure Reducing Valve	22/8	385				
Saturation valve	8	385/170				
Deaerator	1.2	120				
Boiler	22	385	2.4			6

Source: Engecass (2018).

Table 2: Investment

Investment of Equipment (R\$)	
Turbo generator	1,710,000.00
Pressure Reducing Valve	18,000.00
Saturantion valve	12,000.00
Transport	75,000.00
Assembly	225,000.00
Boiler	1,260,000.00
Total	3,300,000.00

Source: Engecass (2018).

In table 3 and 4 are presented 18 months of electric energy consumption and 12 months of matrix electric power consumption of the branch. One can see that the average consumption is concentrated in the array 152,691 kW/month, the branch consumes an average of 7,887 kW/month, but in terms of values, the results are significant. In the array the lower consumption happened in January 2011, with 86,495 kW and higher consumption occurred in August 2017 with 169,812 kW

Table 3: Electric energy consumption data

Analysis of electric power Consumption (Array)				
Month	Consumption(kW)	Accrued (kW)	Invoice (R\$)	Accrued (R\$)
October/16	144,273	144,273	80,699.11	80,699.11
November/16	144,867	289,140	83,210.31	163,909.42
December/16	149,188	438,328	84,591.85	248,501.27
January/17	86,495	524,823	51,201.63	299,702.90
February/17	138,609	663,432	77,116.97	376,819.87
March/17	146,842	810,274	84,100.79	460,920.66
April/17	170,442	980,716	99,670.75	560,591.41
May/17	155,581	1,136,297	87,647.72	648,239.13
June/17	158,351	1,294,648	93,703.70	741,942.83
July/17	158,462	1,453,110	88,185.70	830,128.53
Agust/17	169,812	1,622,922	99,778.31	929,906.84
September/17	162,136	1,785,058	104,842.00	1,034,748.84
October/17	168,605	1,953,713	113,208.22	1,147,957.52
November/17	167,934	2,121,647	114,053.95	1,262,011.47
December/17	165,015	2,286,662	112,879.39	1,374,890.86
January/18	137,795	2,424,457	92,861.05	1,467,751.91
February/18	164,880	2,589,337	141,715.51	1,609,467.42
March/18	159,103	2,748,440	139,317.28	1,748,784.70
Average	152,691		97,154.71	

Source: data provided by the company.

Table 4: Electric energy consumption data of the branch

Analysis of electric power Consumption (Array)				
Month	Consumption(kW)	Accumulated (kW)	Consumption(R\$)	Accumulated (R\$)
October/16	0	0	0	0
November/16	0	0	0	0
December/16	0	0	0	0
January/17	0	0	0	0

February/17	0	0	0	0
March/17	0	0	0	0
April/17	0	0	0	0
May/17	0	0	0	0
June/17	5,559	5,559	3,867.69	3,867.69
July/17	9,102	14,701	5,516.27	9,383.96
August/17	8,226	22,927	5,379.83	14,763.79
September/17	8,238	31,165	5,944.00	20,707.79
October/17	6,616	37,781	5,142.97	25,850.76
November/17	8,448	46,229	6,352.12	32,202.88
December/17	6,563	52,792	5,048.28	37,251.16
January/18	9,374	62,166	6,452.01	43,703.17
February/18	8,461	70,627	6,124.33	49,827.50
March/18	8,232	78,859	5,661.92	55,489.42
Average	7,886		5,548.94	

Source: data provided by the company.

In table 5 and 6 presents an analysis of the investment in the company. With the investment of us R\$3,300,000.00, would have an annual savings of R\$1,343,353.46. That without considering the effects of inflation and the depreciation of equipment. If we consider inflation, the results would be even more significant. The project is viable, because we have an NPV of R\$ 867,681.15 and an internal rate of return of 22.81%, as the rate of attractiveness was 10%, our IRR, is well above the market rate. If we take into account the size of the company, the same could capital at BNDES, with much lower interest rates. Our simple Payback, happens in 2 years, five months and 14 days and the discounted Payback in 3 years. For this type of project, the result is excellent, because it would be acceptable even with twice as much time.

Table 5. Analysis of return on investment

Month	Investment and Return				
	Year 0	Year 1	Year 2	Year 3	Year 4
Final cash flow	-3,300,000.00	1,343,353.46	1,343,353.46	1,343,353.46	1,343,353.46
Cumulative cash flow	-3,300,000.00	-1,956,646.54	-612,888.33	730,465.13	2,073,818.59
Discounted cash flow	-3,300,000.00	1,210,228.34	1,090,295.80	982,248.47	884,908.53
Discounted cash flow accumulated	-3,300,000.00	-2,089,771.66	-999,478.86	-17,230.39	867,678.11
NPV	867,681.15				

IRR 22.81%

Table 6: Simple payback and discounted Payback-balance point

Month	Investment recovery period (Payback)		
	Year	Month	Day
Simple Payback	2	5	14
Discounted Payback	3	0	0

5. Conclusion

In the analysis of this work a mountainous region requires thermal and electrical energy for the manufacture of the final product, so the cogeneration process is justified in the economy generated front the purchase of electric energy of the concessionaire, whereas, the steam is already used, which is inherent in the process. The general goal was to perform the analysis of the economic viability has been completely achieved, the project was viable, in addition to the shows company reduce costs with the purchase of electric energy, the capital invested in the project demonstrates a considerable return, the discounted payback happens after the third year of operation of the turbo-generator. The NPV was R\$867,681.15 and IRR was 22.81%.

Many difficulties had to be overcome for the implementation of this article, since personal problems, which came to interfere directly in gathering data in the enterprise where the study was conducted, as was also very difficult to get the budgets for the equipment needed for the project. Unfortunately the Brazilian companies, perhaps by little culture of investments in research with universities, or even by just targeting profit, passed budgets (the who gave a return) superficial, without a lot of technical data, in which kept contact, were not few, to total ten companies of the area.

In environmental terms, this project brings a considerable return, since all the water in the boiler, used today is discarded in the form of condensate after the thermal Exchange in wood drying kiln, with the cogeneration system, it forms a closed loop, where the condensate returns to the process, is to steam saturation, and/or to feed the boiler, i.e. all the water used will be reused. Another plus point is with regard to residues of the process, only 50% of the logs that come off the logging will turn the final product, so with 43.2% project execution of this biomass residue will be used in the boiler.

Of this research is as a recommendation for future work, the use of the rest of the biomass waste to an even larger generation of electricity, which would add value to this material, which is currently sold for a value negligible for companies in the mountainous region.

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Study on Teaching Methods for Engineering Project Management Based on Professional Accreditation of Engineering Programs

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Abstract

This article is focused on the teaching methodology for Engineering Project Management course. The course is an elementary and core course for automotive engineering major based on the requirement of professional accreditation of engineering programs. The course can be described as a course with big scale and more emphasized on industry. Three teaching methodologies have been used to coordinating with the course features: case-study learning, mission-driven learning, project-driven learning and flipped-classroom learning. The article addressed how the three methods have been applied in teaching. Meanwhile, the article also mentioned that a multi-methods evaluation should be more precise for evaluating students' abilities.

Keywords: engineering project management; professional accreditation of engineering programs; case-study learning; mission-driven learning; project-driven learning; flipped-classroom learning; multi-method evaluation

1 Introduction

Engineering project management is a subject which integrates science in management and engineering together. It is characterized by methods of restructuring management and adapting special management techniques, with the purpose of obtaining better control and use of existing resources. It has evolved from a management philosophy restricted to a few functional areas and regarded as essential to have to an enterprise project management system affecting every functional unit of the company. More and more companies are now regarding project management as being mandatory for the survival of the firm. Colleges and universities are now offering graduate degrees in project management. Project management is also a popular profession and career choice for many job searchers internationally. However, in academic areas, when searching the term 'project management' or similar terms, the come-out results always associate with construction projects or the so-called industrial management, and rarely find them on other field such as engineering fields especially in automotive research area while the project management approaches are everywhere around the automotive industry. In recent years, trends are changing. With more and more universities and colleges which have engineering majors are accreditation oriented, which raised managerial skills and abilities as one of the students' basic graduating requirements, project management related courses are set up for engineering majors, such as 'Engineering project management' course is one of the core course for automotive engineering major in Shanghai University of Engineering Science.

The paper is aimed to provide some generally and innovative ideas about how to share knowledges with students and increase their understanding and practical skills based on the experiences on teaching for the 'Engineering Project Management' course. The paper raises some teaching methods useful in teaching Engineering Project Management course, also proposes the examination method different from traditional examination methods.

2 Teaching Methods

In our country, traditional teaching methods, such as lecture method, discussion method, experimental teaching method, self-study method, etc. are more likely to be used for undergraduates. The newer methods at home and abroad include case-study teaching, task-driven teaching, project-driven teaching, flipped class teaching and bilingual teaching. The selection of methods should be carried out in accordance with the characteristics of the course itself and the requirements of the teaching objectives.

Engineering project management course are special for young Chinese engineering students for their majors' engineering priority are mainly based on basic courses such as mathematics, physics, engineering graphics, mechanics, mechanical design, mechanical principles, engineering materials, etc. They are rarely having economical and managerial courses such as economics, accounting, financial management and etc. As a so-called interdisciplinary course, engineering project management is totally different from the traditional engineering courses from teaching methodologies to examination methodologies. In traditional engineering courses, lecturer leading teaching methods are more common, while in managerial courses, or the so-called liberal arts courses or business courses, the student-oriented immersive teaching are more popular. As an engineering college lecturer, the first challenge is to change the passive teaching to more active ones. The most useful or successful ways used in the engineering project management course are case-based learning, mission-driven learning, project-driven learning and flipped-classroom learning.

2.1 Case-based Learning Method

Case-based Learning also means case-based teaching from different role-players' perspectives. From lecturers' perspective, the method could be called case-based teaching, which means the teachers use the cases as a medium to guide students to learn according to the teaching objectives, originated from Harvard University in the United States, and used for business management. The application of case teaching method in China appeared in the 1980s with the earliest traceable article Jingzhong Xie's 'Case Teaching Method in Staff Education Application Series' published on the *Beijing Adult Education journal* in March 1984. In this paper, the characteristics of the case teaching method, the feasibility of applying the education of staff in China, the preparation of teaching cases and case teaching and examples are studied and discussed. In the following decade, the discussion and application of the case teaching method in China's academic circles is not too high until the change of the undergraduate education model in the 21st century, the case teaching method has returned to the mainstream.

The main advantage of the case teaching method is that the visual and vivid case can stimulate students' interest in learning, improve learning initiative, help to transform theoretical knowledge into practical skills, cultivate teamwork awareness, and train students to discover problems, analyze problems and solve problems.

Therefore, for the engineering project management course, choosing the right case is one of the keys to using the case teaching method.

In the teaching practice, the cases suitable for the engineering project management course mainly include Dongfeng Automobile Logistics Management Solution, which mainly introduce Dongfeng Motor Corporation's information system development, Shanghai General Motors Logistics Cost Management Case, which introduced Shanghai GM's lean production and recycling mode to save costs and Toyota Motor Corporation's Logistics Cost Management Case which provided Toyota's lean production model. The case selection criteria are whether it is closely integrated with automobile projects, the case representativeness and time effectiveness. After selecting the cases, the lecturer would brief on the key points and difficulties of the case, group the students, then organize the students to conduct group discussions, and then form a group presentation after each group form a formal opinion. Comments and scores are given by the lecturer when all groups finished their presentation and report. Through the exercise of this process, students can actively find problems, analyze problems and solve problems within limited information, which is conducive to a deeper understanding and application of the theory, and strengthen their team-cooperating abilities through group discussions and reports. In the teaching process, the main performance of the results is the improvement of the attendance rate of the case discussion class and the improvement of the concentration of students. According to the attendance rate statistics, the attendance rate and the speaking rate of the students in the case discussion class are 15% and 30% higher than the average lectures respectively.

In addition, the case teaching method can choose the graduates' practice content in the corresponding automobile enterprises to explain the PMBOK practice to the students in a targeted manner, to match the actual situation of the undergraduates more closely, and to mobilize their enthusiasm much better. In the meanwhile, the engineering project management course is set at the 7th semester for the automotive engineering major, which means the students' graduating projects are perfect example for them in understanding the theories of project management such as time management, scope description, control theories, etc. it also can help students to formulate their graduating project process and priorities.

This teaching method is more suitable for the introduction of some theories or for the explanations and understanding of theories. However, because the students' thinking in the case teaching is easy to disperse, teachers need to be properly guided at the point. At the same time, because they occupy a long teaching time, the average case needs to take 1.5 class hours. In the case of limited class time, the teacher needs to carefully select the content and rationalize the time distribution.

2.2 Mission-driven Method

Task-driven learning method is a teaching method based on constructivist learning theory. It designs the teaching content into one or more specific tasks. Under the guidance of teachers, students are task-driven, and through the completion of tasks, they can cultivate the ability to discover, analyze and solve problems, as well as the ability to explore independently and the spirit of teamwork. It originated in the United States, and is represented by American psychologist Wittlock. The basic idea is that learning is the process in which learners actively construct their internal psychological structure, including structural knowledge and non-structural knowledge. On this basis, students can actively learn under the guidance of teachers.

The application of task-driven learning method in China's academic field can be traced back to the 'Application of Data Fusion Theory in Robot System Design' by Hai Zhao and Guangxing Wang of Journal of Northeast University in June 1995. Later, until April 2001, Xun Zhang and Zhengli Jin published the 'Advantage and Implementation of Task-Driven in the Teaching of Improving the Subject Status of College Students' in Journal of Hangzhou Institute of Electronic Technology which means the task-driven learning began to develop in the field of undergraduate education. Zhang and Jin's article mainly introduced the advantages of task-driven teaching in the teaching activities of practical courses in improving students' principal status, and gives a case study. From the research of scholars, it is known that task-driven teaching method conforms to the circular cognitive law of 'balance-imbalance-new balance' of human beings, and can give full play to the main role of students through the setting and completion of flexible tasks, which is conducive to the improvement of students' comprehensive ability.

The practice of using task-driven teaching method in the engineering project management course mainly lies in the big assignment (group project) that runs through the whole teaching process - completing the whole project process of students' own virtual enterprise. The whole assignment began at the end of the first lesson. The students are grouped into 4-6 groups. Each group is responsible for formulating a virtual enterprise or project started from stage 0, the idea generation to implementing of the whole process of project. After finishing a stage of project management course, the formulated teams should turn in an updated company file including project description, stakeholders and target customers reorganization, personnel assignment, project charter establishment, time and schedule management plan, cost management plan, quality management plan and etc. Each plan was corresponding to specific project management skills. The whole process is in a state of clear objectives, and can be closely related to the content of teaching, and the existence of grouping for students can promote their own expertise for division of labor and cooperation, but also because of the combination with practice, it also raised students' interests. In the process of teaching, teachers need give students guidance, feedbacks and evaluations of their achievements to help students summarize and expand their knowledge points.

In the process of teaching implementation, the difficulty lies in the collection and collation of relevant information. Some students' analysis is too formal, which violates the original intention of homework setting.

2.3 Project-driven Learning

In addition to case teaching and task-driven teaching methods, project-driven teaching is also an important part of the teaching mode reform in the new century. Project-driven teaching is a teaching method that designs the teaching content as a complete project. Under the guidance of teachers, students make plans in a group collaboration way and complete the whole project in a group collaboration manner, so as to achieve the goal of school knowledge, cultivate the ability of analysis and problem solving, and cultivate the spirit of team cooperation. Compared with the task-driven teaching method mentioned above, the project-driven teaching method is more open, comprehensive and practical. In the process of students completing the project, students are not restricted to play, but free to explore various ways and methods to complete the project. And because of the need to complete the project, students need to understand multi-disciplinary and professional knowledge, which is helpful to cultivate their learning ability, problem solving ability and team building ability. In addition,

the project pays more attention to social needs than the task, so that the practicability of teaching is strengthened.

The big assignment (group project) mentioned above is a perfect example for the project-driven learning. From the teaching practice, this kind of teaching method has strong practicality. Teachers only play a guiding role. It is suitable for the situation with clear purpose and certain practical project design as support. Similarly, because project-driven teaching method is the further development of task-driven teaching method, there is a free-rider behavior of students, which should be paid attention by the teacher for the examination purpose.

2.4 Flipped-classroom Learning

Flipped-classroom teaching is popular when online training are getting more and more common. In the flipped-classroom learning, the traditional learning process (teacher's speaking and student's listening) is reversed to enable learners to complete independent learning of knowledges and concepts in extra-curricular time. The classroom becomes a place for interaction between teachers and students, mainly for answering questions and reporting discussions, so as to achieve better teaching effect. This is a kind of reversal of teaching structure and mode, which not only innovates the teaching mode, but also reverses the traditional teaching structure, teaching mode and teaching mode, and establishes a more thorough 'student-centered' teaching mode. Under this mode, students become the main body of learning, while teachers are the organizers, helpers and instructors of students' learning. The application of this method can give full play to students' subjective initiative and cultivate students' exploratory and innovative abilities. In the process of classroom discussion and questions answering, the students' ability to ask questions and summarize questions is also trained. At the same time, the students' ability of communication and teambuilding is also been enhanced. In the meanwhile, a teacher's interaction with students in a flipped classroom can be more personalized and less didactic, and students are actively involved in knowledge acquisition and construction as they participate in and evaluate their learning.

Due to the limitation of curriculum characteristics, the use of flipped-classroom teaching method is just a part of the whole class, mainly concentrated in the need to strengthen the application of theory. However, almost two third of the students are going to prepare for the graduating college exam, the outcoming of turn-over class method was not as obvious as other methods, which means it need further implementation in the future teaching.

3 Examination Methodology

In the teaching practice, it also explores the assessment methods of the curriculum. Traditional undergraduate course assessment methods are examination centered with various ways include closed-book exam, open-book exam, semi-open-book exam and papers. According to the characteristics of this course, the examination method of paper form has certain requirements for time and energy, and it is less likely that the course will be used alone. Closed-book examination, open-book examination and semi-open-book examination can be used as a form of final examination.

In teaching practice, the assessment of students' performance is no longer limited to the students' usual performance and final examination or paper results, but with a valid combination of four parts: case analysis

results, task follow-up results, final close-book examination results and attendance status at ordinary times, in which case analysis results are set according to the teaching content of the semester. The number of cases accounted for 15-30% of the total score, while the scores of cases were scored scientifically and differently according to the discussion within and outside the group and the final group speech, combined with each student's mutual evaluation in the group. The task completion degree was similar to the case assessment, which was scored by the group's final report and the group members' 'mutual evaluation, accounting for 20-30%. Final exam scores accounted for 45-50% of the total score, while the rest were graded according to the usual attendance performance. This comprehensive form of assessment integrates all aspects of consideration, changing the original assessment method only through attendance and final examination results to measure the state of students' learning, diversified assessment methods help to measure students' comprehensive level.

In the process of practice, this comprehensive evaluation method is highly praised by students, and the average score of students is 73.5 points in the percentage system. There are relatively few students above 85 points and below 63 points. The whole performance curve is relatively smooth, and conforms to the standard normal distribution, which has a certain degree of scientific nature. However, there are high demands on teachers to determine the role of students in case teaching and task-driven teaching reasonably and correctly, and to use the appropriate question-setting methods on the fairness and impartiality of performance determination.

4 Conclusion

Under the new situation, the training of talents in universities should be closer to the needs of enterprises and society. Therefore, the continuous exploration and improvement of teaching methods and assessment methods will contribute to the realization of the training objectives of talents in universities, and the summary of their experiences and lessons can be extended to other similar disciplines with strong practicality and wide scope, which has certain practical significance.

Acknowledgement

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Development of Computational Thinking in Brazilian Schools with Social and Economic Vulnerability: How to Teach Computer Science Without Machines

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Abstract

Computational Thinking (CT) has been placing the focus of educational innovation as a set of troubleshooting skills. Unfortunately, there is not a consensus if the teaching methodology and the available materials attend the expectations of the lecturers. To prove the impact that CT training has in primary school, we attempted to evaluate primary school students with a Quasi-Experimental approach and taking Unplugged CT classes in Brazilian Schools with Social and Economic Vulnerabilities. The research happened in two schools to prove if the activities are effective for students who live in areas where there are no electronic devices, Internet or even electrical power can be also benefited. The results show statistically significant improvement. Our study finds shows that we are able to reinforce the claim that CS unplugged is an effective approach and it is an alternative for students who live in unprivileged areas.

Keywords: Computational Thinking Unplugged; Evaluation; Computers in Education; Primary School; South America; Brazil

1. Introduction

In current times, marked by the fluidity of information and the value placed on knowledge, the challenge imposed on users of information and communication technologies has been to create their own systems (for example, programs and games) or modify existing ones according to their personal needs. More than ever, in order to deal with information, to process it and to transform it into competences, the domain of knowledge and skills related to Computational Thinking (CT) has become fundamental (Kologeski, Silva, Barbosa, Mattos, & Miorelli, 2016). Due to this trend, CT has been adopted in several countries in primary schools (C. Brackmann, Barone, Casali, Boucinha, & Munoz-Hernandez, 2016).

Wing (2006) defines CT as a mental activity for the formulation of a problem that can be solved computationally, in other words, it is a thought processes involved in identifying a problem and expressing its solution effectively, so that both machines and people can execute them. Publications and researches led by Code.Org (CODE.ORG, 2015), Liukas (2015) and BBC Learning (2015) merged the elements cited by Grover and Pea (2013) summarizing the so-called "Four Pillars of Computational Thinking" (or

dimensions) for a problem-solving approach: Decomposition, Pattern Recognition, Abstraction, and Algorithms. These pillars are very important and are interdependent during the process of formulating computationally feasible solutions.

Therefore, Computational Thinking involves identifying a complex problem and dividing it into smaller, easier-to-manage pieces (DECOMPOSITION). Each of these smaller problems can be analyzed individually in greater depth to identify similar problems that were previously encountered (PATTERN RECOGNITION), focusing on the important details and ignoring irrelevant information (ABSTRACTION). Finally, simple steps or rules can be created to solve each of the sub-problems found (ALGORITHMS). By proposing rules or steps used to create a code, the result becomes understandable for use in computational systems, and consequently, in solving complex problems efficiently.

In this context, different activities were created and adapted for teachers so that they could use and replicate this material in their classes without the need for electronic equipment, internet, or electricity. Such activities enabled children to study computer concepts in schools without appropriate equipment (e.g., ruined, outdated, or lacking) or located in geographically distant areas (e.g. rural or forest areas). It is believed that, by using these activities without the use of machines (hence, unplugged activities), it is possible to teach Computational Thinking in a more accessible manner, using basically paper, scissors, pens, coloring pencils, glue, and other commonly used school materials.

The unplugged approach is the only one possible for a huge number of schools around the world that do not have basic technology infrastructure (Unnikrishnan, Amrita, Muir, & Rao, 2016), such as electricity, Internet, computers, mobile devices, and other electronic devices. According to UNESCO, the use of ICT in education is still at a very early stage in most countries in sub-Saharan Africa, since the percentage of basic infrastructures in primary schools is under 15% in all the region (UNESCO Institute for Statistics, 2015). In other regions, such as Asia, the percentage of schools with basic infrastructure is also far from being close to 100% (UNESCO Institute for Statistics, 2014). But even in most European countries, there are still remote, rural areas with a lack of proper resources.

In the literature, there is little research on the application and evaluation of unplugged students. Seeking to fill this gap, this paper presents research carried out in two primary schools in Brazil, where the objective was to verify the effectiveness of Unplugged Computational Thinking classes in primary education. To accomplish this, pre and post-test questionnaires were applied, before and after Unplugged Computational Thinking classes, in order to verify if the children presented better performance regarding Computational Thinking abilities by doing activities without computers. On that ground, Computational Thinking learning objects were developed, classroom interventions were carried out with unplugged activities and, at last, the evaluation of the Computational Thinking of the students who participated in the intervention and the control group occurred.

Thus, this article is composed of six sections that follow this Introduction. The second section is regarding the history and contextualization of the Unplugged Computational Thinking approach. The third section presents the methods and materials used in the research, followed by the fourth section in which shows the quantitative and qualitative results. Finally, the fifth section presents the conclusion of the paper and recommendations for future work, which is followed by acknowledgements of the institutions supporting

the research, as well as the bibliography used.

2. Computational Thinking in Basic Education

In Brazil, the final document of the Base Nacional Comum Curricular (National Curricular Common Base) (BNCC), which is a document created to conduct the teaching of Brazilian schools, from kindergarten to high school, was finally approved by the Minister of Education (MEC) in December 2018. All school institutions in Brazil must, necessarily, implement the BNCC by the end of 2019.

In its paper, BNCC states that throughout basic education, students must develop "Ten General Competences", both cognitive and social-emotional, which include the exercise of intellectual curiosity, the use of digital communication technologies and the appreciation of individuals diversity. One can highlight three competences that follow the line of Computational Thinking, being them (MEC, 2018):

- To exercise intellectual curiosity and to use the science-based approach, including research, reflection, critical analysis, imagination and creativity, to investigate causes, to elaborate and test hypotheses, to formulate and solve problems and to invent solutions based on knowledge of different areas;
- Use verbal knowledge (oral and written) or verbal-visual (as in Libras, Brazilian Sign Language), body, multimodal, artistic, mathematical, scientific, technological and digital languages to express and share information, experiences, ideas and feelings in different contexts and, with them, produce meanings that lead to mutual understanding;
- Use digital communication and information technologies in a critical, meaningful, reflective and ethical way in the various daily practices (including the school ones) by communicating, accessing and disseminating information, producing knowledge and solving problems (MEC, 2018, p. 11).

In addition, the BNCC predicts the use of concepts of Computational Thinking in Mathematics disciplines to assist the process of solving a problem, according to (MEC, 2018):

Algebra learning can contribute to the development of students' Computational Thinking, since they need to be able to translate a given situation into other languages, such as transforming problem situations presented in the mother language into formulas, tables and graphs, and vice versa.

Associated with Computational Thinking, it emphasizes the importance of the algorithms and their flowcharts, that can be study objects in the classes of Mathematics. An algorithm is a finite sequence of procedures that solves a given problem. Thus, the algorithm is the decomposition of a complex procedure into its simplest parts, relating and ordering them, and can be graphically represented by a flowchart. Algorithmic language has points in common with algebraic language, especially in relation to the concept of variable. Another ability related to algebra closely related to Computational Thinking is the identification of patterns for establishing generalizations, properties, and algorithms (MEC, 2018, p. 271).

The integration of PC in Basic Education is also analyzed in Valente's research (2016), where he carries out a survey among different authors and defines six categories of approaches in teaching the concepts of Computing in Basic Education, namely: activities without the use of technologies, programming in Scratch, pedagogical robotics, digital narratives productions, game creation and use of simulations.

Each of the approaches has a different characteristic to reach the common goal: the development of Computational Thinking. Notice that all the approaches mentioned in the research require the use of specific equipment and software, except the first. A non-technology approach, also known in the literature as "Unplugged Computational Thinking" or "Offline," has become one of the main focuses of this research, considering its ease of application in different economic and social realities in Brazil.

3. Unplugged Computational Thinking

The literary records about the emergence of Unplugged Computational Thinking are diffuse, since it is known that the need for abstraction to create any software and hardware is an essential part of Computer Science (CS). Instead of participating in an expository class, unplugged activities often occur through kinesthetic learning (e.g., moving, using cards, cutting, pasting, drawing, painting, solving riddles, etc.) and students work together to learn CC concepts.

In relation to elementary education classrooms, the first records refer to Bell *et al.* (1997), with the launch of a book draft in digital format called "Computer Science Unplugged. Off-line activities and games for all ages," intended for teachers interested in differentiated classes for their students, applicable at all academic levels. At the time the idea was well received by the other teachers, as well as by Academia. Due to the quality of the material published, the Association for Computing Machinery (ACM) recommended that the activities contained in the book be part of the curriculum proposed by the Computer Science Teachers Association (CSTA) of the United States of America. Until the publication of this article, the book *CS Unplugged* is in version 3.1 and can be accessed at the project site (Bell, Witten, & Fellows, 2015)

There are several studies that investigate the efficiency of programming languages (visual and coding) with children (Román-González, Pérez, & Carmen Jiménez-Fernández, 2015) (Román-González, Pérez-González, & Jiménez-Fernández, 2017) (Shuchi Grover & Basu, 2017) (Franklin et al., 2017)), but they lack unplugged approaches. Other studies have attempted to standardize the evaluation and teaching of CT Unplugged activities, such as (Nishida et al., 2009), in which he presented a proposal for a design pattern, a transversal evaluation of CT at a high school (Feaster, Segars, Wahba, & Hallstrom, 2011), case studies in the process of adopting CT in the classroom (Curzon, 2013), and evaluation of student points of view regarding CS before and after CT classes (Taub, Ben-Ari, & Armoni, 2009), as well as suggestions on how teachers can assess student progress in performing CT activities (Curzon, McOwan, Plant, & Meagher, 2014). Lambert *et al.* (Lambert & Guiffre, 2009) made a similar attempt, however to identify an increase in interest in the areas of Computation or Mathematics, without checking the increase/decrease in skills related to Computational Thinking.

The solution proposed by (Rodriguez, Stephen, Rader, & Camp, 2017) sought to evaluate students doing unplugged activities at basically three-levels (proficient, partially proficient, and unsatisfactory). In (Campos et al., 2014) there was also the attempt to adopt a test, however without presenting satisfactory results. However, (Scaico, Mychelline, Cunha, & Alencar, 2012) carried out an evaluation of student success, but without the use of a pre and post-test to verify changes in their performance.

The works cited here are part of a large set of studies that try to measure CT skills, but do not use a direct solution that is easy to apply and with a formal validation process to achieve a more precise result as

proposed by (Román-González, 2015; Román-González et al., 2015).

Without proper evaluation, Computational Thinking in the classroom will not be likely to follow the path of success in any curriculum (Grover, 2013), that is, in addition to the need to evaluate the effectiveness of any curricular approach by integrating Thought Computational, it is necessary to define attributes that allow educators to evaluate what students have learned.

It is also important to note that the use of physical examples and school materials are common to simulate the behavior of machines up to the present day in undergraduate courses. Many important Computer Science (CC) topics can be taught without the use of computers. The unplugged CC approach introduces hardware and software concepts that take everyday technologies to non-technical people.

4. Methods

In this section, we describe the sample in our research, and how participants were divided into two different groups-conditions: the experimental group-condition and the control group-condition. Then, we present the instrument used for assessing the CT skills of the participants from both conditions, with a pre-test and a posttest. The pedagogical materials containing the unplugged activities taken by the experimental group along the teaching sessions are then explained. Finally, we report the procedure followed in our quasi-experiment.

4.1 Participants and Test Groups

The research was developed in years 2016 through 2017. The valid sample of our quasi-experiment, that is, the set of individuals who were assessed both in the pre-test and post-test time, is composed by 63 students enrolled in the 5th and 6th grade (10-12 years old). The CT Tests and the classes were applied in a public-school system in the city of Santa Maria, an inland city of the Rio Grande do Sul state. The children who participated in the research were chosen randomly by the school management and they participated in the research activities on a voluntary basis. None of the participants had formal programming experience. The distribution of the participants by gender, level, age, and class (group) are shown on **Table 1**.

Table 1. Distribution of research subjects

	Grade	Age	Cond	Gender		Total
				Boys	Girls	
School A	5 th	10-11	C	7	3	10
			E	7	8	15
School B	6 th	11-12	C	13	6	19
			E	8	11	19
Total				35	28	63

Author

4.2 Evaluation Instrument: The Computational Thinking Test

The Computational Thinking Test (CT Test) (Román-González, 2015, 2016; Román-González, P rez-González, et al., 2017) was the instrument used to assess the level and development of the participants' CT skills. The CT Test was selected for our research because of its precise (although necessarily reductionist) operational definition of CT, which may shed some light on the controversy surrounding this often blurry construct (S. Grover & Pea, 2013; Kalelioglu, Gülbahar, & Kukul, 2016). The CT Test was also elected due its quantitative and aptitudinal approach, and because it has already undergone a rigorous validation process, which has stated its content validity (Román-González, 2015), criterion validity (Román-González, P rez-González, et al., 2017), and convergent validity (Román-González, Moreno-León, & Robles, 2017). This test attempts to identify the skills to form and solve problems, based on the fundamental concepts of computation, in addition to using the logical syntax used in programming languages. All the items that assemble the test involve, to a greater or lesser extent, the four-pillar cognitive processes of CT: decomposition, pattern recognition, abstraction and algorithmic design. Thus, when a student tries to solve an item (e.g., item #8, see **Figure 1**), the student must: break down the steps that the Pac-Man should follow; recognize the visual patterns on the marked path (e.g, in the item #8 there is a repeated pattern that consists of advancing four squares and then turning to the right); abstract the core elements of the problem and ignore the irrelevant details (e.g., such as the color of the path or the features of the characters); and design an algorithm to solve the problem, which involves some computational concepts (e.g., in item #8, nested loops must be used along the algorithmic design).

The psychometric studies of the CT Test support that this test is reliable ($\alpha \approx .80$) and valid for assessing the level of CT in students from 10 to 16 years old. The instrument is composed of 28 multiple choice questions, each of which has four alternative answers of which only one is correct. It is divided basically into three parts, the first uses arrows to move the character, the second makes a move related to the position and direction of the character using blocks and the last one uses a pencil to make drawings also using blocks. The test can be applied using any browser (e.g., Chrome, Firefox, Edge) and may be accessed from any device. The study only used the school's computer lab equipment. Three examples of the CT Test are show in Figure 1, Figure 2 and Figure 3 (Anonymous, 2007).

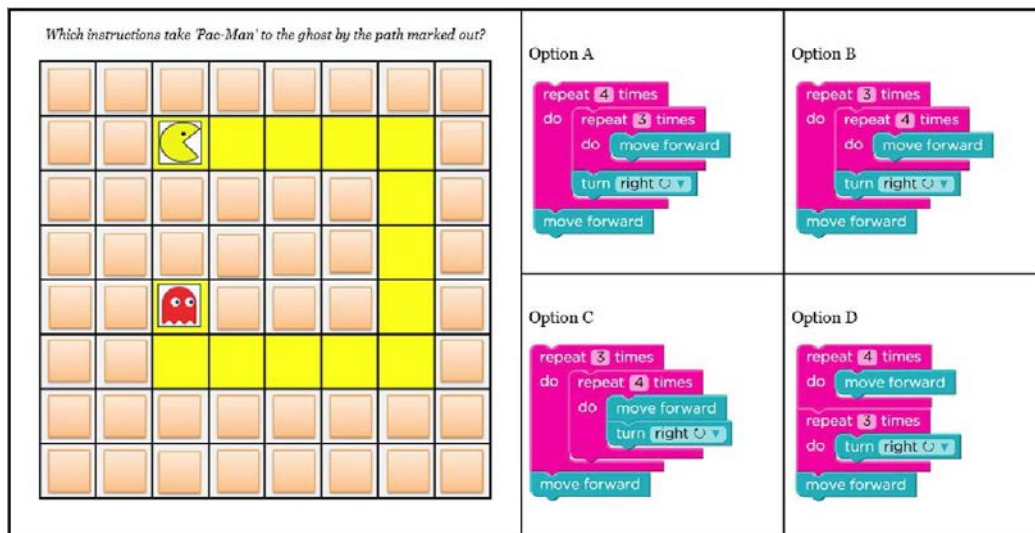


Figure 1. CT Test, question #8 ('maze'): loops 'repeat times' (nested); 'visual blocks'; 'sequencing'.

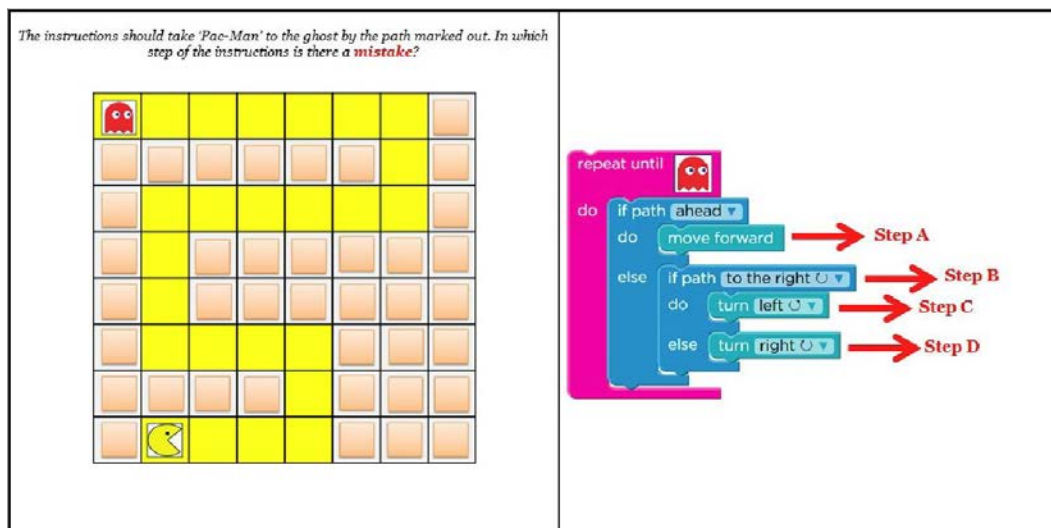


Figure 2. CT Test, question #16 ('maze'): loops 'repeat until' + if/else conditionals (nested); 'visual blocks'; 'debugging'.


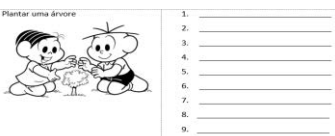
<p>The following set of instructions is called 'my function', and draws one triangle of 50 pixels each side:</p> <pre> Function my function repeat 3 times do move forward by 50 pixels turn left by 120 degrees </pre>	<p>Option A</p> <p>15</p>	<p>Option B</p> <p>5</p>
<p>The instructions below should make the artist draw the following design. Each side of each triangle measures 50 pixels. What is missing in the instructions?</p> <pre> repeat ??? times do my function jump forward by 50 pixels </pre> 	<p>Option C</p> <p>4</p>	<p>Option D</p> <p>3</p>

Figure 3. CT Test, question #26 ('canvas'): loops 'repeat times' + simple functions; 'visual blocks'; 'completing'.

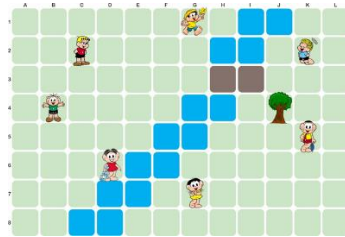
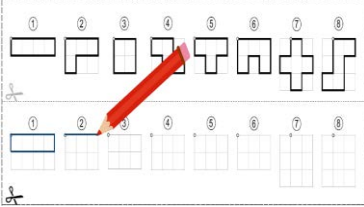
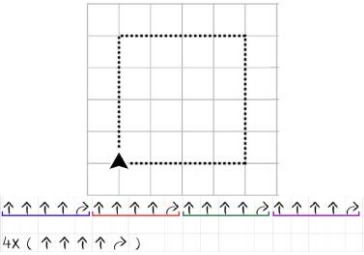
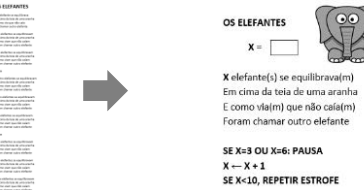
4.3 Development of the Activities

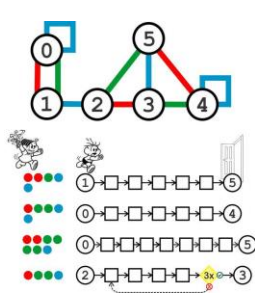
Most of the pedagogical unplugged materials used with the experimental group were developed by the authors for this study, while the rest were translated into Portuguese and adapted from pre-existing activities such as the book *Hello Rubby* (Liukas, 2015) and the board game "Code Master", created by (Engelberg & Thinkfun, 2015). In an attempt to attract the children's attention, popular characters were also used in the activities. For the reader to become familiar with the activities, some are presented in **Table 2** and others activities are available in the "*Pensamento Computacional*" website⁹. It is important to mention that the main objective of the activities is to assist in the teaching/learning process of Computing concepts for elementary school children. Its application procedure is described in greater detail in the following section.

Table 2. Activity Examples

Image	Description of Activity	Main pillars involved
	<p>"Decomposition" activity: Students had to break down many problems (e.g. Plant a tree) identifying all the steps necessary to solve it. Other examples were: Wash Hands, Prepare breakfast, Take an elevator, Tie a shoe, etc.</p>	<p>Decomposition Algorithms</p>

⁹ <http://www.computacional.com.br/>

	<p>"Monica's Map" activity: A map with many characters is shown to the students and they have to find the shortest route between them using only up, down, left and right arrows (\rightarrow, \leftarrow, \uparrow, and \downarrow). On a second moment, they should use multipliers (i.e. $\rightarrow \rightarrow \rightarrow \rightarrow \rightarrow = 5x\rightarrow$) to write down the solutions.</p>	<p>Pattern Rec. Algorithms.</p>
	<p>"Tetris" activity: some drawings of Tetris pieces are presented to one of the students who gives instructions to its partner. The student who got the upper part of the paper had to hide the images from the partner so it would be possible only to hear the instructions without looking to the answers. The instructions are limited to "start", "up", "down", "left", "right", and "stop". No other words can be used to describe how the figure is drawn.</p>	<p>Abstractions Algorithms</p>
	<p>"Repetition Drawing" activity: allows the students to understand the use of repetitions on Tetris-like figures. In this case, the students need to use instructions based on the perspective of the direction of the arrow and try to use the most amount of multipliers in their command. Differently from the "Tetris" activity, the students do it individually and only the use of turn left, turn right and forward are available (\uparrow, \curvearrowright, and $\frac{1}{4}$). The pillars of abstraction, pattern recognition and algorithm are mainly developed.</p>	<p>Decomposition Abstractions Pattern Rec. Algorithms</p>
	<p>The Elephants: the activity uses a popular children's song to exemplify how a song can become an algorithm. This particular song works on the concepts of repetition, variables, and conditional statements.</p>	<p>Pattern Rec. Algorithms</p>

	<p>"Monica's Automata": The last activity is a simpler remake of the Code Master board game developed by the ThinkFun company. In this activity the student is supposed to find a route between two nodes using the allowed colors for each path. All the colors had to be used, leaving no blank spaces. The number located on the left side is the start point and on the right side the finish point.</p>	<p>Decomposition Abstractions Algorithms</p>
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Author

4.4 Procedure

To apply this research, contact with the schools and the project presentation were made up to one month in advance of the beginning of the tests and the classes. The researchers were very well received by both institutions, which offered all the necessary support. Each of the schools had at least two classes of a specific grade (School A: two fifth grade groups and School B: two sixth grade groups). Among the available classes, the Experimental Class and the Control Class were randomly selected, respecting the existing grouping of the subjects in their natural classrooms (i.e. the individuals were not randomly assigned to the conditions).

The classes with Unplugged CT activities were applied to the Experimental Group after the pre-test and before the post-test, totaling 10 class hours. However, in order for the Control Group to have the same opportunity to benefit from the proposed activities, CT classes were given after the post-test, without generating the quantitative and qualitative data. Thus, both groups did the same activities in a different order, as shown in Figure 4.

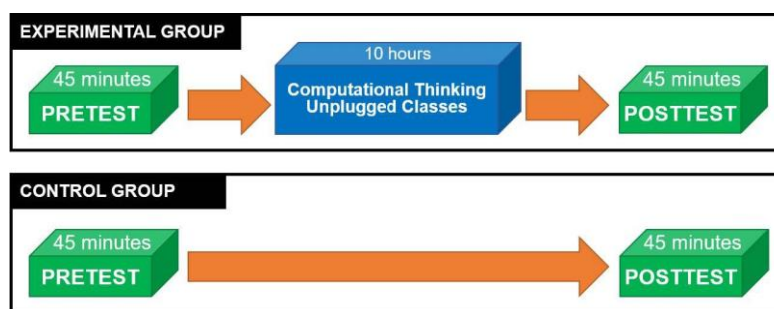


Figure 4. Research Stages

During the first week of the research, students from all four classes were invited to participate in the experiment as part of their regular classes during the first semester of 2017. For the application of the pre-tests, the students were accompanied by their teachers to the school's computer lab, where they remained for up to 60 minutes to carry out an individual test developed described in section 4.2.

During the next five weeks, once a week (approximately two hours per week) CT classes were given to the experimental group using the materials presented in section 3.3. In each weekly session, it was possible to work on an average of two activities.

In the seventh week, students from both groups (Experimental and Control) were sent back to the computer lab so they could take the post-test in the same way as described before. After six weeks elapsed between the pre-test and the post-test, it is a sufficient time to avoid the undesirable 'memory-effect' of using an identical set of items at both administrations.

All student responses were recorded in the Google Cloud so they could be viewed, retrieved, and converted, and then tabulated and analyzed statistically by XLStat 2018.3 and Past 3.20 (Hammer, Harper, & Ryan, 2001). Results and discussions on the collected data are available in the next section.

5. Results and Discussions

This section briefly described the findings of our quasi-experimental research. At the first moment, we report the qualitative results which include informal observations of the researchers during the application of unplugged activities and the CT Test. In the next section, we present the quantitative results which intends to answer the research question "Did que unplugged activities improve the Computational Thinking skills of the students?". Remembering that none of the students had any previous contact with formal programming classes.

5.1 Qualitative performance of student activities

During the application of the tests and activities, the researchers made several notes related to minor adjustments or corrections of the activities to make them easier to understand. Due to space limitations, only the most relevant records are listed below (please use **Table 2** as reference):

- All activities were well accepted by the students, depending on the class level (e.g., "The Elephants" activity uses children's music and did not appeal to older students). The most motivating activity was the "Monica's Automata" because it involved several steps (cutting, pasting, and strategy creation). Since the activity also had more than one correct answer, the students enjoyed comparing and discussing with their colleagues the various possibilities.
- During the "Repetition Drawing" activity, more than half of the students had difficulty understanding the position and direction (perspective) of the arrow. The activity had to be explained several times and in different ways until the students could understand the behavior of the arrow and the commands needed to control it as expected. The most appropriate solution was to stand and walk/rotate according to the commands the students wrote on paper.
- Very large deficiencies in basic mathematical concepts and even literacy were identified. There were cases of students who were unable to read or understand an activity, thus not being able to complete the tasks in full. There were also several cases of serious Portuguese errors and sentences lacking concordance at both grade levels.

- During the post-test application, the researchers noticed that intervention groups took longer, on average, to complete the test. According to the students, they took longer because, as they had worked on the concepts previously in class, they paid more attention to the test questions.

5.2 Quantitative Performance of Computational Thinking Tests

The score of the CT tests was calculated according to the amount of questions answered correctly, remembering that the test is composed of 28 questions. As explained in section 4.4, the test was applied in both the Experimental and Control Groups.

The results obtained with this instrument were submitted to statistical procedures in order to test the null hypothesis, in other words, to evaluate if there was a difference between the results of the pre-test and post-test and if this difference was significant. The **Table 3** shows the number of participants (N), results of the means, standard deviations and Median of the two classes and the pre- and post-test scores performance alteration.

To verify if the mean improvement was statistically significant or occurred at random, the T-Test for paired samples was used, considering a 95% confidence interval. In the Experimental Group, the result found were $P(T \leq t)$ two-tailed = 0.013 and 0.020. Considering that these values are less than 0.05, there is a significant difference between the averages from a statistical point of view. The same data treatment was used in the Control Group and $P(T \leq t)$ two-tailed = 0.484 and 0.916, in other words, in these groups there were no improvements in performance. Taking into account the p-value (0.484) obtained in the 5th year of the School A, higher than the nominal value in the control group, it was not evidenced the hypothesis rejection of equality of the group for the Test, with that, without any performance improvement. The opposite occurred in the experimental group, where a p-value lower than the nominal value (0.013) was observed, indicating a significant difference between the pre- and post-tests, evidencing the rejection of the null hypothesis. For the 6th year of School B, a p-value (0.916) was higher than the nominal level in the control group, and the rejection of the hypothesis of equality of the group for the test was not evidenced, proving that there was no significant performance improvement. The opposite occurred in the experimental group, where a p-value lower than the nominal value (0.020) was found, indicating a significant difference between the pre- and post-tests, as well as evidence of rejection of the null hypothesis. This fact reinforces the theory that the improvement in Computational Thinking in the Experimental Group was in fact motivated by the unplugged activities. Thus, the data presented shows that there was an improvement in the student performance in the Experimental Group and stagnation in the Control group. The results are also in **Figure 5** where the data was plotted using error bars with 95% confidence intervals for the means of the CT Test.

Table 3. Statistical Results

		N	Test	Mean	SD	Median (IQ)	p-value	Performance Alteration
School A (5 th grade)	Control	10	Pre-test	9.30	3.59	8 (6,75-11,25)	0.484	+1.00
			Post-test	10.30	3.09	11 (7,5-12,25)		(+10.75%)

School B (6 th grade)	Experimenta 1	15	Pre-test	9.93	3.26	9 (8-11)	0.013	+1.80
			Post-test	11.73	4.03	10 (9-14)		(+18.12%)
	Control	19	Pre-test	9.68	4.07	10 (7-11)	0.916	-0.11
			Post-test	9.58	3.45	10 (7-3)		(-1.09%)
	Experimenta 1	19	Pre-test	9.16	3.10	9 (7-11)	0.020	+1.89
			Post-test	11.05	4.54	10 (7-15)		(+20.69%)

Author

We consider that these finding have two additional implications: 1) demonstrates that the CT Test is a valid and sensitive tool to measure improvements on CT skills of the participants not only after practicing with “plugged” activities, but also in “unplugged” activities; 2) The results give evidence that unplugged activities can be used as part of the school regular classes, enabling the guidance for future curriculum decisions of teachers and policy makers. Overall, the results allow us to answer the research question through our quasi-experimental approach.

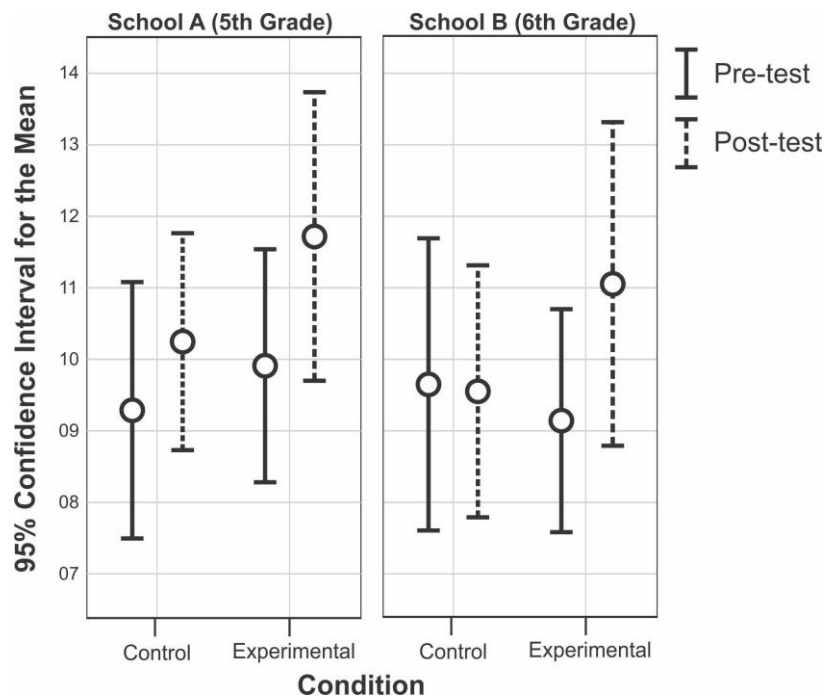


Figure 5. Error bars with the 95% confidence intervals for the means of the test score, split by school and grade, for both groups-conditions, and in pre-test and post-test times.

6. Limitations and Threats to Validity

Some limitations and threats to validity of our research can be pointed out:

- The CT Test has some limitations, since it is heavily focused on computational concepts, only partially covers computational practices, and ignores computational perspectives (Brennan & Resnick, 2012). Moreover, the CT Test has a (deliberately) reductionist conception of CT, which puts over-emphasis on path-finding algorithms;

- Most of the unplugged activities carried out along the research might be considered as excessively and artificially aligned with the items of the CT Test. Therefore, if a different set of unplugged activities had been used, we would probably have obtained different results;
- The small size of the sample should be noted ($N < 120$), in order to consider the limited generalization power of our results.

7. Conclusions and Future Efforts

This paper presented a brief introduction to Computational Thinking, its history and the quasi-experimental research carried out in two Brazilian schools to attempt to test the efficiency of unplugged activities to allow countries with economic and social vulnerabilities to teach Computer Science during their formal education without the need of a machine or another equipment.

The study was carried out in two public schools that are located in unprivileged areas. All students who participated in the research were divided into two groups (control and experimental). The experimental group, after taking the pre-test, participated in classes about Computer Science without the use of machines (unplugged), while the control group didn't have the lessons. After the post-test, it was possible to compare the results and identify that there was an improvement in the student performance in the Experimental Group and no alteration in the Control group's score. Consequently, these findings provide empirical evidence about the effectiveness of the unplugged approach to develop CT skills and contribute to reaffirm that Computational Thinking as a cognitive variable which mainly consists in problem-solving ability or process whose development doesn't necessarily is connected only to computer programming (Wing, 2006). The review of studies that provide evidence on the utility of unplugged computing to develop CT skills has identified the importance of deepening empirical research, especially when it comes to its use in primary schools. Consequently, with the research reported in this article, we sought to add relevance to the list of evidence.

Based on the experience gained during the process, it was possible to conclude that the children were very enthusiastic and motivated during the CT classes. Teachers also expressed great satisfaction with the opportunity given to their students. In general, schools were remarkably receptive to CT classes, and did not create any barriers to the project.

As can be seen in **Table 3**, there was a considerable improvement in students' scores with highly significant statistical results in the experimental group after 10 hours of Unplugged Computational Thinking, unlike the Control group which maintained a post-test score very close to their pre-test score. These results proved the efficacy of the unplugged approach and met the main goal of this study. The positive data could also be understood as a very small variation in performance improvement, but it is essential to consider that there were only 10 hours of classroom activity.

The unplugged approach has its limitations, and therefore, its use in the introduction of Computational Thinking is recommended. The unplugged approach could be an alternative for countries with social and economic difficulties, taking into consideration that a just a few basic office materials were needed (paper, pencil, eraser, scissors, etc.) and very little cost to print or copy the materials. This will allow the students to access the Computer Science fundamentals, independently of its future professional career, to have

greater opportunities and development.

For future studies, more detailed research is necessary to identify the point of convergence for the plugged and unplugged approach or when the unplugged approach loses its effectiveness and it becomes necessary to migrate to the machines. In addition, some more questions can be inserted in the research, being:

- Will the unplugged material have the same effect on students in private schools?
- From what age or school year should one introduce Computational Thinking?
- How can Computational Thinking be developed and measured in early school years?
- At what point does the unplugged approach begin to lose its intended effect and the use of machines is recommended?

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Appropriations of Identities in daily lives of high school students from a private school from Novo Hamburgo city/RS

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Abstract

This research aims to understand the forms of appropriation of identities in the daily life of 29 high school students of a private school in Novo Hamburgo / RS. In this school, the study made its observations, field journal and interviews in the target groups at their 15 to 18-year olds. It is considered that the forms of appropriations in the daily life of youth occur through the need to belong, to fit in the contexts that are permeated and show the urgency to accept certain characterizations referring to a model, and this is redirected by the order of consumption and which is mediatized in their lives.

Keywords: Youths; Appropriations; Identities; Consumption; Media.

1. Introduction

The field of communications has important reflections on children's daily lives and produces endless narratives about their actions and behaviors. They have a legitimate role in relation to the identities of autonomous individuals in forms, in which young people can become attractive in the eyes of others - through consumption.

Specifically, for young people aged 15 to 18 involved in this research, the process of identity is the expression of what makes sense to their lives and guarantees entry to a place of belonging linked to some social group or particular style of life. For example, they seize the clothing of brands and accessories relevant to their social context, so that they feel permanently observed and evaluated in everything they do, or show they have done. They are appropriated from the most current cell phone as different brands stamped on their clothes.

Thus, they show that clothing is used in various ways as a means of communication and that it can bring new possibilities of insertion into other groups. According to Bauman (2005), the concept of identity was born from the crisis of belonging and of the commitment that it unleashed in order to bridge the gap between the "must" and the "is" and raise reality to the standards established by the idea – recreating the reality to the similarity of the question. According to this author there is an eagerness and constant attempts to find or create new groups with which they can experience belonging, that it can facilitate the construction of identity, softening the distance of this individual with a crowd of unknown people.

In other words, youths in conviviality are exposed to different looks and stereotypes about the scenarios that permeate them. They are inserted in a society destined to live in transience, characterized by postmodernity, either bound to their identities, their bodies, their relationships or their belongings. Thus, it

is necessary to understand how individuals live their daily lives: the vulnerabilities and potentialities contained in their living conditions and the plurality of cultural expressions that emerge from the experience of groups.

In this perspective, it is noted that the media has a significant role in relation to the appropriations of identities of this specific group for subsidizing ways in which these young people can mirror themselves to become attractive through other people's eyes. In the midst of these factors, the author Garcia (2009) points the school as a privileged place for young people to build their friendships and their groups.

Thus, this research chose a school as the place to observe these individuals allowing an approximation with the student diversity and had interviews in the focus groups corresponding to their sociocultural practice (Theater - GF1, Student Group - GF2 and Athletics - GF3), observations and field journal. The institution inserted is from the private network of Novo Hamburgo / RS. It can be observed the context in which these individuals are inserted and how these young people in their daily lives are characterized in the group, about who they are, what they do, what they like and what they use. Since, according to Pais (2003), "environment" is an important category in the study of juvenile identities, once they occur in physical places transformed by everyday practices into social spaces. Therefore, the purpose of this study is to understand the forms of appropriation of identities in the daily life of these 29 high school students of a private school in Novo Hamburgo / RS.

2. Media, Groups and Youth Daily Life

The media, which influences cultural terms, is so striking that its presence could not fail to be felt when it comes to appropriating identities. Even if one has a perspective of what place it occupies in our daily lives, the discussions about the interfaces between Youth and Media continue in consolidation. According to the author Setton (2009), there is a serious and narrow association between culture, globalization and consumption conveyed mainly by the media and leisure.

The culture of spectacle and visibility fascinates the young, providing an immense repertoire for the conception of the self and the construction of their identities, and it is from the moments of conviviality that they share specific symbols that express the belonging to a certain group. This symbolic web can have its woven yarns based on art, sport, science, politics, religion, etc. According to the author Silva (2013), it is in the group that the youths discover the comfort of sharing, of receptivity in relation to what they think, feel and covet.

In Brazil, academic studies on youth are developed only in the mid-1980s and they give visibility to the diversity of Brazilian young people's ways of living and showing the need to treat their plurality. In this conception, the youth category is understood as historical, economic, cultural and relational partner constructions, set up in a permanent process of change and resignification (PAIS, 2003). It can be said that young people live in post-modern times a time of deep changes and indelibly affect their daily lives in sociability.

Their relationships are challenged by social attributes that distinguish the young from each other, considering the different ways of living youth, (re) invented in daily life. For this reason, I will approach the elements that, in a certain way, "produce" ways of being young, of affirming oneself in society directly

linked to the stimuli of consumption and the gains and losses that occur in all their daily practices in their networks of relationships.

The exclusion of consumption makes it unsafe to belong in a youth culture, daily governed by uncertainties and constant changes. Their lives are woven by precariousness and reveal encounters and misunderstandings that reflect the macrostructural problems. In such a way, it reveals the perversity of a system that excludes, violent, negligence and leaves its young. Above all, regarding consumption, while there is a supposed democratization of access, we face the exclusion of a large part of the population as to the use and possession of these goods (BAUMAN, 1998).

Therefore, it is extremely important to have a look at the young as actors and not as a simple reproducer of what they live and experience, so they need to be understood from the world in which they are inserted in. Only by observing their ways of being, their conceptions of themselves and the contexts lived daily is that we can understand their feelings of belonging, how they construct their symbols and values, expressed in their ways of dressing, in their gestures and in all that somehow produces meanings of self.

Sarlo (2000) warns that all desires tend to resemble each other, but not all desires have the same conditions to be fulfilled. Ideology constitutes us as universal consumers, although millions are just imaginary consumers. In this logic, winners and losers are always created and this implies social consequences, since the market produces strategies to compensate some as well as punishments for those who are inefficient.

Since all social practices convey meanings, and these shape and influence what we do - our behaviors - all practices have a discursive aspect. Therefore, it is through the world of culture that the youths in their diversity have spaces of construction of shared identities. Next, I specify the methodological procedure selected for the investigation of the study.

3. Methodology

This research is defined as qualitative, having as reference the interpretative paradigm. Its analysis and interpretation of data was carried out through theoretical and reflexive source triangulation (FLICK, 2009), as well as the analytical category of Barbour (2009), reinforcing the differences between the intergroup (from one interest group to another) and intragroups (issues within the group).

The study included focus group interviews, observations and the field journal to analyze 29 individuals enrolled in the regular High School of a private school in Novo Hamburgo / RS. Each young student was included in one of the three (3) groups corresponding to her sociocultural practice (Theater - GF1, Student Guild - GF2 and Athletics - GF3).

As a methodological reference we used the authors Gaskell (2002), Barbour (2009) and Flick (2009), who talk about focus groups and methods of moderation and interaction. That is, it is understood the possibility of observing different or identical discourses between the intergroup, as well as within the intragroups, being able to show similarities or distanciations with respect to the other individuals.

In the following passage we will describe a synthesis of what they have transmitted and expounded on their individual and collective perceptions as presentation of the results.

4. Collective Marks of Youth Who Consume

The focus of the target group is that the conversation between them reinforces language as a resource in which we consent to express ourselves in our thoughts and desires, expressing current issues of their realities. By encouraging them to express who they believe they are, what they want to be or what they would like others to think they are, there is the incentive to reflect on their processes of building as individuals.

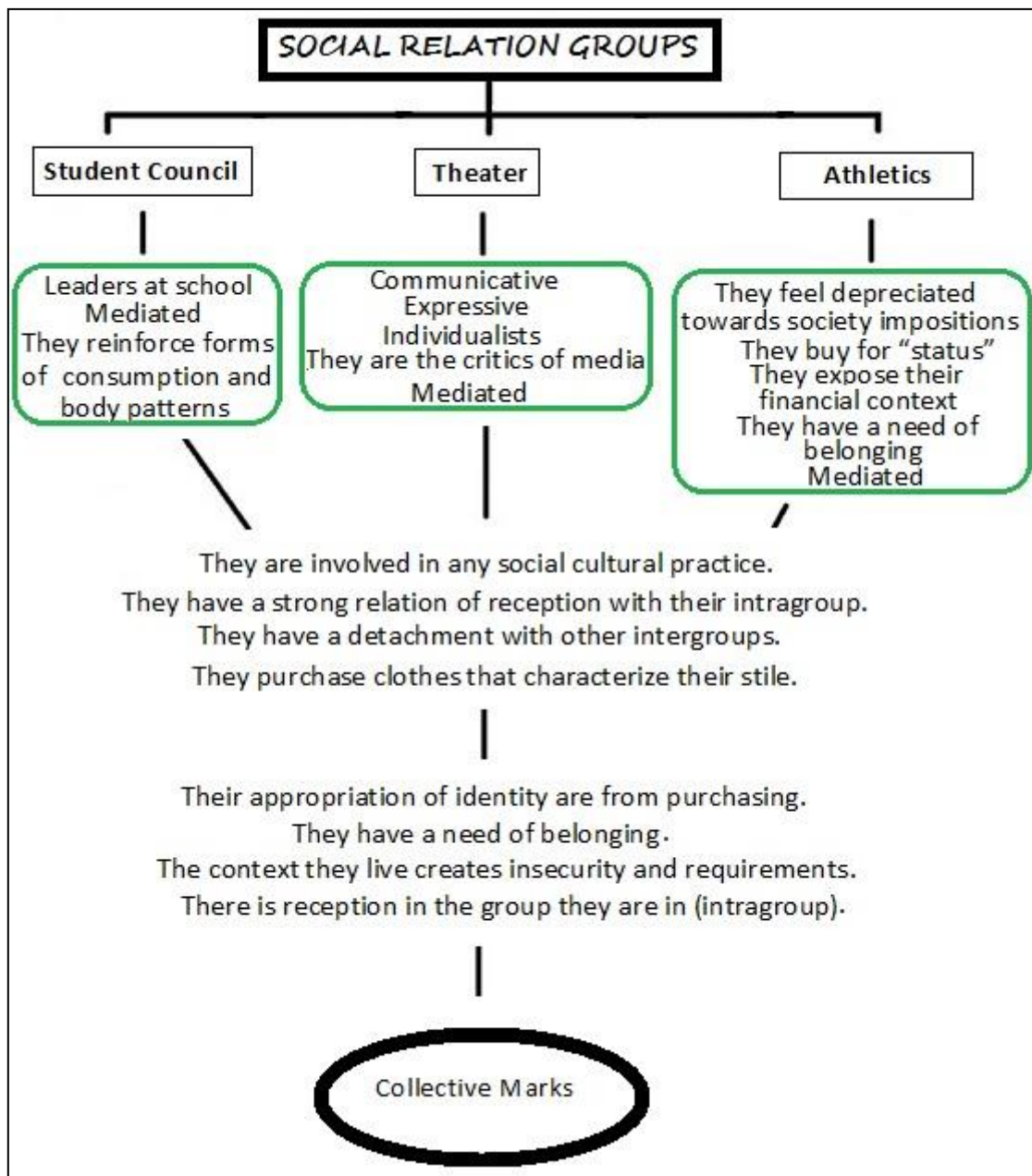
These young people are citizens between the ages of 15 and 17 who study in the first, second and third year of regular high school, who have just experienced a kind of 'rite of passage', which is entering this new cycle and is (re)constructing their identities and places of belonging. Thus, young denominations, individuals, focus groups, social groups, youths are all used to refer to this specific population, which was present at all times of the research and should be treated in the plural, as Dayrell (2005) puts it.

In addressing studies that cover the youth issue, it is deeply and committedly entangled in a complex web of social representations that are being built and modified over time and historical circumstances. That is, it is understood that young people are a representation through successive adjectives, which sometimes becomes a masked reality (PAIS, 2008). Within this perspective, the collective marks that sustain or distance these individuals in their relationships in social groups will be discussed in this category.

Based on their lines, four collective marks can be identified in the three focus groups about their ways of appropriating identities. The young people pointed out that they identify themselves through successive adjectives and that they consider the body as the first form of communication with the other. Above all, their appropriations occur from the relations between the subjectivity of symbols and the languages they develop in their daily lives.

That is, their appropriations of identity take place from the consumption (first mark) that occur due to the need of belonging (second mark) and the feeling of insecurity that permeates them (third mark). However, they also emphasize finding in their intragroups places of lower social pressure and there they can feel comfortable and secure (fourth mark). Also, it was necessary to elaborate a schematic synthesis of these groups, showing the aspects that differentiate each other and the approximations between them. Above all, to reinforce the collective marks identified in this research.

Figure 1 – Scheme of synthesis of the category



Source: Created by the author.

Based on these precepts, I will describe collective marks - not by classificatory order, because it is believed on their interconnectedness and their complexities - explaining and pointing out some of the speeches of these young students to understand this social picture. Their interrelations are situated in a constant cycle of new productions of discourses allowing circularity to the senses and produced meanings.

In the definition of these aspects and related to the reality of their daily life, the young people of this research are the reflection of an uncertain and provisional world, in which, belonging is conquered at each moment (MARQUES, 2003). These groups are constantly observed and evaluated in everything they do, or show they have done. In this sense, they expose the urgency of acquiring, through consumption, characteristics and values to be in a group.

To illustrate this feeling, the quotation from Guilherme, from the group of the Student Council

(GF2), mentions the need to mold themselves, exposing clothes, accessories and everything that defines them as part of the non-excluded, in order to feel safe somewhere. Then, they take ownership of what is imposed: "[...] imagine, buddy, I enjoy fanny packs. And that's when I came wearing a fanny pack. Everyone is going to fool you. You're going to feel bad. Depending on the person, man, he or she is going to cry. We do not use what we like, we use what is there "(GF2A9, 05/25/2016).

According to these questions it is observed that these young people do not want to have their identities allocated to stereotypes that exclude them from the ideal model of domination and power existing in their daily lives. Their narratives tell us that they are often judged by what they are not or what they do not have, generating a constant discomfort in their self-esteem. Now consumers, now commodities, they transit the networks of belonging, building relations of affection and power with their appropriations.

As it can be seen in the quotation from the young Athletic group La (GF3), who mentions how strange she feels about appropriating clothes she likes as an individual, but sometimes she is not exposed by the fear of inadequacy: " clothes that I like [...] are not so used, and I want to use it, but when I use it I feel insecure, [...] I'm very worried about what people are talking about, judging me and I did not want to, you know? "(GF3A8,17 / 06/2016).

These young people show in their appropriations what the author Marques (2013) poses regarding the game of representation of the identity to be sold and emphasizes that everything is inserted in the complex web of consumption: the image, the body, the style of dressing and behaving, the objects they own, and their preferences. In other words, their choices must be situated in the face of the struggle for survival characterized by constant pressures, as Bauman (2008) cites, whether by the media or society, so that "let us be one more person" (p.128) appropriating the updates, being connected to social networks, staying connected to the logic of consumption, doing college, etc.

That is, these youths behave as if their lives were an endless contest, in which the score can be reversed at any moment in favor or against them crossed by the variety of consumer scenarios. According to Pais (2008), young people "are what they are, but they are also (whatever they are) what is thought of them, the myths that are created about them" (p. 8) and which disguises and nominal masks they elect to be included. However, it is important to point out that all these fabrications seen in these young people come from the interconnectivity with the media and from their contact with it, which reshapes their lives.

In this conception, allusive to these positions, Pais (2007) develops a reflection on the questions that involve the idea of the increasing reflexivity, characteristic of postmodern society. It emphasizes that daily life is, par excellence, a place of reflexivity and it discusses the influence of social ties on our actions. This term implies concomitantly in different acts that modify our identity. The author reinforces that the affirmation of the self does not only mean a knowledge of itself, justifying that, however much one has an individuality, it is part of our legitimacy a recognition of self, by others.

This author also mentions that our society, rather than a "risk" society - is a dilemma society that reflects that the impasses of life and the choices we are made to take seem to favor affirmation of identity of self. In this sense, the problem of reflective identities revolves around not only the options to have, but, above all, the need to choose (PAIS, 2007).

From this finding it is realized that there is a real dilemma that manifests itself in a constant

movement of approaching and distance from the other, these needy and bondless youths connect, invent and reinvent ways of living their daily lives and ways of appropriating the which is relevant to them. According to Bauman (2008), these young people are being encouraged or forced to be and promote an attractive and desirable product that is to their liking. As the young Julia from the Theater group (GF1) points out, "the media are always creating a new one, putting them in advertisements or in social networks, paying people, [...] they pay people a lot to advertise about somewhere, some product and everyone wants to participate in it, everyone wants to be within this standard that was established. (GF1A3, 04/29/2016).

Consequently, in the daily life, these individuals seek the belonging from a guiding pattern, of any adornment that helps them to define and indicate the place that will welcome it. In view of this, youths experience multiple frameworks in relation to their appropriations of identity and idealize collective actions of insertion in society.

On the other hand, when searching for the place of belonging, the intragroup in this research proved to be a positive reference in their daily life, in which they can be themselves. As some individuals mention: "... we see that in order to have friends, we do not have to be the type they expect of us, we have to be what we are and find our group" (GF1A7, 04/29/2016); "[...] that is the hardest part, to deal with it [...] with other people [...]. And from there you have to remember, that somewhere they accept you as you are and there you belong "(GF2A5, 05.25.2016); "We enter knowing that we will not be judged, [...] everyone is adapting and, when you see it, you can be the richest person, and she will not care about showing off and of and showing what you have" (GF3A4,17 / 06/2016).

Therefore, "with whom they are", has a relevance to their identity traits. Alone they struggle at every moment for recognition and perceptibility, and they must advertise this way of life, so that they suppress this feeling of non-adequacy. However, when these young people mention the group they participate they connote another meaning for their world.

In the following passage, I bring three quotes from each focal group that shows in their narratives the security of belonging in something. "In here I think we get along very well, the group is very good, but the question that gets the most is outside" (GF1A7, 04/29/2016); "But so, there are groups that I feel more comfortable, like the Theater I use what I want, there are groups that I go the way I want, but there are groups that, I don't know, I go more straight, more fashionable "(GF2A6, 05.25.2016); "In this group I feel welcomed. And it does not matter if it's Nike, whether it's Adidas, if it's unbranded, we respect each other. And that happens, because everyone is there [...] to do their best and support the other "(GF3A7, 06/17/2016).

Consequently, one sees a break in the need to show what one possesses by being comfortable in one's own place. The connections that they make with their social group are as if the intragroup were the reference that in their daily life they have a space in which they can be themselves, without appropriating specific brands or, according to J Machado Pais (2008), of the nominal masks.

In this sense, I also emphasize the author Marques's (2013) speech that specifies the expectations of young people as to how they would like to be seen, the way they are seen and the way they believe they are seen are directly related to the cultural codes of the social group in which they are inserted. Therefore, referring to the first mark mentioned above, we identify a guideline of individual responses of each

intragroup, regarding behaviors and appropriations in their daily lives.

For the passage of these issues, I will point out more characteristics and discourses that form the intragroups, consequently having a wide picture of information that compares the intergroups. That is, I will detail the socio-cultural practice that the students practice in order to define the context in which these young people are inserted and project other possibilities of appropriations of identities and their insecurities.

The target group (GF1) represents the extracurricular activity known as theater, composed of 17 students, 11 of them (6 boys and 5 girls) participated in the research. It is a communicative and expressive group that highlighted different points to be discussed as: the forms that they appropriate in their daily life; different media platforms used in your daily life; the role of the individual in reinforcing the use of brands constantly in their bodies - call this process "human showcase" by displaying in their clothing specific symbols and, finally, criticizing the media for illusively selling a utopia, a world that is non-existent, claiming that it contributes to the disappointments of the current society.

In this way, this group (GF1) brought discussions that crossed several issues, but whatever the question, one could notice the reinforcement of individuality, the power of their choices and the ways of expressing themselves differently from the other. As Manuela mentions, in the midst of this discussion: "I think nowadays it's very easy for you to be just like everyone else, because we are in a generation that something becomes fashionable and everybody uses it" (GF1A6, 29/04/2016). However, during the interview, these same young students who spoke about this (pseudo) individualization of their choices of appropriation reconsidered their position in the face of reflection and concluded that there is, indeed, an influence.

The group that represents the Student Council of the school (GF2) elected through the creation of a slate and the voting that occurs in the school among all the students. It consists of 16 students, 13 of whom are in high school, and 9 (3 boys and 6 girls) participated in the study. In the interview most of the students highlighted different points to be discussed: the interaction of media and platforms in their daily lives; the forms of consumption to justify their interests of appropriation; the implications that brands have on their identities, the standardization of bodies and the need to consume something to feel someone.

Thus, it is noted in their speeches, including in the observations, the importance of the clothing characteristics and the fascination for globalized products, highlighting the countries of Europe and the United States. In addition, they report in their speeches the insecurity of appropriating something that is not accepted or positively highlighted in their context and constitute the question that erodes their wills and attitudes.

According to Bauman (2009), the context of liquid modernity in which we live, full of confused signals, subject to rapid and unpredictable changes, is fatal to our ability to feel comfortable and secure in the context in which we live. In this way, these young people project insecurities that they have in their daily lives in which they do not feel included or prepared for so many transitorities; which now require the capacity to be autonomous, disciplined and individualistic, almost as if they were the hope of a better world; now indicate the need to take advantage of the living and experiences that only occur in that period of age, as if the time more and more deprived of their lives.

From this context, this group shows how their daily lives have social pressure according to the

standardizations that are constantly disseminated through the media, they reflect on how they fit in and support some patterns, such as the Black Barbie collection, and despise others, like the advertising pieces that expose the supposedly ideal body and the way you follow these models. According to Pais (2003), it is from their appropriations that they establish social forms of conception and understanding that are articulated with specific ways of consciousness, thought, perception and action.

In contrast, the athletic group (GF3) also represents an extracurricular activity of the school and performs its training every day, joining diverse ages in the same time taught by a specific teacher of the area. This group is made up of 42 students, of which 15 are in High School and 9 (6 boys and 3 girls) participated in the interview about this research.

These students, even if they practice an individual sport, have an integration of stimulus, encouragement and support among themselves. They guide each other about their dedication and posture in the practice. It is a relaxed group that is related through anecdotes, but in their lines they show total comfort with the way of living. They constantly reinforce in the interview that they appropriate things so that they do not feel excluded from society, because this possession is a requirement of their daily lives and it makes them included.

In this group the young people's discussion was permeated by their dissatisfactions: now they revolved around the obligations and pressures of society, already mentioned above, and what it imposes on him; or reinforced consumer appropriation issues to feel good and fit. As Arthur quoted: "Society and the media itself right? The media is the worst influencer of the business, so people are what they are because they look at it somewhere. And, whatever, on TV, in the newspapers, etc." (GF3A3, 17/06/2016).

They presented individual stories about their financial conditions, reporting that they have a student scholarship through sport and did not always feel understood in school, only in their social group or at home. In the same way, they justify the difficulty in appropriating what is "fashionable" and how much it influences their belonging in a place.

According to Hall (2014), the processes of identity are the expression of what has meaning and value in the life of the individual and it will depend on an individual or collective subject. In view of this, it is noted that the youths experience multiple belongings in relation to different subjects, be they linked to the social group, to issues of gender, socioeconomic conditions, among others. These young people idealize collective actions of insertion in society, appropriations of identities and expressions that are their own.

There is a real dilemma that manifests itself in a constant movement of closeness and detachment from the other, this needy and bondless individual connects, inventing and reinventing ways of living his daily life and ways of appropriating what is relevant to him or her. In order to discuss the appropriations of identities of young people, we must also look for the micro differences among which so many others only perceive uniformity and conformity. Supposedly, each subjectivity, its values and its difference to the other is generated in each individual, although there are still similarities, there are multiplicities that emphasize the beauty of each individual, and that make the group so heterogeneous, although with a generalized look all look alike, conformed and standardized with the trend of consumption and belonging.

5. Conclusion

In view of the objective of this study, it is considered that the forms of appropriations in the daily life of youth occur due to the need for belonging, to fit in the contexts that are permeated and show the urgency to comply with certain characterizations referring to a model, and this is redirected by order of consumption and what is mediatized in their lives.

These young people in their social contexts only reinforce the construction of identities about the liquidity, the uncertainties and the fragility that exemplify the characteristics of the individual in postmodernity.

Regarding the intergroups, small characteristics are perceived that represent a distinction between them, but these signs are insignificant close to the similarities ascertained. Even though each group has exposed specific characteristics on the same subject, there was the identification of conformities among them, associated with the true values that drive their appropriation processes (the four collective marks mentioned previously in the three focus groups).

Finally, it is noted that sociability among young people has a wide field of discussion as to how their network of relationships is experienced by their groups and their respective changes, the gains and losses that occur in all their daily practices.

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Stakeholders' Awareness and Acceptability of the Leyte Normal University's Vision, Mission, Goal and Objectives

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Abstract

This study determines the awareness of the stakeholders on the vision, mission, goals and objectives (VMGO) and how these are disseminated; evaluates the stakeholders' understanding and acceptance of the VMGO. It uses a descriptive type of research using survey approach, with a stakeholder survey questionnaire to gather data. Results show that the stakeholders are generally aware, understand and accept the VMGO. The study also reveals that the stakeholders generally perceive that the VMGO are clearly stated, consistent with each other, congruent to educational practices or activities, and attainable. It also shows that the internal stakeholders, especially the administrators and faculty members, are much aware, understand and accept the VMGO than the external stakeholders. The Vision, Mission, Goal and program objectives offered in the College of Arts and Sciences were highly acceptable to the various stakeholders of the University.

Keywords: *Vision, Mission, Goals, Objectives (VMGO); stakeholders; descriptive; internal stakeholders; external stakeholders; understanding and acceptance; College of Arts and Sciences*

I. Introduction

The state university's vision, mission, goals and objectives (VMGO) should be the basis of its operations. The VMGO is the most fundamental component of a university's existence. Its day to day operations including transactions rely with the basic concepts of its VMGO. During accreditation, the VMGO is one of essential areas that needs to be surveyed and evaluated. Everything in the university is justified only to the extent that it realizes its VMGO (The Accrediting Agency of Chartered Colleges and Universities in the Philippines, 2010).

The **Vision** of a particular school of learning leads all the people working in that educational entity what they foresee their university to become in the future. It can be compared to a bible of that edifice of learning, in which all the administrators, members of the faculty, staff, students, parents and stakeholders (community members and officials) are expected to know it.

The **Mission** on the other hand shows the way how the vision is to be met. It tells what the school would like to produce on their mentee in the future. It also shows how to go about the fulfillment of such a vision.

The **Goal/s** of an Academic Unit, envisioned what they want their graduates to become. It states the purpose of the existence of the said academic unit.

The **Objectives** is taken from every specialization/major in that academic unit. This has to be known to the students who are enrolled for them to be guided what will become of them when they graduate; what are expected of them as graduate in that particular field of endeavor and the polishing of their character as graduate of this university.

According to (CHED, Series of 2012) the mission and vision are statements on the long-term self-view of the institution and the environment in which it operates. It includes the reason of its existence, its lasting role and importance, and what it does to achieve this. Program objectives are statements that helps to prepare graduates to become successful in their chosen careers and profession and achieve such within three to five years of graduation and are aligned to the needs of the industry and workforce for graduates in these programs.

All academic units of a University must have goals that are consistent with the University's vision and mission and it includes that all programs under an academic unit must have objectives that are consistent with the goals of the academic unit. The College of Arts and Sciences of the Leyte Normal University is one of its three colleges and offers a handful of programs that are top performing and also is a provider as a service college to the two other Colleges of the university. All of its programs aim to produce graduates that can demonstrate competencies in their fields of specialization or chosen careers, and with critical and creative thinking skills, ethical leadership and proper values.

Being at the forefront of outcomes-based education (OBE) in the country as shown in its numerous university-wide training and workshop activities, LNU's vision and mission statements are outcomes-based, to wit (Leyte Normal University, n.d.) :

Vision: A leading university of education and diverse disciplines attuned to local and global development needs.

Mission: To produce top performing professionals equipped to engage on knowledge and technology production so necessary to develop a sustainable society.

With these vision and mission, Leyte Normal University is currently shifting into an outcomes-based higher education. Seminar-workshops on outcomes-based approach and consultative meetings as regards various programs' objectives were already conducted and participated by the members of the university's academic community. According to Castillo (2014) the paradigm shift should be discussed and presented not only to the university's faculty and personnel but also to its internal and external stakeholders.

The Leyte Normal University is also looking to improve its SUC levelling status by rigidly undergoing evaluation from the Accrediting Agency for Chartered Colleges and Universities in the Philippines (AACCUP) for its different programs as evident in its continuous practice of submitting the university to this rigorous process. Accreditation is a formal recognition of an educational program as possessing certain standards of quality and excellence based upon an analysis of the merits of its educational operation in relation to its VMGO and to its unique role in the community that it serves. Further, the VMGO needs to be shared in order to be effective and to be attained. And to be shared, it needs to be developed in a collaborative manner (Philippines-Canada Local Government Support Program, 2004).

The success of a university depends upon bringing its stakeholders together, both physically and philosophically. The stakeholders need to reconcile differing perspectives, find common ground and create a shared VMGO.

Objectives of the Study

This survey aims to:

1. To know the level of awareness of the LNU VMGO as perceived by the following groups:
 - a. Administrator;
 - b. Faculty;
 - c. Staff;
 - d. Student;
 - e. Alumni;
 - f. Parents and;
 - g. Stakeholders.
2. To know the extent of dissemination of the LNU VMGO to the same group given the various systems used.
3. To know the level of acceptability of the LNU VMGO to the group.

II. Methodology

This study is a descriptive type of research using survey approach. A stakeholder survey questionnaire was used to gather the needed data and the frequency means were computed for the various items in the questionnaire and were interpreted.

The respondents of the survey are the university's stakeholders broken down as follows: administrators, faculty members, administrative staff and personnel, students, parents, alumni, and external stakeholders from industries and linkages. A nonrandom convenience sampling was used; that is, respondents are chosen as to who were readily available.

The gathering of data from the internal stakeholders and some alumni was done by the researcher himself through the help of some colleagues. The distribution and retrieval of survey instruments from the parents or guardians and some alumni was through the students related to them, while those for the industry people was through the on-the-job training (OJT) students and some alumni belonging to a particular company. The data collected were tabulated and analyzed. In particular, mean was used to determine the results.

III. Results and Discussion

The first part of this study deals with the level of awareness of the Vision, Mission of Leyte Normal University. This also includes the level of awareness of the College of Arts and Sciences goals as well as the Bachelor of Science in Information Technology program objectives. Below are the data gathered from the respondents that include the parents, stakeholders, faculty, alumni, administrator, staff and the students. The scale below was used to measure the level of awareness.

Scale:

- 3.25 - 4.00 - Highly Aware
 2.49 - 3.24 - Moderately Aware
 1.76 - 2.48 - Barely Aware
 1.00 - 1.75 - Not Aware

Table 1.1 Level of Awareness of the University's Vision and Mission

	Parents	Stakeholders	Faculty	Alumni	Adminis- Trator	Staff	Student	Ave. Mean
A. Vision	3.00	3.50	3.86	3.83	3.62	4.00	3.70	3.64
B. Mission	3.00	4.00	4.00	3.67	4.00	4.00	3.70	3.77

The data show that all the respondents are highly aware of the Vision and Mission of the University with an average mean score between 3.64 and 3.77.

Table 1.2 Level of Awareness of the College of Arts and Sciences Goals

	Parents	Stakeholders	Faculty	Alumni	Adminis- trator	Staff	Student	Ave. Mean
C. Goals	3.14	3.75	3.71	3.50	3.17	4.0	3.40	3.52

Table 1.2 shows that the staff respondents are highly aware of the LNU College of Arts and Sciences goals followed closely by the stakeholders, faculty and alumni, while the parents are the least aware of the goals. Also, the data show that all the respondents are highly aware of the College's goals with an average mean of 3.52.

Table 1.3 Level of Awareness of the Bachelor of Science in Information Technology Program Objectives

	Parents	Stakeholders	Faculty	Alumni	Adminis- trator	Staff	Student	Ave. Mean
D. Objectives	3.00	3.25	4.00	3.33	3.00	4.00	3.30	3.41

The data in Table 1.3 show that the faculty, staff, and students are highly aware of the objectives of the Bachelor of Science in Information Technology program. Likewise, the stakeholders are also highly aware while the parents are the least aware of the program objectives.

This part of the study presents the results on how the different stakeholder respondents viewed the manner of dissemination of the University's Vision and Mission and also the goals of the College of Arts and Sciences. It also highlighted the result of the system dissemination of the program objectives offered in the Bachelor of Science in Information Technology. The scale below was used to measure the extent of dissemination of the VMGO.

Scale:

- 3.25 - 4.00 - Highly Disseminated
 2.49 - 3.24 - Moderately Disseminated
 1.76 - 2.48 - Barely Disseminated
 1.00 - 1.75 - Not Disseminated

Table 2.1 System of Dissemination of the University's Vision and Mission

	Parents	Stakeholders	Faculty	Alumni	Administrator	Staff	Student	Ave. Mean
Radio	2.00	2.25	2.60	1.67	2.33	2.00	2.40	2.18
TV	1.57	2.25	2.57	1.67	2.33	1.00	2.10	1.93
Posters	2.86	2.50	3.57	3.17	3.33	2.75	3.20	3.05
Billboards	2.14	2.50	3.86	2.17	3.17	2.75	2.70	2.76
Leaflets	2.86	3.00	3.71	2.50	3.33	4.00	3.00	3.20
Programs	3.28	2.75	3.86	3.00	3.33	3.50	3.40	3.30
Meetings	2.10	2.75	3.43	3.33	3.50	2.50	3.00	2.94
Trainings	2.71	2.75	3.43	2.83	3.33	2.50	3.30	2.98
FlagCere	3.00	3.00	3.14	3.50	3.17	2.75	3.50	3.15
ClassDis	3.14	3.00	3.43	2.67	3.29	2.75	3.50	3.11
Others								
Website					(1)			

Table 2.1 shows that the University's Vision and Mission were highly disseminated through the use of programs. It could also be gleaned from the table that leaflets, flag ceremony, class discussion, posters, trainings, meetings and billboards are also venue in knowing the Vision and Mission by the respondents having a rating of moderately disseminated. The radio and television are the least utilized means in disseminating the Vision and Mission.

It was also suggested that a Website could be used as another venue for the dissemination of the University's Vision and Mission.

Table 2.2 System of Dissemination of the College of Arts and Sciences Goals

	Parents	Stakeholders	Faculty	Alumni	Administrator	Staff	Student	Ave. Mean
Radio	2.43	2.25	2.43	1.67	2.17	2.50	2.50	2.28
TV	2.00	2.25	2.43	1.50	2.00	2.50	2.30	2.14
Posters	2.29	2.75	3.29	2.33	2.67	4.00	3.20	2.93
Billboards	2.29	2.75	3.29	2.00	2.50	4.00	2.70	2.79
Leaflets	2.57	3.00	3.29	2.17	2.67	4.00	3.10	2.97
Programs	3.29	2.75	3.43	2.83	2.83	4.00	3.10	3.16
Meetings	3.43	3.25	3.43	3.00	3.17	2.00	2.90	3.02
Trainings	3.14	3.33	3.29	2.29	2.67	2.50	3.00	2.89

FlagCere	3.00	3.50	3.00	2.67	2.33	2.00	3.00	2.79
ClassDis	3.43	3.50	3.43	2.67	3.00	2.50	3.10	3.09
Others								
Website					(1)			

As to the manner of disseminating the goal of the LNU College of Arts and Sciences, it is moderately disseminated through the use of programs, class discussions, during meetings, leaflets, posters, trainings, flag ceremony and billboards. However, the faculty viewed it as highly disseminated using all venues except for radio, tv and flag ceremony. Again, the use of radio and television are the least used media of disseminating the College of Arts and Sciences goals.

Other means to disseminate the College of Arts and Sciences goals is the use of a website.

Table 2.3 System of Dissemination of the Program Objectives

	Parents	Stakeholders	Faculty	Alumni	Administrator	Staff	Student	Ave. Mean
Radio	2.14	3.00	2.29	1.50	2.00	3.50	2.10	2.36
TV	1.86	3.00	2.29	1.33	2.17	3.50	1.90	2.29
Posters	2.14	3.50	3.43	2.33	2.50	4.00	2.70	2.94
Billboards	2.13	2.75	3.29	2.00	2.50	4.00	2.50	2.74
Leaflets	2.29	3.00	3.57	2.33	2.83	4.00	2.56	2.94
Programs	3.67	3.75	3.57	3.00	2.67	3.29	3.22	3.31
Meetings	3.57	3.50	3.50	3.00	2.33	4.00	3.44	3.33
Trainings	3.29	3.50	3.43	2.67	2.50	4.00	3.10	3.21
Flag Cere	3.14	3.00	3.00	2.17	2.33	4.00	2.90	2.94
Class Dis	3.57	3.25	3.14	2.83	2.50	4.00	3.11	3.20
Others								
Website					(1)			

The above data show that the program objectives in the Bachelor of Science in Information Technology are between highly and moderately disseminated using posters, billboards, leaflets, programs, meetings, trainings, flag ceremony and in class discussions as perceived by all the respondents. On the other hand, the program objectives were only barely disseminated by using television and radio.

The objectives of the different programs could also be disseminated through the use of website as suggested again by an administrator.

This part of the study reflects the level of acceptability of the LNU Vision, Mission, Goals of the College of Arts and Sciences, and also the objectives of the Bachelor of Science in Information Technology program under study. The scale below was used to measure the level of acceptability.

Scale:

- 3.25 - 4.00 - Highly Acceptable
 2.49 - 3.24 - Moderately Acceptable
 1.76 - 2.48 - Barely Acceptable
 1.00 - 1.75 - Not Acceptable

Table 3.1 Level of Acceptability of the University's Mission and Vision

A. Vision	Parents	Stakeholders	Faculty	Alumni	Administrator	Staff	Student	Ave. Mean
1. The vision clearly reflects what the institution hopes to become in the future	3.28	4.00	3.86	3.83	3.83	3.5	3.80	3.73
2. The vision statement is simple and can easily be understood & memorable	3.71	3.75	3.86	4.00	3.83	3.00	3.60	3.68
3. The words used in the vision statement are specific and not open to many interpretations	3.28	3.50	3.86	3.50	3.83	3.00	3.70	3.52
4. It is ambitious enough to be exciting but not too ambitious for it be unachievable.	3.43	3.50	3.86	3.17	3.83	4.00	3.20	3.57
5. It is aligned to the values that the university wants its people to exhibit as they perform their work	3.28	3.75	4.00	3.67	3.83	3.00	3.40	3.56
B. Mission								
1. The LNU mission clearly reflects the Institution's legal and educational mandate.	3.57	3.50	4.00	3.83	3.67	4.00	3.80	3.77
2. The LNU mission inspires employee commitment, fosters client engagement, and helps boost the university's performance -- among other benefits	3.43	3.75	4.00	3.83	3.83	4.00	3.50	3.76
3. The LNU mission defines what the university stands for -- its purpose and the reason for its existence	3.57	3.75	4.00	3.86	3.83	4.00	3.40	3.77
4. The LNU Mission declares the difference it seeks to make in the world	3.57	3.35	3.86	3.50	3.83	3.00	3.50	3.51
5. The LNU mission is aligned with the vision statement and is acceptable	3.14	3.50	4.00	3.67	3.83	3.00	3.70	3.55

Table 3. 1 clearly reflects that both the Vision and Mission of the University is highly acceptable as perceived by the parents, stakeholders, faculty members, alumni, administrators, staff and students. All the respondents have high ratings for both the Vision and Mission acceptability specifically in terms of clarity of the meaning and terms used in the statements, understandability, alignment to the values being promoted by the University.

Table 3.2 Level of Acceptability of the College of Arts and Sciences Goals

	Parent s	Stakeholder s	Facult y	Alumni	Administrato r	Staf f	Studen t	Ave. Mea n
1. The goals are clearly stated, and are consistent with the mission of the Institution	3.57	4.00	4.00	3.67	3.83	4.00	3.80	3.84
2. The goals are focused on the important aspects of implementing the mission	3.14	3.50	4.00	3.67	3.83	4.00	3.70	3.69
3. The goals are a milestone(s) in the process of implementing the mission	3.28	3.00	4.00	3.67	3.83	4.00	3.60	3.62
4. The goals are stated in a way that it can be adapted and changed as needed	3.43	3.25	3.86	3.67	3.83	4.00	3.60	3.66
5. The goals are relevant to the BSIT program	3.28	3.50	3.86	3.67	3.83	3.00	3.40	3.51

The above data reflect that the goals of the College of Arts and Sciences is highly acceptable to the majority of the respondents. The goal statements are highly acceptable specifically the way the statements are stated, its focus in accomplishing the mission, and also in terms of adaptability and relevance.

Table 3.3 Level of Acceptability of the Bachelor of Science in Information Technology Program Objectives

	Parent s	Stakeholder s	Facult y	Alumn i	Administrato r	Staf f	Studen t	Ave. Mea n
1. The objectives clearly state the expected outcomes in terms of competencies (skills and knowledge), values and other attributes of the graduates	3.28	3.75	4.00	4.00	3.67	4.00	3.50	3.72
2. The objectives are measurable, it reflects what the programs wants to achieve	3.43	3.75	4.00	3.67	3.83	4.00	3.40	3.72
3. It is suitable as a means to measure the achievement of the goals	3.57	3.75	3.86	3.43	3.67	4.00	3.60	3.70
4. The objectives are realistic and feasible	3.57	3.75	3.86	3.50	3.83	4.00	3.20	3.67
5. The objectives are applicable to the BSIT program	3.14	3.25	3.86	3.67	3.83	4.00	3.50	3.61

It can be gleaned in Table 3.3 that the program objectives of Bachelor of Science in Information Technology program is highly acceptable as perceived by all the respondents in terms of clearness of the expected outcomes, suitability to measure in achieving the goals, being realistic and applicable.

IV. Conclusion

1. The different stakeholders of Leyte Normal University to include the administrators, faculty, staff, students, alumni, parents and stakeholders are either highly and/or moderately aware of the Vision, Mission and also with the goal of the College of Arts and Science. There is also a high level of awareness of the objectives of the Bachelor of Science in Information Technology program.
2. The University's Vision and Mission, goal of the College of Arts and Sciences, and also the specific program objectives are highly disseminated and have largely make use of posters, billboards, leaflets as a means to disseminate the VMGO. It likewise utilized meetings, trainings, the daily flag ceremony and class discussions as venues to disseminate the same.
3. The Vision, Mission, Goal and program objectives offered in the College of Arts and Sciences were highly acceptable to the various stakeholders of the University.

V. Recommendation

The level of awareness and acceptability of the Vision, Mission, Goals and Program Objectives could be further enhanced by maximizing the use of other materials and avenue. Based on the result of the study the use of broadcast media should be maximized and also the use of websites which is accessible and available to all the stakeholders of the University. It is also recommended to use social media pages to promote the Vision, Mission, Goals and Program Objectives.

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Project-oriented Teaching Method for Computer Simulation of Automatic

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Abstract

The new engineering department represents the latest development direction of industry and business, referring to the new engineering discipline that is being formed or is about to be formed. The talent cultivation of colleges and universities is the most important core task for the new engineering construction to meet the current and future development needs of the industry. It is necessary to cultivate and bring up a group of cross-composite engineering and technology talents with innovative and entrepreneurial abilities and cross-border integration capabilities in high quality. In order to satisfy the training objects of Emerging Engineering Education, a new teaching pattern is needed. As a heuristic teaching method, project-oriented education is to organize students to participate in the whole process of project design, implementation and management, and complete the teaching tasks in the project implementation process. By this way, the students may acquire not only the solid theoretical knowledge but also the experience in application of this knowledge in professional field. Therefore, project-oriented teaching method is effect and competitive teaching mode for Emerging Engineering Education. For the course of computer simulation of automotive, the project-oriented teaching method is adopted. Corresponding implementation program is proposed and analyzed.

Key words: computer simulation; teaching reform; project-oriented; Emerging Engineering Education

Introduction

In response to the new demands of national strategic development, the new situation of international competition, and the new requirements of strengthening morality education, China's engineering education has established the reform direction of Emerging Engineering Education (3E). New engineering is cross-integration and multidisciplinary, leads the frontier of engineering, and guides innovative cross-border development ^[1]. Therefore, the construction of Emerging Engineering Education courses requires an innovative talent-training model and a curriculum system that spans the boundaries of various industries. At present, there are three main types of teaching methods in colleges and universities. One is to teach knowledge and skills in teaching language such as giving lecture and examining through questioning and answering; the other is the display method of visual perception such as experiment, demonstration and visit; the third is heuristic teaching method of “student-based, independent learning” in which the teacher is supplemented by the guidance ^[2]. The former two as traditional pattern have been widely used in engineering education, and heuristic teaching methods are becoming increasingly popular.

In fact, heuristic teaching method has existed in ancient times. Confucius proposed that one would not

explain unless he is desperately anxious to learn and effective learning is knowledge migration. Up to now, heuristic teaching methods are diverse, including discussion methods, research methods, case methods, project-based teaching methods, research-based teaching methods, academic-oriented teaching methods, problem-based teaching methods, participatory teaching methods, and working directed methods, etc. Professionals such as medicine ^[3] and management ^[4] often use project-based teaching and achieve good teaching results. How is the project-oriented teaching method implemented to teach engineering courses? How does it meet the needs of new engineering development? This paper focuses on the project-guided teaching method and discusses its application in the course of computer simulation of automotive.

Project-guided Teaching Method

The idea of the project-oriented teaching model came from the famous educator, Dewey, in 1986. He put forward the idea of “designing teaching method” against the disadvantages of traditional teaching pattern. The basic connotation of the concept is that there is a practical solution to be solved in the actual process of teaching. Students can grow and develop while they take advantage of opportunities and personally implement meaningful and purposeful unit activities to solve problems and gain practical experience. ^[5]

The project-guided teaching method firstly appeared in the United States, and is popular in Germany which has been widely used and has achieved good results in elementary education, vocational education, and higher education. The students trained by colleges and universities not only have the theoretical knowledge necessary for the future workplace, but also have practical experience in the project, so they are favored by major enterprises. .

Boehm defines project-oriented teaching mode as a teaching method that is achieved by students engaging in a complete practical work or developing a teaching theme design by themselves” ^[6]. Simply, the project- oriented education is to guide students who study theoretical content in the form of project while teachers divide the application of course content. Then, the students are guided to develop the project, carry out the summary of theoretical knowledge, design the scheme of the project, realize the project and take the final evaluation.

In the implementation process of the project teaching method, since the teacher clearly defines the project tasks covered in the assessment at the beginning of the course, the students are more purposeful in theoretical study, and the application of theoretical knowledge is more concrete. Compared with the traditional passive acceptance teaching pattern and the disconnection between knowledge and practice, the project-oriented teaching method highly improves learning efficiency ^[7]. At the same time, in order to complete the set project tasks, students need to set up teams, work together, and collect project-related information in various ways. Brainstorm is good way to resolve solutions. Finally, form the schedule and implement schemes. This process effectively cultivates students' ability in independent innovation, active learning, and teamwork.

Computer Simulation of Automotive and Its Teaching Issues

The course of computer simulation of automotive is the application of computer simulation technology

in the field of automotive industry. To build a simulation model on the computer, the engineer and the researcher can imitate the response of the actual system and its changing process with time. Through the observation and statistics of the simulation test process, the simulation output parameters and basic characteristics of the simulated system are obtained to deduce the actual parameters and real performance of the actual system, so that the performance and long-term dynamic characteristics of actual system can be fully realized by computer in a very short time. Computer simulation technology is the core technology of digitization and intelligence which make the vehicle design and production process more intelligent and efficient. Undoubtedly, the course is important, but there are many shortcomings in teaching.

Many teaching methods to impart knowledge ignore the development of students' intellect, and neglect encouraging students to learn creatively. In the overall structure of teaching methods, there are many teaching method used in a single. It is rare, especially in joint use of methods that are conducive to independent learning of college students. In particular, the use of self-learning methods, independent experimental methods, discussion methods, and research methods is less. In classroom teaching, there are more perfusion types, less heuristics, less discussion styles, and low student participation. The forms of individualized teaching are ignored, such as group discussions, research classes, self-learning activities, etc. Some teachers use modern teaching equipment such as multimedia, but do not use reasonable teaching methods. Teaching method reform is needed now.

Project-oriented Teaching Method for Computer Simulation of Automotive

The course of computer simulation of automotive based on engineering practice can comply with the talent training objectives of Emerging Engineering Education, which pay more attention to cultivate students' strong ability of engineering practice. Meanwhile the course is helpful to develop independent engineering design ability. Then, students are supposed to have capability of engineering innovation by training. Due to its theory as important as practice, the traditional teaching methods cannot meet the needs of the curriculum. For this reason, projects are introduced in the teaching process. The teacher provides project-oriented training and guides students to learn independently^[8]. To do a project is comprehensive training for students so that the teacher should carefully design and select every project that is an open-end one. Usually, it is better to be a practical application or research topic. Because there is no standard answer, students need to use professional theoretical knowledge to solve it gradually. To start with quantitative data, they apply mathematical modeling thought and then complete research tasks through calculation, analysis, and reporting. The training provides them with opportunities for challenging and autonomous research.

The specific implementation is as follows.

1. Projects release. In the early stage of the course, students will be able to understand the overview of titles and the teaching effect. Due to the teaching objects, a list of projects for automotive and transportation professionals is provided. At this stage, students should have clear project objectives. Based on the same point of interest, students build their own project team and each team should consist of 3 to 5 members. The leader of each group should be elected by members, and responsible for management. Relying on the teacher's assistance, students independently decompose the projects into different stages and set the work goals for each stage. Additionally, the teacher ensures that each team

- member clearly understands his or her own work tasks. Everyone in a group should take responsible for their own tasks and cooperate to complete the project actively. When giving lectures, the teacher briefly introduces this knowledge point corresponding to the questions of projects.
2. Guidance of implementation process. Students arrange project execution plan according to the content of the syllabus. At the same time, everyone collects materials needed for projects through networks, databases, books, etc. The group summarize the materials, discuss issues that are decomposition sub-problems of project and work out solutions to the problems. When encountering an unforeseen problem, the scheme and schedules should be timely re-arranged. Teachers carry out the stage check and take process supervision according to the teaching log which is good for detecting problems timely and correcting them in time. To guide on key issues and make recommendations is the guarantee of success of the project.
 3. Project evaluation. Each group member must participate in preparing these assignments. The assignments are team's efforts and not a copy or download of any literature resource. Team members must be divided to write different functions of each assignment and coordinate efforts. There are a large number of random interviews in the classroom, which can greatly reduce the speculative psychology of students on the final exam. The reports must be printed and should not be more than 8-10 pages for the final report. Each team will only have 10 minutes for the PPT presentation and 5 minutes for questions and answers.

Additionally, the practical and operational character of the project-oriented teaching model requires that the relevant teachers not only have the professional knowledge of the discipline, but also have the practical experience of completing the relevant projects. The teacher also have to change how they work and increase the communication and cooperation with engineers in the field. Only in this way can the professional knowledge be more scientific and practical to the students, so that students can be more competent at the future work and study. In addition, reflective teaching is necessary for the teacher to learn from experiences in the project implementation process.

Conclusion

The project-oriented teaching has obvious advantages, and it is more suitable for the cultivation of students' practical ability than the traditional teaching method, which is easier to meet the requirements of "new engineering". Engineering majors such as vehicle engineering have a significant background of industry and a large number of practical cases, providing a wealth of materials for project-oriented teaching. The combination of the two provides a good way for practical talent training. By the course reform of computer simulation of automotive, students improve their practical ability. Meanwhile they are familiar with search tools and may independently solve problem to some extent.

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Exploration on the Construction of Digital Content Security Course under the Background of New Engineering Disciplines

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Abstract

According to the development and construction of the "new engineering disciplines", the training requirements for talents and the construction of digital content security course are discussed in this paper. Based on the current development situation, this paper clarifies the tightness of digital content security and the development of "new engineering disciplines". The digital content security course has both a complete frontier theoretical system and close correlation with various new engineering disciplines. Combining these two characteristics, this paper proposes three aspects of construction: comprehensive social resources, the formation of a new curriculum teaching system, and the creation of a digital content security gold course; further introduction of school-enterprise cooperation, promotion of the combination of production and education, practical and targeted activities; training of students' ability to master and

apply digital content security and promotion of the construction of applied undergraduate programs.

Keywords: New engineering disciplines; Digital content security; Gold course; School-enterprise cooperation; Applied undergraduate programs.

1. Introduction

With the advancement of "Industry 4.0" and "Made in China 2025", science and industry have quietly changed. In order to better cope with the technological development under the information age, "new engineering disciplines" emerged as the times require. There is no explicit stipulation on the boundaries of the "new engineering disciplines", but there is a basic consensus on the types of industries it covers. "New engineering disciplines" is developed in the era of Internet information. Compared with the characteristics of "old engineering", "new engineering disciplines" is more closely related to the development of the times, meeting the needs of the society for talents, emphasizing the practical application and comprehensive development of the subject, especially the engineering industry related to the Internet, and bringing new industries such as information security technology, software engineering and electronic information into play. It will be combined with the traditional engineering specialty. The new subject includes but is not limited to: computer science and technology, cloud computing, data science and big data technology, machine learning, intelligent robots, cyberspace security, etc. It also includes the upgrading and transformation of traditional engineering such as mechanical manufacturing, control engineering, vehicle and so on. The era of "new engineering disciplines" is closely related to the development of digital content, and the development of technology provides a guarantee for the dissemination of information. At the same time, digital content also accelerates the process of the information age. Digital content is based on digital equipment to disseminate information, which is closely related to the development of informatization and digitization. It connects many fields, such as communication, control, signal processing and analysis, and the technologies related to these contents are playing an increasingly important role in many other fields of science and new technology. Therefore, taking the construction of talent cultivation requirements of "new engineering disciplines" as an opportunity, we should improve the teaching quality of digital content security. Starting with teaching content, teaching form and teaching resources, we should introduce the educational form of school-enterprise cooperation, further integrate theory with practice [1], create the education gold course under "new engineering disciplines", and take the road of developing applied undergraduate program [2].

2. Educational impact of "new engineering disciplines"

According to "the Guidelines for Talents Development Planning" in Manufacturing Industry issued by the Ministry of Education of the People's Republic of China, it is expected that in the future, robotics, materials, intelligent control, information network security and other industries will face a serious shortage of talents. In this case, a number of "new engineering disciplines" have emerged. In order to promote the training of talents and the development of science and technology, since February 2017, the Ministry of Education of the People's Republic of China has carried out three major discussions in turn: "Fudan Consensus", "Tianda Action" and "Beijing Guidelines". It has determined the direction and objectives of education at the present stage, emphasized the guarantee of education quality, combined with internal and external resources, promoted the reform of education structure, and opened a new chapter of talent training

under new challenges [3].

The development of science and technology in the era of "new engineering disciplines" is changing with each passing day. Disciplines such as deep learning, intelligent manufacturing, cloud computing, artificial intelligence and robotics are all centered on the Internet or artificial intelligence, and their iteration speed is much faster than that of traditional disciplines. For this kind of science and technology, students are required to have rich creativity and understanding, to master their theoretical knowledge and to have strong practical ability, to adapt to the rapid development and innovation of technology. At the same time, the development of these emerging industries cannot be separated from the dissemination of information, without information, there will be no modernization. Digital content occupies an unshakable position. With the rapid development of the information age, digital content and its security have attracted great attention.

3. Digital content security in an interdisciplinary context

The rapid development of "Internet +" has brought about the explosive propagation and iteration of information. As a part of information, digital content widely exists in the Internet, computer vision, artificial intelligence and other fields. Diffusion through the Internet is an inseparable part of the development of modern science and technology. The contents of digital media (text, image, sound and other information in digital form) are a part of information. U-disk, CD-ROM, hard disk and so on can be carriers of digital content, and they can be widely disseminated through the network.

3.1 Classification of digital content

With the advancement of global information technology, digital content has covered people's daily life extensively. Common digital content includes text publishing, communication, news, video, announcement, entertainment activities, etc. It covers many fields such as education, science, finance, culture, entertainment, commerce, communication and so on. It provides support and guarantee for the development of Internet, artificial intelligence, machine learning and other fields. From the form of expression, digital content can be subdivided into digital text, image, audio and video content. Digital text often appears in mail, engine search, news, papers, microblog, WeChat and various announcements in our life; digital images include photographs taken by digital cameras or digital images spread on the network, and often appear with text to describe news facts; in addition, audio and video are also full of this people's life, and are also more common forms of digital content in News and TV. From the technical level, digital content can be divided into three parts: the development of digital content, the transmission of digital content and the security of digital content. The development of digital content and software and hardware are inseparable. The hardware devices and processing software will leave traces in the digital content. Different transmission modes will also have a certain impact on the digital content. Digital content security is based on the characteristics and traces of digital information to judge its credibility and authenticity. The development of communication technology has further expanded the influence of digital content. 5G communication has been implemented. People are crazy to receive all kinds of information. If its authenticity is not guaranteed, it will cause great waves in society. Therefore, it is of great significance to protect the privacy, integrity and authenticity of digital content.

3.2 The impact of digital content security

With the wide spread of digital content, whether in life, work or government management, people often need to make decisions based on the content they get. However, in the current Internet, there are many false

information, tampered pictures, edited videos and modified voice, which make people question the authenticity of the dissemination of information. For example, during the 2004 U.S. political party election, a photo of Senator John Kerry and American anti-Vietnam war actress Jane Fonda appeared online, causing a great disturbance. In fact, it's a splicing version of two photographs taken at different times, but people who don't know the truth are misled. In scientific papers, pictures should accurately reflect experiments, data and other information, but now the phenomenon of tampering of data and pictures is becoming more and more serious. Michael Roberts, an American scientist, admitted on December 7, 2006 that there was a problem of falsification in a research report he wrote. The image of mouse embryonic cells in the report was falsified. He hoped that the Science Journal withdrawn the corresponding paper, this matter has caused a great sensation in the academic circles. Each coin has two sides. The development of Internet and media processing tools brings us convenience and at the same time makes false content spread wantonly. In the era of public participation, it becomes increasingly important to ensure the security and authenticity of digital content.

Digital content security is mainly divided into two parts: one is to protect the generated digital content, which can be guaranteed by watermarking, encryption, information steganography, message authentication and digital signature; the other is digital forensics technology, which is used to identify whether digital information has been tampered or not. Digital forensics can be divided into active forensics and passive forensics. Active forensics is based on the information identification embedded into the original content in advance, so it will be greatly limited [4]. Passive forensics is also called blind forensics, and it can judge the authenticity of the content without any additional information. Generally, for digital information from unknown sources, some algorithms are needed to determine the authenticity of its content, such as the detection of digital content tampering, source identification and so on.

Digital content tampering forensics is generally based on its characteristics, equipment, noise or format information, etc., to study the law of its tampered features or noise changes, so as to draw identification conclusions. Different forms of digital content contain different characteristics. Specific forensic content can be based on the needs of different majors, teaching and practice. Digital source forensics is based on the assumption that all information from the device contains the intrinsic information of the device, which is related to the generated device and has nothing to do with its content. Hardware devices are unlimited, such as mobile phones, cameras, recorders, computers or other hardware equipment.

4. The realistic path of training digital content security-related talents under the new situation

In higher education, digital content security is a gap at present. In order to meet the development needs of the "new engineering disciplines", we should not simply create a general course, but aim at the relevant "new engineering disciplines" specialties, such as artificial intelligence, intelligent manufacturing and robotics, so as to cultivate the concept of cross-border compound talents and create a gold course model of digital content security; condense the professional needs into cases, and integrate them into digital content security analysis, artificial intelligence and other aspects. We should combine professional needs with enterprise cooperation to achieve skilled application.

4.1 Innovating teaching methods to create practical "gold course"

In June 2018, the Ministry of Education of the People's Republic of China convened the National Conference on Undergraduate Education in Colleges and Universities in the New Era in Chengdu, China, which emphasized the need to turn the "water course" in teaching into a "gold course" with depth, difficulty

and challenge. "Water course" means a closed, cramming and exam-oriented course, while "gold course" is an open, thoughtful and practical one. University may be the last step before a person goes to society. Students can benefit directly from the course. In the course of university, we should realize not only the study of theoretical knowledge, but also the mastery of practice and the way of thinking about research problems. Compared with the previous emphasis on teaching and neglect of thinking, the practical "gold course" should bring students more possibilities, the ability to find and solve problems.

For the construction of digital content security course, we can create the combination of online and offline, integrate the resources from home and abroad on the Internet [5], implement the "new engineering disciplines construction needs to learn from international experience and strengthen international cooperation mentioned in the "Fudan Consensus"[6]. Similarly, "Tianda Action" also pointed out that students' interests, innovative engineering education methods and means [7] should learn from the teaching videos all over the world and improve the teaching content system. There are different research methods in different forms of digital content. University should discuss and apply their characteristics according to the needs of each specialty, and carry out targeted teaching. We should focus on the practical application of teaching, break the boundaries between classroom and school. Changing the relationship between teachers and students in traditional teaching, such as the reference in "Beijing Guidelines" that "more attention should be paid to concept guidance"[8]. Teachers are not blindly playing the role of speakers, but as a planner, leading students to find problems, solve problems, combine theoretical knowledge with practical application, and draw relevant theoretical interpretations from practical cases and software and hardware operations, so as to enable students to combine theory with "new engineering disciplines" industrial technology, realize constantly innovate practical ability, and the combination of science and education.

4.2 Enriching teaching resources and promoting school-enterprise cooperation

In order to create a high-quality digital content security "gold course", we introduce school-enterprise cooperation in the whole teaching mode and combine research with practice in depth. School-enterprise cooperation focuses on students' practical ability, so that theory can be thoroughly understood and mastered through practice. According to the needs of enterprises, schools can cultivate students' knowledge and ability of digital content security, form school-enterprise interaction, and train students to adapt to the development of enterprises, so as to promote the progress and perfection of the "new engineering disciplines" era and achieve a positive cycle effect.

Just as the consensus of "Fudan Consensus" that the construction of "new engineering disciplines" needs the active participation of social forces and the construction of "new engineering disciplines" needs the strengthening of research and practice [6], students can learn theoretical knowledge and basic practice in schools, experience the cases and projects of digital content security in enterprises, feel the importance of digital content security for life and society. Students can actually apply and get rid of the phenomenon of high knowledge and low ability in the past.

In the "Tianda Action", "creating conditions for internal and external resources, creating a new ecology of open integration of engineering education" is advocated. It focuses on the combination of school and enterprise resources, and information sharing win-win mode [7]. School-enterprise cooperation achieves the innovation of school teaching mode, which can well integrate the society, market demand and school education. School-enterprise cooperation opens up a new idea of combining practice with theory, realizes the combination of production and education, and opens a broader vision for digital content security education.

4.3 Change the teaching structure to realize the applied undergraduate

In the "Tianda Action" and "Beijing Guidelines", it is emphasized that "the main body of the school should push forward the reform, explore the independent development of new subjects, self-motivation mechanism" and "pay more attention to structural optimization", and refine the orientation and training of talents. Drawing on the construction of "new engineering disciplines", we should promote professional transformation and upgrading, formulate strict digital security teaching system and curriculum system, and adapt to the development of the new situation. Through upgrading classroom education, optimizing curriculum resources, effective participation of enterprises and other measures to continuously promote applied undergraduate.

Exploring the "gold course" construction of digital content security and introducing school-enterprise cooperation can also promote the construction of Applied Undergraduate education. On the contrary, applied undergraduate education can also meet the needs of personnel training under the development of "new engineering disciplines", and can cultivate high-quality talents who can meet the needs of economic development and have the ability of innovation and entrepreneurship.

5. Conclusion

In view of the rapid demand for digital content security talents in society, colleges and universities should formulate a long-term talent teaching plan to cultivate "political, industrial, academic, research, creative" cross-disciplinary talents to adapt to the rapid development of the information age. For the construction of curriculum content, we should start with the curriculum itself and the cooperation between schools and enterprises, and take the road of application-oriented undergraduate course.

(1) Colleges and universities can add digital content security courses to many "new engineering disciplines" to strengthen the integration of students and the development of the times. Since digital content security involves many disciplines and specialties, it can provide specific teaching and guidance according to the characteristics of different specialties and the needs of the market for talents.

(2) Closely cooperate with enterprises in teaching, so as to cultivate talents with high knowledge and ability. According to the needs of the market and enterprises, we should cultivate talents in a targeted and classified way. Schools lack a practical environment for digital content security, so the way of school-enterprise cooperation is conducive to cultivating talents who really meet the market demand.

(3) Intelligent interconnection is used to build learning mode in the era of "new engineering disciplines", share everything connected in Internet, connect lecturers and students in series, connect different regions and enterprises in series, and build a better application-oriented undergraduate road.

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Quality of Work Life in Higher Education Institutions

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Abstract

The quality of work life, whether in the public or private institution, aims to promote well-being for employees, so that they can perform their activities satisfied and motivated, thus contributing to an excellent organizational performance. This study is a review of the literature on the quality of life at work, in which approaches and applications were sought from public servants, especially from Higher Education Institutions. For that, bibliographic research was carried out, with an exploratory and descriptive character, with a qualitative approach and deductive method. The collection of data in front of the compiled and localized scientific works focused on the identification of existing models, among which Walton was considered the most adequate and therefore, with higher utility for the future study of deepening in an application with public servants of Higher education institutions. This model includes a structured questionnaire with eight criteria: social relevance of work life, use of skills, working conditions, social

integration in the organization, work, and total living space and constitutionalism, fair and adequate compensation and opportunity for growth. It is understood that new research applied in this sense, help the managers of the HEIs studied in the decision making aimed at promoting improvements to the Quality of Life at Work.

Keywords: Institution of Higher Education; Quality of Work Life; Walton Model

1. Introduction

The scenario in which the organizations are inserted is marked by intense and accelerated changes, from which the organizations expect of their worker's speed, mobility, innovation and changes (Robbins, Decenzo & Wolter, 2014), acceleration that can be perceived at any moment.

To keep the work environment in harmony with this scenario and to meet employees' demands for satisfaction, contemporary organizations, to remain competitive and globalized, present their human capital as the most significant differential.

Such organizations are also continually seeking quality in their products and services, and they must synergistically combine these variables to achieve their objectives. With this, they are increasingly interested in providing employees satisfaction, to maintain excellent organizational performance. In this context, quality of work life (QWL) is linked to the search for employee satisfaction and the excellence of products and services (Batista, Antunes & Lizuka, 2012).

The concern with the QWL is no less relevant when it comes to public organizations. Although the general manager finds specific difficulties in implementing QWL plans, due to being linked to legal issues, limits on investments, job structure and server career, among others, it is essential that the public service adopts strategic measures that promote quality management of life in the work of its employees, because this action will collaborate to improve the well-being of these workers, besides benefiting the whole society and the public sector itself (Amorim, 2010; Garcia, 2010; Piacentini, 2017).

2. Justification and Objectives

In view of the relevance of the activities carried out by both the teacher and the technical-administrative staff, and considering the demands and demands that fall on them, as well as the lack of scientific studies involving them and relating them to QWL, this study was directed to contribute the knowledge and understanding gap in the context of the public service, especially on applications in HEI of the Cacaoal campus of UNIR, making possible information for decision making pertinent to the managers of the researched institution as well as others who are concerned about the subject and search for replicate this research or take advantage of the ideas presented here.

Therefore, it was chosen as the objective of the study: to analyze from the scientific literature applications for measuring the levels of satisfaction of Quality of Work Life with public servants and, possibly, specifically of Higher Education Institution.

3. Theoretical Review

In this topic, two topics are described that provide the theoretical basis for this research, which is distributed as follows: the first covering concepts of the term Quality of Work Life and the main existing and most used models to evaluate Quality of Work Life. Life at Work, and the second comprising research on QWL in higher education.

3.1 *Quality of Work Life - QWL*

The following manifestations of workers during the 20th century stimulated researchers from several areas to investigate the QL phenomenon in the workplace, which later gave rise to the new indicator: Quality of work life (Pedroso, 2014).

Through research and interventions in companies, the term QWL has undergone several adaptations, and the formulation of its concept has evolved and, over time, has gained new perspectives from authors who contribute to complementary approaches to the term (Pinto, Paula & Boas, 2012).

Fernandes (1996), in the attempt of a conceptualization, exposes the need to have a "dynamic and contingency management." A dynamic management because an organization that aims to adopt a set of actions, with the intention of introducing improvements in the work environment, needs to consider that both the organization itself and the individuals change constantly; "[...] and it is contingent because it depends on the reality of each company in the context in which it is inserted" (Fernandes, 1996: 46).

The QWL is constructed from the moment one sees the whole person, an approach known as biopsychosocial, originated from Psychosomatic Medicine, which suggests an integrated and holistic view of the human being, according to Limongi-Franca (2004). Thus, the author states that "every person is a biopsychosocial complex, that is, has biological, psychological and social potentialities that respond simultaneously to the conditions of life" (Limongi-Franca, 2003, p.26).

Pilatti and Bejarano (2005: 89) point out some concepts that are fundamental to the QWL: they are: employee participation in decisions that affect the performance of their functions; restructuring of tasks, structures and systems so that they offer greater freedom and satisfaction at work; compensation systems that value work fairly and according to performance; adaptation of the working environment to the individual needs of the worker; satisfaction with work. While for Garcia (2010: 78), "QWL seeks to rescue the humanization of the company environment, to emphasize a greater balance between work and leisure, to seek the general well-being for the worker in all environments that are part of his days."

Among the identified models, which are described in the sequence of this research, Walton's (1973) perception about QWL was considered more adequate and useful, which suggests that the organization knows the needs and desires of its employees, since, when the individual has opportunities to use their knowledge and a chance to improve them, he is proud to carry out his work with greater autonomy leaving aside the insecurity, and thus, the QWL becomes perceptible by the collaborators.

3.2 *Models for evaluation of Quality of Life at Work*

Many are the concepts and models that the literature presents QWL. These models are used to identify the determinants of QWL in organizations (Garcia, 2010). Among the most prominent authors are Walton

(1973), Hackman & Oldham (1975), Westley (1979), Werther & Davis (1983), Fernandes (1996) and Limongi-France (2004). The following is a synthesis of the approaches conceived by these authors, considering the increasing chronological order, aiming the perception of evolution in time.

3.2.1 The Walton model

Richard Walton pioneered the creation of a QWL assessment model in which he sought through surveys and interviews to know dimension factors that could affect the performance of the worker in his field of action. Thus, its model is the one that contemplates a higher number of criteria, being eight, with the objective of evaluating the QWL in the organizations (Fernandes, 1996).

According to Walton (1973), regardless of the employee's occupation, job dissatisfaction is a problem that affects the majority. Which is sorry for both him and the organization. However, this problem is complex, says the author, due to the difficulty of isolating and identifying the causes responsible for affecting the QWL of the employee. In this perspective, Walton established eight criteria that influence the QWL of the employees, thus considered:

1) Fair and adequate compensation: it has the purpose of evaluating the employee's perception of the organization's payment system, taking into account work factors such as training, responsibility and working conditions (Timossi et al., 2010). In this sense, Martins (2011, 33) points out that "it is important to determine whether the professionals' incomes are adequate to the degree of effort, responsibility, and ability they perform in the organization." a fair remuneration is considered internal equity criteria (equilibrium in salary when compared to other members of the organization) and external equity (similarity of the payment received with other professionals in the labor market) (Fernandes, 1996).

2) Working conditions: "refers to the conditions of the environment and the working day, to ensure the physical and mental integrity of the worker" (Martins, 2011, p.34). It is an analysis of the reality of the work environment, based on the worker's perception of the work day he is subjected to in the organization as well as the distribution of schedules that should aim at minimizing work-related illnesses; and a physical environment that provides comfort (Fernandes, 1996).

3) Use and development of capacities: it has as a purpose the measurement of the QWL about the possibility that the worker has to apply his knowledge and aptitudes, autonomy is given to him, as well as feedback of his performance (Moreira, 2012). To the extent that the organization provides the employee with the opportunity to show his or her potential, the employee feels fulfilled and thus seeks improvements, making a collaborator satisfied. "It is a satisfactory and productive alliance between worker and organization" (Martins, 2011, 34).

4) Opportunity for growth and security: the focus of this criterion is to evaluate the career opportunity granted to employees. According to Góes et al. (2013, p.11), "the function of this category is to assess the opportunities that the organization offers for the development of its employees and stability in employment." Thus, to have professional growth, it is essential that the organization has job and salary plans, and that it has incentives to increase the knowledge and skills of its employees. (Fernandes, 1996; Martins, 2011).

5) Social integration in the organization: it involves equal opportunities, regardless of social class, racial, sexual, among other forms of discrimination (Albuquerque, 2013). Complementing the concept, Martins (2011, p.35) defines that social integration in the organization "refers to equal opportunities and interpersonal relationships and a team spirit. It involves eliminating hierarchical barriers, mutual support, interpersonal honesty, and lack of prejudice. "

6) Constitutionalism: "The existence of norms establishing the rights and duties of workers are considered as fundamental elements in the work situation" (Moreira, 2012, p.42). The purpose of this criterion is to determine whether the organization complies with labor laws and rights, norms and rules that need to be clear, objective and accepted by workers. Freedom of expression and personal privacy are also present in this category (Martins, 2011).

7) Work and total living space: "Work is present in human life during all hours of the day." (Batista et al, 2012, p. 2). In this perspective the objective of this criterion is to measure the balance between the personal life of the worker and the life in the work, not being able to absorb all the energy and the time of the collaborator causing damage to his family life, his activities of leisure and community (Fernandes, 1996).

8) Social relevance of work life: this criterion evaluates the worker's perception of the image he has of the organization, how it treats the work and the professional as a human being and the participation of the parties (organization and collaborator) in the face of social responsibility (Fernandes, 1996; Martins, 2011; Piacentini, 2017). In summary, it is the satisfaction that the employee has in working in that company.

Because it is an old model, some complaints were made to the instrument due to the language used (Timossi et al., 2010). In view of this, it is proposed that, considering its adoption in applied research, an adaptation of the Walton model be made using a more straightforward and more direct language, thus allowing the questionnaire to be applied to any individual, regardless of their level of schooling or limitation of comprehension, thus guaranteeing the achievement of accurate results.

3.2.2 The Hackman and Oldham model

The Hackman and Oldham studies show that in order to achieve good results in the personal and organizational spheres, there are three factors that influence motivation in the workplace, called the Critical Psychological States: knowledge and consequences of their work, perceived responsibility for the results of their work and perceived significance of their work (Pedroso & Pilatti, 2010).

In this way, the model was developed and based on the basic dimensions of the task. The aspects of the mission include the variety of skills, task identity, task significance, autonomy, and feedback, as they are believed to be responsible for the emergence of the three critical psychological states directly related to motivation and individual satisfaction with work (Sant'Anna, Kilimnik & Moraes, apud, Nunes, 2012).

3.2.3 The Westley Model

The model was published in 1979 in the United States. According to Westley (1979), there are four types of problems that directly affect people's lives in the workplace. These are political (insecurity), economic (injustice), psychological (alienation) and sociological (anomie) problems as described in Table 1.

Table 1. Indicators of Quality of Work Life.

INDICATORS OF QUALITY OF LIFE AT WORK			
Economic	Political	Psychological	Sociological
<ul style="list-style-type: none"> • EquitWage • Adequate Remuneration • Benefits • Workplace • Workload • External Enviroment 	<ul style="list-style-type: none"> • Job Security • Trade Union Activities • Retro Information • Freedom of Expression • Appreciation of Position • Relationship with the boss 	<ul style="list-style-type: none"> • Potencial Realization • Challenge Level • Development • Criativity • Self-evaluation • Assortment of thetask • Identity with task 	<ul style="list-style-type: none"> • Participation in Decisions • Autonomy • Interpersonal Relationship • Responsibility • Personal Value

Source: Westley adapted by Rushel (*apud* FERNANDES, 1996, page 53).

From the Westley model, QWL can be understood as a set of measures that culminated in the maximum humanization of the workplace, minimizing the four problems: insecurity (job instability), injustice (salary inequality), alienation (low self-esteem) and anomie (lack of labor legislation) (Pedroso & Pilatti, 2010).

3.2.4 The model of Werther and Davis

The main focus of the study by Werther and Davis (1983) is the valuation of positions. According to Werther and Davis *apud* Pedroso and Pilatti (2010) although the employees have a good salary, good working conditions, and proper supervision, the activities they develop under their perspective can be tedious. "[...] is the position that most closely involves the worker." (Pedroso & Pilatti, 2010, p.120.

The model structured by Werther and Davis (1983), specifies organizational, environmental and behavioral elements as aspects that influence job design in terms of quality of work life (Fernandes, 1996), according to Table 2.

Table 2. Model of Werther and Davis (Elements of QWL)

Organizational Elements	Environmental Elements	Behavioral Elements
Mechanistic Approach	Employee Skills and Availability	Autonomy
Workflow	Social expectations	Variety
Work practice		Task identity
		Retro Information

Fonte: Werther & Davis *apud* Fernandes (1996, p. 54)

As shown in table 2, the organizational elements are the identification of the job to the job, in which there

must be consistency between work and the use of methods and processes aimed at improving work practices, seeking to avoid a mechanical approach, while the behavioral elements are linked to the needs of the worker. Environmental elements, however, refer to the external conditions, organization, skills, availability and social expectations of workers, and the skill factor must be considered necessary so that the dimensioned position is not above or below the worker's professional pretensions. (Fernandes, 1996; Garcia, 2010).

3.2.5 Fernandes

The Brazilian researcher Fernandes (1996) developed a model called "Operational Audit of Human Resources for the Improvement of Quality of Life at Work," whose objective is to evaluate the level of employee satisfaction.

According to Fernandes (1996, page 67), this evaluation must be done in a deductive way, using the concrete procedures, as it is used in the total quality, "[...] use of control items, in order to measure the results of a process, allowing it to be managed, acting on the causes of deviations from the expected patterns [...]", because according to Ishikawa apud Fernandes (1996, 68)," who does not have control items does not manage "The model is the result of the association of several theoretical models and identifies nine factors indicative of QWL, being: working conditions, health, moral, compensation, participation, communication, company image, boss-subordinate relationship and work organization (Fernandes, 1996).

3.2.6 Limongi-France

The model proposed by Limongi-Fran a (2004) called the BPSO Biopsychosocial and Organizational Model, investigates the following areas: biological, which involves health issues, safety and attendance to physical needs in general; psychological, which are related to the promotion of self-esteem and the development of professional and personal capacities; social, which involves the provision of compulsory and spontaneous benefits, creation of opportunities for leisure, sport and culture; organizational structure. It also aims at valuing a corporate image, the organizational structure, products, services and the relationship of the company with its employees.

3.3 QWL Research

Pizzio and Klein (2015) carried out a study with teachers at the Federal University of Tocantins to analyze the teachers' QWL, considering the reflexes of productive restructuring and the increasing precariousness in work relations. To meet the proposed objective, an evaluation instrument was formulated, which they called IA_QVT / UFT. This tool has quantitative and qualitative items. The results indicated that the lower averages correspond to the working conditions (physical and instrumental structure) and organizational support. On the other hand, the higher percentages are due to social insertion and the sense of work for this subject. Thus, the authors conclude that "... the greater the integration of the project of a life of the teacher to the institution, the greater the QVT, even in unfavorable working conditions. On the other hand, the greater the distancing of the personal/collective project from the institutional objectives, the smaller the QWL becomes "(Pizzio & Klein, 2015, p.493).

Already Sanchez (2015), with the objective of analyzing the effect of the aspects related to the work on the

QL and QWL of university professors and to identify the influence of the elements associated to health in the QL and QWL of university professors of different areas of knowledge, through a descriptive cross-sectional study, in which the data were collected with the support of a sociodemographic questionnaire composed of questions regarding work and health data. The study concluded that the work and life of teachers are interdependent and that the QL and QWL of teachers in different areas of knowledge do not differ. Also, work-related aspects and health-related aspects influence the QL and QWL of the teachers studied.

Another study was produced by Vasconcelos et al. (2012) for which they used the Walton model to analyze aspects related to the QWL of the Santa Cruz Center of Higher Education (CESAC) and the Higher Education Institute (ISED), Santa Cruz do Capibaribe (PE). The methodology used was exploratory and descriptive, and the data collection was done from the application of a questionnaire. The results showed a high level of satisfaction of the teaching staff, evidencing the existence of the QWL indicators of the company.

In this same perspective, a study by Albuquerque (2013) at the Federal University of Para (UFPB), aimed to evaluate the level of QWL of the administrative technicians in the light of the Walton model. The methodology used was qualitative and quantitative, and the research counted with the participation of 1301 administrative technicians. The results found in this study indicate that the QL level of technical-administrative personnel is considered good.

Moreira (2012) also used the model proposed by Walton to identify the perception of non-teaching staff about QWL in the Higher Education Institutions located in Fortaleza and its Metropolitan Region. It counted on the participation of 553 employees, and the results found indicated participants' dissatisfaction in two categories, being: fair and adequate compensation and opportunity for growth. On the other hand, the different groups presented satisfactory indexes.

4. Methodology

This is a review of the literature on the topic of Quality of Work Life, carrying a bibliographic research, exploratory and descriptive, with a qualitative approach and deductive method. Thus, this study has as main function the description of characteristic of a certain population, being possible to establish correlations between variables that, in this case, was to describe the existent scientific production about the subject as well as models to measure the QWL applicable to public servants, especially, of Higher Education Institution.

The approach was qualitative and exploratory, following the understanding in Piacentini et al. (2017), which focuses on discovering and classifying the variables and their relation, while allowing familiarity to make explicit the problem. The deductive method was used, according to Gil (2008), and it presupposes a general knowledge of the phenomena under study, which will seek particularities since it is based on principles considered as valid and indisputable that allow a purely formal conclusion to be reached.

As for the techniques of data collection, the bibliographic research was used from scientific works compiled and located about the theme. The bibliographic analysis was carried out from August to November of 2017, through books, articles, dissertations, theses, available in the library of the Professor Francisco Gonçalves

Quiles campus of the Federal University of Rondônia (UNIR), in Cacoal, as well as on the internet.

5. Data Results and Analysis

In the second half of 2017, UNIR in Cacoal, had 60 active servers from which the localization of all was obtained, and the questionnaire was handed over to each one. Thirty-one respondents returned, 1 of them being disregarded for lack of information (incomplete). Therefore, for the analysis of the research, 30 questionnaires were used. According to the valid questionnaires, 50% of respondents are male and 50% female, showing balance in this regard. From the results of the sample, 43.3% were professionals from 30 to 39 years of age, 13.3% from 20 to 29 years old, 40 to 49 years old from 23.3%, and the rest (20.1%) are over 50 years old. The marital status of the majority, 73.3%, is married, 16.7%, single and 10% divorced. Regarding the schooling of these professionals, 36.7% have specialization, 36.7% are masters, and 16.7% are already PhDs. Most respondents (55.2%) work in the institution between 1 to 5 years, 13.8% work between 6 and ten years, 10.3% work between 11 and 15 years, 3.4% between 16 and 20 years and those who have been in the "house" for more than 20 years total 17.2%.

5.1 Perception of the level of satisfaction of teachers and technical-administrative

To compare the level of perception of the teachers and technical-administrative staff of the UNIR Cacoal campus, the average of the criteria that constitute the QWL was calculated according to the Walton model. It is an exposition of the results obtained in each test analyzed, separated by the group of teachers and technical-administrative, as well as the general average of the QWL of the same, according to Table 3.

Table 3. Average of the servers for the QWL criteria (in descending order)

PROFESSOR		TECHNICAL-ADMINISTRATIVE	
QWL Categories	Average	QWL Categories	Average
Social relevance of work life	66.5	Social relevance of work life	61.7
Use and capacity building	64.4	Use and capacity building	67.1
Constitutionalism	56.3	Constitutionalism	65.6
Working conditions	55.3	Working conditions	56,9
Work and total living space	56.9	Work and total living space	52,3
Social integration in the organization	58.7	Social integration in the organization	73.4
Opportunity to grow. and security	44.1	Opportunity to grow. and security	52.4
Fair and adequate compensation	38.9	Fair and adequate compensation	56.3
Overall average	54.6	Overall average	61.3

Source: Research data (2017)

The average obtained by the technical-administrative was 61.3, therefore classified as satisfactory, that is, they have a positive perception regarding QWL. The primary criterion was the "social integration in the organization" (73.4), which refers to equal opportunities regardless of social, racial, sexual, and other forms

of discrimination (Martins, 2011; Albuquerque, 2013). As for the teachers, these obtained an average of 54.6, being thus classified as satisfactory. However, this result is neutral, that is, they are neither satisfied nor dissatisfied, and this is a compromising result regarding QWL since teachers do not demonstrate a formed perception. The criterion that obtained the best average among these was the "social relevance of life at work" (66.5), which in turn represents how much the employee feels satisfied to work.

Still on the basis of table 3, it can be seen that in the criteria: "working conditions", "use and capacity development"; "Opportunity for growth and security"; "constitutionalism"; "Work and total living space" and "social relevance of work life", obtained similar averages (considering a difference of 12.5 points), that is, the perception of teachers and technicians regarding these QWL criteria It is identical.

However, the criteria "fair and adequate compensation" and "social integration in the organization" had a disparity of means between the groups of servers. As for the "social integration in the organization", which on the part of the technicians-administrative obtained an average of 73.4, indicating that they are satisfied and tend to be very satisfied, but the teachers do not have this perception and with a difference of 14, 7 points between the averages, they show contentment, that is, they are satisfied. However, they are not biased to be very satisfied.

In the item "fair and adequate compensation," the technicians obtained an average of 56.3. They are moving from a neutral perception to a satisfactory tendency. However, this perception does not apply to teachers, which resulted in an average of 38.9 for the criterion, being in an unsatisfactory framework, that is, they do not recognize that they are rewarded for the effort and skills developed in work and these compromise QWL. According to the classification of QVT satisfaction, Figure 1 was created to demonstrate the rating of the average of the QVT criteria of the servers, that is, the result is now of both teachers and technicians-administrative. As shown in Figure 1, of the eight tests analyzed, two are classified as having an unsatisfactory mean and 6 with a satisfactory average.

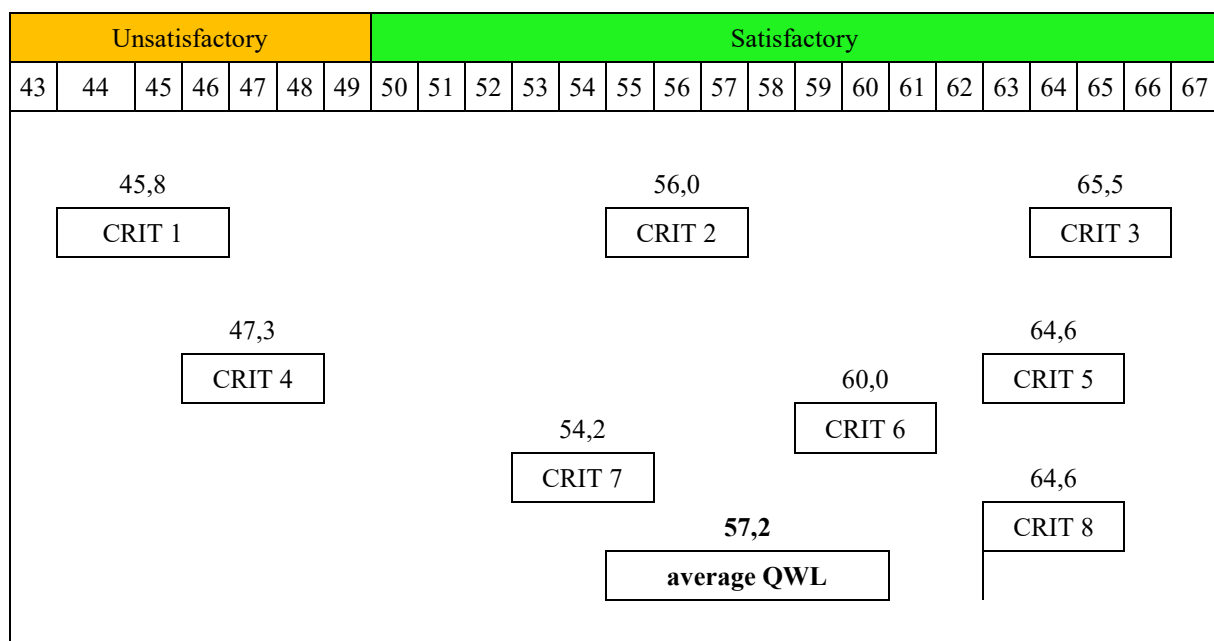


Figure 1. Results of QWL criteria

Source: Research data (2017)

The criteria in which the average estimate is at an unsatisfactory level are "fair and adequate compensation" (45,8), showing that the reward received does not meet the efforts and skills developed in the work of both categories of servants and "opportunity for growth and security" (47,3), that is, the development opportunities granted to employees do not meet their expectations. Timossi (2010) says that the lower indexes can interfere negatively in the QWL since they can indicate relations of conflict between these factors and what would be considered ideal by the servers.

The other criteria are: "use and capacity development" (65,5), "social relevance of work life" (64,6), "social integration in the organization" (64,6), "constitutionalism" (60, 0), "working conditions" (56,0) and "work and total living space" (54,2) presented satisfactory averages, yet none of the 8 QWL criteria was evaluated as very satisfying.

The average of the eight criteria analyzed is 57.2, classified as satisfactory according to figure 1. Regarding the personal satisfaction of the individual with the work he develops, Martins (2011, 34) describes that "[...] when the person is satisfied with the work he does, it is because the sense of accomplishment is present ... and this is perceived through the opportunities granted by the organization so that the employee demonstrates his potential, his competence and the effort to improve. [...] is a satisfactory and productive alliance between worker and organization" (Martins, 2011, p.34), establishing a win-win relationship between the two.

However, the overall QWL average of UNIR - campus Cacoal servers is relatively low, as it tends to neutrality (50.0) or even to dissatisfaction (<49.9). It is worth noting that the employee's dissatisfaction with the QWL, leads to the appearance of illnesses, demotivation, loss of satisfaction and income, thus affecting collaborator and organization, as well as impacting on the personal and social life of the worker (Martins & Surugi, 2011).

6. Conclusion

Because of the quality of work life approach, the level of satisfaction of UNIR's faculty and staff in Cacoal, as well as all the identified QWL assessment models and all previously related researches, was judged. The Walton model is the most suitable and useful for future applications with the INSTITUTE OF HIGHER EDUCATION servers. Thus, the need and commitment that the organization has before its employees in favor of a pleasant organizational climate, so that its employees can feel motivated and committed to the corporate objectives. From the goals proposed in this article, it was verified that the eight criteria established by Walton have great potential to describe, identify, compare and analyze the main factors influencing server QWL.

As for the criteria: "capacity utilization" (65,5), "social relevance of work life" (64,6), "social integration in the organization" (64,6) and "constitutionalism" (60,0), obtained positive results, showing that there is a positive perception on the part of the servers, showing a motivating QWL. However, two criteria, such as "working conditions" (56,0) and "work and total living space" (54,2) indicated an intermediate satisfaction on the part of the employees, since, with regard to "conditions of work, "the use of technology and the fatigue that the work causes, were expressive indicators. The same applies to the criterion "work and total living space," in which the hourly index of work and rest divide opinions between satisfaction and

dissatisfaction. However, the criteria: "fair and adequate compensation" (45,8) and "opportunity for growth and security" (47,3) had a negative perception, showing that the employees are dissatisfied with the remuneration received and do not see professional growth, thus compromising your QWL.

Using the arithmetic mean to compare the level of satisfaction of the groups surveyed, it was obtained that the technical-administrative ones have a satisfactory perception, with an average of 61.3. Not differing much from the teachers, who had an average of 54.6, i.e., also have an adequate understanding. However, the latter tend to dissatisfaction, which is detrimental to their QWL.

Thus, the QWL of the servers of UNIR - Cacoal campus resulted in an overall average of 57.2, evidence that they have a definite link with the Institution, that is, they feel satisfied with QWL. Because of the points discussed, it is suggested that the institution restructure the servers' service plan, since the criterion "fair and adequate compensation" was the one with the lowest index (45.8) as regards server satisfaction, to assure them improvements in salary. Likewise, it allows the creation of measures so that they can seek for more qualification, considering that the criterion "opportunity for growth" was the second lowest index (47.3) of satisfaction.

It is hoped that this study will contribute to a better understanding of the QVT of the servers of UNIR - Campus Cacoal, and possible applications in the field, as well as to assist HE managers who are studied in promoting improvements to the QVT. Thus, new QVT research is recommended at UNIR - Cacoal campus so that the QVT criteria here pointed out in future studies in organizations and HEIs are improved.

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Educational Counselor training and action: interdisciplinary perspectives

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Abstract

The Educational Counselor is one of the professionals in the school management team. His role is to be the relation mediator in the school. He is the one who enables the creation of spaces for dialogue and listening among those involved in the school community. The objective of the present research is to investigate the formation and performance of the Educational Counselor at an interdisciplinary perspective. Nine educational counselor were interviewed and, in order to analyze the produced data, we have used content analysis. The results have pointed out different conceptions of education brought by the participants. They have stressed the importance of training in psychology, in addition to the experience acquired in daily work, with no consensus regarding the role of the educational counselor to the school staff. It was certified not only the importance of working with families, but also the usage of an adequate language to reach the school community. Regarding the knowledge needed to be an educational counselor, they have indicated: analytical listening, institutional analysis, and human development, skills and abilities that are part of the psychologist's training. New studies should be developed on the work of the educational counselor, as well as a militancy for a public education policy that makes possible the insertion of this indispensable

professional in all the schools of the country.

Keywords: Educational Counselor; Educational school psychology; Interdisciplinarity

1. Introduction

The Educational Counselor (EC) - one of the professionals in a school management team - is responsible for mediating relationships within the school (student/student, student/teacher, and family/school). It happens because this professional enables the creation of spaces for dialogue and listening among those involved in the school community. Studying the training and performance of this professional is, therefore, extremely complex, but necessary, since his work is based on an interdisciplinary approach (PASCAL, HONORATO, and ALBUQUERQUE, 2008).

However, this professional, who is essential in the school charts, regularly ends up not existing, and other people who work in the school context often perform his role. The purpose of this text is to analyze the Educational Counselor's training and the performance at an interdisciplinary perspective. Firstly, we have defined the role of this professional in some authors' view. Secondly, we have presented the context of the research, the generated data, and the performed analysis. Finally, some conclusions are made explicit. As a contribution, we have established conceptual and methodological parameters that can contribute to the understanding, formation, and performance of this professional in the school context.

2. EC in the school context

According to Grinspun (2003), the EC should focus on the construction and development of citizenship, subjectivity, and inter-subjectivity through the dialogue of all subjects who are involved in the educational process (students, families, teachers and education guides). In addition, the Educational Counselor is responsible for the students' learning process, through teaching practice questionings (didactic and pedagogical aspects, methodology, relationship with teachers and students, and the role of the school). He will work directly with the student and on his personal training. The EC would have the responsibility to create proposals to increase students' cultural level, making their existence in the school environment more harmonious. Briefly, according to the author, the Educational Counselor would take care of both the student's training and the interpersonal relationships that occur in the daily routine of the school.

School is the micro-society within the macro society so that what occurs outside the walls of the school is reproduced within it. The EC's work involves challenges and insecurities that bring the need for rapid and dynamic intervention and action in different situations. This action could not be the result of experience alone; it should be based on a series of reflections that would enable effective intervention without losing sight of the educator's political character.

The institutional demands of a school, its problems, and contradictions added to the social actors' education conceptions (teachers, counselors, coordinators, and principals) influence the student's education. It is necessary for the EC's formation to, critically, understand the educational and school phenomena, so that he can analyze the students' socialization processes, and understand how they express their perceptions,

feelings, and thoughts. In addition, the understanding of teaching and learning processes, educational policy, and power relations in the educational field are aspects to be considered.

The EC works directly with the students, following their academic and personal development, that is, he acts, often, overcoming didactic-pedagogical issues: his performance is also important in the students' socio-cultural formation. Moreover, it is the EC's job to try to break with the logic of school failure (PATTO, 2000), as even nowadays we find the discourse of education impregnated with expressions such as problem-student, lazy student, unstructured families (CARVALHO, 2011; OLIVEIRA-MENEGOTTO, FONTOURA, 2015).

For Spricigo (2012), in the educational process, guidance is an integral service of school life. It acts, at many times, to promote the development of the student's learning. The EC's action progresses through a specific set of activities, such as: encouraging the student body in the student's learning process; guide him to social and affective themes; assist him in his professional choice. These activities are always carried out with the support or the partnership of several sources, namely: the educational structure, the teachers, the parents and, especially, the students themselves. (SANCHES, 1999).

Thus, EC practice cannot be done by trial and error, nor can it be founded without some theory, since, without solid theoretical foundations, it becomes impossible a knowledge construct that allows understanding of the student's socio-cultural reality and his pedagogical process.

3. Methodology and methodological procedures

In order to accomplish the study, we have chosen a qualitative approach, which, according to Minayo (2007), is a method that considers the participants' uniqueness.

We have interviewed nine educational counselor who work in private schools in the city of S o Paulo. The following table presents the profile of the interviewees:

Table 1 – Participants' characterization

Participant	Age	Gender	Graduation	Postgraduation	Time of work
P1	49	Female	Pedagogy	Psychopedagogy	10
P2	42	Female	Pedagogy/ Speech Therapy	Education Psychoanalysis	15
P3	51	Female	Pedagogy	Psychopedagogy	7
P4	44	Male	Social Sciences	Educational Management	8
P5	30	Female	Psychology	Art therapy/ Family Constellation	5
P6	44	Female	Psychology	Family and Couples therapy	9
P7	42	Female	Pedagogy	Psychopedagogy /	16

				Neuropsychology	
P8	42	Female	Psychology	Political Psychology	10
P9	57	Female	Psychology	Psychoanalysis	38

The participants' average age is 44.5 years old and the performance average time in the role of an educational supervisor is 13.1 years. The professionals interviewed are graduated in different areas - four in pedagogy, four in psychology and one in social sciences. One subject of this research has two graduations: pedagogy and speech therapy. All participants have post-graduation *sensu lato*. It is noteworthy that none of the subjects has masters and doctoral degrees.

We have informed all of the participants about the nature of the research that guarantees the confidentiality and privacy of the information. They have received the letter of information to the subject and the written informed consent form providing information about the study and the right to withdraw at any time from the research.

The recorded interviews were transcribed and organized. The content analysis technique was used. According to Bardin (2009), the content analysis is a set of investigative techniques that, through an objective description, systematic of the manifest content of communications, is intended to interpret what was said.

4. Results and discussion

The interviews were conducted individually, at a time and place previously scheduled by telephone contact with the educational counselor. We have recorded the speeches in a voice recorder and later they were transcribed. After the exhaustive reading of the collected data, we have established the following categories: conceptions of education, training for the practice - professional development, EC's role in the school team, EC's action with families, difficulties, challenges and the knowledge needed to be an EC.

4.1 Conceptions of education

Everyone who chooses to work with education, even if he has never thought on the concept of education, brings with him, even intuitively, a conception of education, and it possibly will consolidate his whole way of reading and interpreting the facts within the school universe. In this sense, we have begun the interview with the following question: -What is your conception of Education?

The following transcriptions exemplify the interviewees' conceptions of education:

P2- There are times that I do not even know how to understand correctly, what education is. If it is more about the school, the family, things are very mixed: the school in the role of education and the family aside.

P4- Education that transforms, that changes that breaks the paradigm, that leaves the sameness, education that acts for the improvement of people's lives.

P5- Path. I understand education as a liberating path, an opportunity. Education can lead you to the development of knowledge, an opportunity for you to extrapolate, to revise concepts.

P6- Education for me, in my opinion, is for you to help the subject to develop socially and acquire skills to be functional in society.

P8- It is the way that culture is transmitted and, as it is being transmitted, it is being modified from one group of people to another.

Even with some possible difficulty in conceptualizing education, the educational counselor of this sampling have brought different conceptions.

Although not defining what education is, the subject P2 has attempted to make connections between school education and family education. Participants P4 and P5 have brought the perception of progressive education, that is, school activity should be centered on discussions of social and political issues and on concrete actions about the immediate reality. The interviewee P6 has pointed out a way of seeing education as a process of social insertion.

In a school-based society, a school is an essential tool in the process of humanization and in the possibility of constructing the subject as a generic and singular human being. Thus, the school accepts an ambiguous role in society, since it can serve both to legitimize social inequalities and not to legitimize them.

According to Brand o (2007), the education acts in the process of building beliefs and ideas, involving exchanges of symbols, goods, and powers that, together, build and reinforce a certain type of society.

Although the work of the educational counselor is solitary, for he can believe that he acts on his own and that he is working for the autonomy of that student subject, he may be building the kind of person that society wants. The society produces people with emotional and social skills, capable of masking their feelings in favor of a supposed empathy, resilience, and false social activism with the idea of changing the society in which they are inserted. However, in fact, it functions as a mechanism capable of hiding it, transforming what is a social construction into a natural one, transforming exceptions as rules, in order to reinforce neoliberal ideology and logic.

Education is present in the imaginary of people and in the ideology of social groups, with the pretension of transforming the world into something better. The question is, better for whom? For the *status quo* maintenance and reifying any form of thought, since, dialectically, radical socialization is the cruelest of all alienations. Possibly one of the only ways that the Educational Counselor has to act is to be aware that he is a part of this gear and that he must act in the clarification of the contradictions, for the emancipation of the students.

Therefore, regardless of the educator's conception of education, the act of orientating involves, as in any other action in the field of education - in the words of Freire (2001), the ethical, political and professional responsibilities of the teacher – giving him the obligation to prepare himself, to search qualification, to graduate before starting his teaching activity.

According to Costa (2016), for Freire, Education, as a praxis, is an effort that does not ignore the critical

socialization of hegemonic culture in order to fill the access gaps to dominant cultural goods, but then it effectively can accomplish this approach, turning its attention to marginalized culture in educational spaces and in society in general, since it affirms to be its recognition indispensable to insert it, as well as the school, in the agenda of democratization of society.

4.2 Training for practical action: professional development

This category sought to elucidate what should be the theoretical and training contributions of the educational counselor since this professional is all the time mediating relations between the different actors of the school community: students, teachers, managers, and families. When we have asked, "How do you evaluate your training for your practical action?" participants have responded:

P2- Health-oriented training helps more than pedagogy itself.

P3- Psychopedagogy and learning disorders, I think those helped me a lot.

P5- I think of having my clinical base, which refers to listening practice.

P4- I took life-coaching courses, and I use those instruments a lot in school; they have a nice effect.

P7- I think it was much more theoretical than practical, I think the practice itself was happening on a day-to-day basis at work. Then, within the practices, situations that I was coming across at work, I looked for the theoretical issue, as evidence.

P9- Fundamental, my background, before and above all, is psychology and I understand that it is fundamental to my practice, because the educational supervisor is the mediator of the subject, who is now, a student.

The participants have pointed out the importance of health education, psychopedagogy, learning disorders, and clinical (P2, P3, and P5, respectively). They also indicated training in coaching (P4); the importance of the experience acquired in the daily work (P7) and psychology (P9).

We have verified in the statements of the Educational Counselor the belief in the importance of the priority issues related to health within the school environment, often giving the impression of forgetting that the school is an area of education and not health.

According to Christofari, Freitas and Baptista (2015), behavioral issues, or the so-called deviations of conduct, become pathological symptoms as medical rationality, especially medical-clinical discourse, is present in all fields and expands through different educational practices.

The hegemony of medical discourse within education is reducing human diversity. There are labels and classifications, which insert the phenomenon of medicalization into a network of pathological explanations. Medicalization is a device that transforms political, social and cultural problems into personal issues to be treated or medicated (MOYSÉS and COLARES, 2010). The individual is isolated from a context to analyze

in detail his particularities, making them pathological. It is a way of looking at the other as if he were a simple sum of biological and behavioral characteristics, both taken as a starting point for the definition of the presence of possible pathologies (CHRISTOFARI, FREITAS, and BAPTISTA, 2015).

According to Calado (2014), the medicalization of education transfers to the medical field the collective questions, from social and political issues, reducing them to biological aspects, exempting other instances of power from responsibility, which may result in the individualization and in the blamefulness of children, adolescents as well as their families.

The Educational Counselor should always be attentive to this process of medicalization, for this medical discourse becomes an ideology as it masks the school as an institution that reflects social, economic and cultural inequalities. According to Marcuse (1982), social and ideological aspects are no longer only in the field of ideas but have become the social order itself. Thus, when we discuss the formation of the Educational Counselor, the belief of what in fact, would be essential to form him goes through what seems to be indispensable for solving problems that are medical knowledge.

This medicalization of education is becoming the determining order of education. It is also determined by the means of production that regulate the cultural industry, and fetishize medical knowledge to the detriment of other knowledge, often determining the men's way of being, acting and thinking, which, in this context, the medicalization of education only reproduces in vigor standards already established, within schools as educators.

Within this universe, it is necessary a constant exercise to decipher the conditions and constraints that determine the guide's ways of being. Thus, according to Freire (2001), the activities in the field of education require that preparation, qualification, and training become permanent processes. Training that is based on the critical analysis of its practice.

4.3 Role in school staff

School management is not just a way to manage the whole school. This means seeking to meet the demands of all sectors that involve those practices, from employees, the physical structure of the school to the relationship of parents and students and the atmosphere with the educational environment (OLIVEIRA and WALDHELM, 2016). In this scenario, it is the responsibility of the educational counselor to help to create a healthy environment inside and outside the classroom so that everyone in the school community can feel welcomed in their needs, being they academic or relational.

According to the interviewees, the role of the Educational Counselor in the school team is:

P1- A helping role.

P3- I'm a kind of putting out the fire, so it's like this

P4- My role is leadership, this is how I was called and summoned to reestablish a leadership role.

P5- Someone who offers a listening space, who seeks to care for the personal characteristics of the professionals who work in school, in their due roles.

P7- In my role I feel that many times I cannot act as an educational counselor. Sometimes I see myself a lot in the bureaucratic work, doing bureaucratic things that take a lot of my time and not being able to develop, for example, projects.

P9-Educational counselor on the school team will depend on the institution he is in, but I understand that he is someone who can fundamentally mediate the team's relationships for the benefit of the student, the one who is our most interesting subject

We have noticed that there is no consensus among the participants of this sample about the role of the Educational Counselor in the team, as each of them understands their role in a different way, ranging from a professional to "*put out a fire*" (P2) to "*leadership role*" (P4).

The understanding of the Educational Counselor's role in school management is of fundamental importance, since intra-school factors may influence both positively and negatively the students' learning and development (ALVES and FRANCO, 2008; OLIVEIRA and WALDHELM, 2016).

According to Soares (2007), management comprises the tasks related to ensuring the functioning of the school regarding to routine, so that we can use the resources in it to meet the students' learning needs, conciliating those functional administrative issues to the maintenance of a favorable environment turned to the learning process and a collective work shared between and by the whole team.

That Soares' administrative technical vision is increasingly present in schools. Considering that the school is a living organism, an institution that in many parameters resembles a total institution, the manager alone does very little or can do very little. According to Libâneo (2005):

The school manager must be aware that he alone cannot manage all the problems of the school. The way is decentralization, that is, the sharing of responsibilities with students, parents, teachers, and staff. This is what we call democratic management where all the actors involved in the process participate in the decisions. Once taken, we deal with decisions collectively, in a participative way, and so we put them into practice. For this reason, the school must be well coordinated and managed. We do not mean by this that the success of the school resides solely in the person of the manager or in an autocratic administrative structure in which he centralizes all decisions. On the contrary, it is necessary to understand the role of the manager as a cooperative leader, as one who can bring together the aspirations, desires, and expectations of the school community and can articulate the adhesion and participation of all segments of the school in the management in a common project. "The director cannot focus solely on administrative matters. As a leader, it is up to him to have an overall vision and an action that apprehends the school in its pedagogical, administrative, financial and cultural aspects" (p.332).

As the Educational Counselor is a member of the management (he is a mediator between the different actors of the school community), he should promote spaces for collective work. Thus, work within the universe of education is completely different from the nature of work in general and the production of its products. It is important to emphasize that any collective work is not simple, since dealing with different subjectivities and life histories require much more than the practice of management: it is an exercise of listening and being himself in other's pair of shoes.

4.4 The action of counselor with families

The relationship between school and family is not always a calm relationship. According to Filho (2000),

the discussions about this relationship have worried researchers and/or managers of systems and units of education almost all over the world. Still according to the author, this fact is evidenced, on the one hand, by a large number of researches and specialized journals on the subject, and, on the other hand, by the concern manifested in the most diverse forums (from school meetings to national and international forums) by professionals responsible for managing simple school units or complex national education systems. According to Filho (2000), in one way or another, omnipresent or discreet, pleasant or threatening, the school is part of the daily life of each family. As the author continues, the form and the intensity of the relations between schools and families vary enormously, being related to completely different factors (structure and families' tradition of schooling, social class, urban or rural environment, number of children, parents' occupation, etc.).

P1- It's a very frank relationship, fair and square... I do not treat families differently for any reason, and for me, they are partners of the school in our job.

P2- It has to be a relationship of trust and exchange.

P5- You have to go through the confidence and also your courage to signal aspects that you understand as important in that student, son of that family, that father, and that mother, and helping the families to endure the wait and the frustration and return to their positions of father and mother.

P8- It is to build a bond and they trust me, trust that student, that child so normally protected to a person they have just met.

P9- Very difficult, mainly depending on which institution you are providing service.

According to the Educational Counselor's perception, families should be partners in the orientation work, establishing a relationship of trust and of exchange that is built through a bond. It is important, however, to emphasize that all this happens through the institution in which the advisor provides his service, and the institution can facilitate or make difficult the bonds with the family.

According to Filho (2000), the participation of the family in the process of children's schooling has been increasingly considered in the children and adolescents' discussions of school trajectories. According to Almeida and Betini (2015), a crucial topic in the relationship between family and school is the difficulty of communication, as often a clear dialogue cannot be established regarding the student's orientation. Still, according to the authors, the dialogue between family and school takes place in the line of counseling, in which the school gives to the family a set of guidelines so that families can help to improve their children's performance.

Being the Educational Counselor the professional that will have contact with the families, it would be up to him to have the perception that for a dialogue to exist it would be necessary a bond, which is always a path to be built in the relationship.

The school institution could establish alternative forms of contact with families, other than just the meetings at the end of each quarter or two-month period, and build a new link involving the two realities common to the child and the adolescent, i.e. his family and school.

4.5 Difficulties and Challenges

Each Educational Counselor carries his history and his way of seeing the world, so each one subjectivity

understands the difficulties and challenges of his practice differently. When we asked about the difficulties and challenges faced in the day-to-day work, they said:

P1- I think it is reaching all the students in the way we want to.

P3- The biggest challenge is families, you work with different families with different instructions in the same environment, so I think this is a big challenge, and deal with teachers. Where you have a student who needs a different look, you are there counting. However, many do not accept.

P5- Some questions of ideological order, the time in which things happen, the need for quick answers to things that require more time for thinking and deepening, I think that the immediacy of life and of the world is a great challenge for the advisor.

P8- The difficulties are, precisely, work with very different visions about the children's day-to-day.

P9- It's the human, the too human who jumps on the scene all the time without realizing it. The greatest challenge is the vanities that each one has within the institution and the relations of the practice of education.

The supervisors of this sampling presented the issue of communication as a challenge and a difficulty in the daily work since it should be direct and effective, with clear and adequate language to reach everybody in the school community - students, families, teachers.

According to Lane (2008), language, as a product of a collectivity, reproduces through the meaning of words articulated in sentences, true or false knowledge, and values associated with social practices. Language, then, produces a worldview; language is not neutral, nor is the school.

According to Freire (1992), the dialogue among the members of the school does not make them equal but marks a democratic position among them. Thus, the ethical duty of the educational counselor as the subject of an educational practice, which is not neutral (it is impossible to be neutral ...), is to show respect for differences of ideas and positions, even opposing positions.

That dialogue in the school, according to Freire (1992), cannot interfere with the students' creative, formative and investigative capacity, otherwise, the often-necessary directivity of the Educational Counselor, becomes authoritarian, which can happen when he wants to impose his beliefs.

4.6 To be an Educational Counselor

This sampling has a very heterogeneous categorization, presenting professional bachelors in pedagogy, psychology and a social scientist. The different courses provide very different visions of the man and of the world to their graduates, which will directly influence the way in which they will carry out their work. However, even with different formations, those professionals have brought elements that they consider important for this orientation, as they are part of the psychologist's training: analytical listening, institutional analysis, and human development. The interviewees stated:

P2- The main thing is to listen to the families and the students' history.

P3- Studying constantly is fundamental, every day a new thing comes up and you have to know about it, you have to know what is happening, a lot of repertoires because they bring a lot of demand that you, at least, have to understand.

P5 - The counselor should go through a training area such as psychology so that he has a better condition of understanding the processes of his work with adolescents, with children and their families. Always working on a political and reflexive analysis about these processes, not taking from a closer look at the world in which we live, our reality, the contextualization.

P6- It is you who makes it possible to do the parent-student-school tripod; doing, I think, a good bond, which is what most guarantees a good job as a mentor.

P7- The fact of knowing the students' development as people, then cognitive psychological development

P8 - Analytical listening. I think it's fundamental that we can actually hear what people are saying, ask the right questions, understand that person's position. Of course, we will have our stories and conceptions, but we try to, actually, understand the essence of what is being said. Analytical ability is to take all these elements and get to understand how they relate and focus: that is actually, to establish what will be your performance at that moment. Even if you review it, you have to be reviewing it all the time.

P9 - Educator has to know about human development. Thus, I would work on Piaget in principle, and then, using Piaget's own final testimony, saying that psychology has to come in, and psychology that contemplates the social, the being inserted.

In the face of what participants have emphasized - analytical listening, institutional analysis (tripod parents-students-school /P6) and human development - we can conclude that they pointed out skills and abilities that the psychologist acquires in his education, and perceives the socio-historical nature of man.

They understand the performance of the Educational Counselor as a mediator of different contexts, situations, and conflicts within the school universe, and it is up to him to know the individual in his relationship, both in what is specific to him or in what is a group and social manifestation (LANE, 2008).

From this perspective, the Educational Counselor has the possibility to perceive with more clarity the dynamics of the school complaint to act in it. School complaints include not only learning difficulties but also all the facts of the school dynamics that become a lament in the teachers' talk of direction, supervision, and orientation, such as indiscipline, aggression, sexuality, among others. (SOUZA, 2005; MACHADO, 2000, LABADESSA and LIMA, 2017). In addition, he is able to establish new strategies to deal with school complaints and other problems of the complexity in daily education.

5. Final considerations

Briefly, the generated and analyzed data have indicated that:

- Even with some possible difficulty in conceptualizing education, Educational Counselor of the sample have brought different conceptions of education. Some, with perceptions aligned with a progressive education proposal, others with a more conservative perspective.
- The participants pointed out the importance of training focused on health, on psychopedagogy, on learning disorders, from a clinical perspective.
- It is noticed that among the participants of the sampling there is no consensus about the Educational Counselor's role in the team, each one defining his role in a certain way, ranging from a professional

to "put out a fire" to one to exercise "the leadership role".

- Most of them have stressed the importance of working with families. They should be partners in the work of orientation establishing a relationship of trust and exchange built through a bond. It is important to emphasize that all of this happens through the institution in which the Educational Counselor provides his service since the school can facilitate or make the bonds with the family more difficult.
- A common point of challenges and difficulties among participants is the issue of communication with adequate language to reach students, families, and teachers.
- On the knowledge needed to be an Educational Counselor, the participants have pointed out: analytical listening, institutional analysis (tripod parents-students-school) and human development as skills and abilities that the psychologist acquires in his formation, thus understanding the social and historical nature of man.

Therefore, the Educational Counselor, although part of the school management, often works alone, having little space for the exchange of experiences.

We bet on the idea of collective construction of knowledge. It is necessary to form interdisciplinary networks among the school community and the Educational Counselor, so that a combined action exchange of knowledge may truly take place.

However, Educational Counselor, no matter how well-intentioned they might be, are heavily involved in day-to-day work, making dialogue unfeasible and, thus, the exchanging experiences, too. According to Benjamin (1987), a faculty that seemed alienable, that is, of exchanging experiences, seems to have been withdrawn from us.

Educational Counselor occurs in relationships between people and, those relationships can consist of a practical indication, a tip, and a theoretical construct, that is, someone gives, offers advice to his listener. According to Benjamin (1987), giving advice is something, in the author's words, out of fashion, because the immediacy of experience no longer exists. Thus, we have lost the ability to give advice to ourselves and to others.

"The advice interwoven in the matter of lived life is wisdom" (BENJAMIN, 1987, p.59). Thus, the loss of the capacity to narrate makes it almost impossible to think and the only possible faculty becomes that of obeying, because according to Matos (2006), it is observed that the technical rationality dissociating means and ends and, consequently, a fetishistic worship of the technique itself, as something superior to man and not as something produced by man, which often leads to the difficulty or impossibility of listening to the other, since information, as well as technique, must be quick and objective.

This difficulty of listening to the other can be understood by the fact that, according to BENJAMIN (1987), people do not communicate anymore through the narrative of a situation, i.e., contextualizing the fact that has occurred; they just pass on information. If before the possibility of listening to the other narrating something was attractive, what attracts now is the information, because there is no need for a socio-historical cultural context. The information informs pleonastically, giving the impression that in itself and by itself carries all that is sufficient for the other to know. The information "puts the requirement for ready verifiability. What takes precedence in it is the fact that it is intelligible by itself" (BENJAMIN, 1987, p.61).

The fact that it is intelligible by itself guarantees a fetishistic character to the information, the same of the goods since the information is embedded of a magical character, which is assumed when the social history of the production of this information is omitted. We lose every single ability to exchange experience, which is so necessary and fundamental to any human activity. It is even more needed inside the school.

Due to the complexity of the formation and performance of the Educational Counselor, this professional should have as the main point of his activity, the emancipation of the subjects that are students, so that they can perceive and act on the social contradictions and not simply acquire the so-called socioemotional abilities. In this sense, the action of the Educational Counselor is a political act that would enable a conscious reflection of the social contradictions that should reach not only the students but also all of the school community. Thus educational guidance should direct its efforts to elucidate contradictions and resistance "by showing pupils the falsities" present in a culturally constructed life and "awakening the awareness of how much men are permanently deceived" (ADORNO 1995, p.181-183).

It is necessary to continue exploring and deepening other aspects of the formation and practice of the Educational Counselor, always with the ultimate goal of providing the emancipation and enlightenment of students and of all those in the school community who have their relationships within the school mediated by this professional. New studies must be developed on this important work in education, as well as the militancy by a public policy that allows the insertion of this professional in the public network of cities and states, so that the maximum number of students, the families and everyone in the school community have contact with him.

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Corporate Sustainability as a Competitive Strategy in Brazilian Companies

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Abstract

Only sustainable practices make it possible to guarantee the existence and usufruct of natural resources for coming generations. Certain Brazilian companies were classified in 2016 as the most sustainable companies in the cosmetics sector, according to the Exame sustainability guide; the objective of this study was to describe the sustainability activities that they implemented. The deductive method and qualitative approach were adopted, with reading and data analysis of the companies classified in the ranking of Revista EXAME in 2016. Research of an exploratory and descriptive character was used to organize, describe and compare the sustainable practices of the companies. The attitudes in the companies were

perceived to involve awareness but some restriction in the steps of sustainable practices and beliefs, with some way still to go, since not all the companies are normally aware of the importance of these practices, and they often intend merely to respect the laws and environmental rules, not taking into account the fact that the environment should be respected. The results obtained confirm that the continuous sustainable actions developed by Natura, Avon and Grupo Boticário are essential and such activities contribute to the renovation, preservation, and conservation of natural resources, which should serve as a reflection and alert not only for other companies but also for society as a whole.

Keywords: Brazilian companies. Sustainable competitive strategy. Sustainable practices.

1. Introduction

Sustainability has been defined as an ability to meet the needs of the present and not jeopardize future generations (Hart & Milstein, 2004). Sustainability has been gaining attention and becoming a central concept in the management of companies' conduct, reaching and providing sustainable activities in all sectors, whether with regard to the environment, the economy, education, administration or other areas.

Organizations can adopt sustainable actions and guarantee, in the medium and long term, the preservation of natural resources for future generations; they can also make the world more conscious of possible scarcity and the need to maintain the natural resources. Thus, in addition to introducing new practices and customs that benefit the economy, people and the environmental, organizations also seek to establish sustainability goals on the basis of their corporate social responsibility, to repair the impact of the disasters that have already occurred.

This study explores the sustainability practices implemented by Brazilian companies which apprehend the need for sustainable competitive strategy. To do so, it considered the sustainability practices implemented by Brazilian companies, based on the classification of the most sustainable companies in the year 2016.

The study employed descriptive exploratory methods, with a qualitative approach, deductive method, and bibliographical and documentary analysis. Its criteria are based on information contained in the Guia Exame de Sustentabilidade, whose rankings of the 100 most sustainable companies of 2016 identifies the practices carried out by companies.

2. Corporate Social Responsibility

Corporate Social Responsibility (CSR) is seen in the practice of those who meet their legal obligations and commitments to the performance of the economy. According to Tenório (2006), CSR is characterized as showing a company's involvement in community activities; it may sometimes represent the social interests directed to its business environment or its group of employees (Daniel, 2014).

The social responsibility of a company is discharges in actions and direct participation that promote and prioritize social and environmental obligations and show more social communication with its employees. Not even its support for community development and preservation of the current situation is enough to characterize a company as socially responsible. It must also prioritize the well-being of its employees and

good communication, and transparency in its treatment of them.

In the liberal view, companies have the function and objective of always seeking higher returns for their shareholders and stockholders, including obedience to a "set of rules that governs ethical business behaviour"; thus they manage the choice by individuals (stakeholders or shareholders) to receive the returns generated by the company, which knows how to handle its resources. In this sense, they propose that each partner makes an individual decision to accumulate wealth or to assign benefits to society, as a matter of ethics and individual responsibility, not the concern of the company (Machado Filho, 2006). According to Machado Filho (2006), stakeholder theory is based on the idea that the final balance of a business organization's activity should take into account the returns that enhance the results not only of the shareholders but of all the stakeholders involved.

Finally, in Eon's view (2014), social responsibility consists of managing a continuous process and improving and developing the company's welfare and its relationship with its employees, suppliers, and society. The companies that give their management a socially responsible position grow more sustainably: that is, they improve their image and opportunities, being less likely to provoke judicial conflicts.

2.1 Business Sustainability

Sustainability is the ability to sustain. Sustainability has as its essence the preservation of natural resources, as well as respect for human dignity; it is concerned not only with the present but also with future generations (Mikhailova, 2004). Corporate sustainability is based on the development, implementation and maintenance of actions that make a competitive organization economically viable, it takes account of environmental efficiency and social responsibility in its operations, focusing on natural resources, society and its stakeholders (Pimenta, 2010).

Sustainability is still defined by some authors as the Triple Bottom Line (TBL), which refers to the three dimensions of sustainability: to manage a business with social, economic and environmental circumspection, mapping its axes and identifying the company's position.

For Vellani and Ribeiro (2009), the definition of TBL focuses on the need for companies' strategic decisions to consider the economic Bottom Line, the social Bottom Line and the environmental Bottom Line; managers should consider economic sustainability as the calculation of profitability and the generation of value; social sustainability as the stimulation of education, culture, leisure and justice to the community; and ecological sustainability as maintaining the ecosystem and biological diversity. The interaction between these three kinds of sustainability forms the Bottom Line Tripod of Sustainability, illustrated in Figure 1.

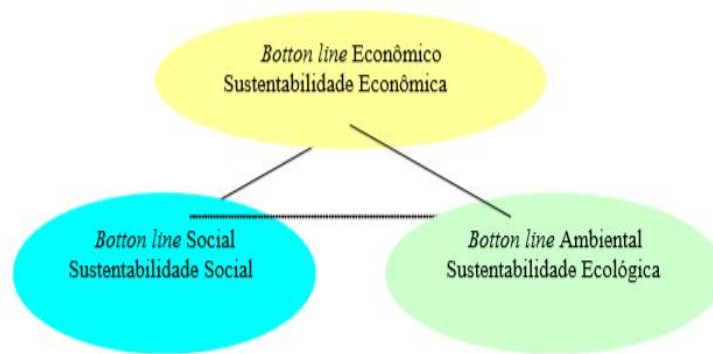


Figure 1. Interaction of the Triple Bottom Line (TBL) of Sustainability

Source: Vellani and Ribeiro (2009).

Corporate sustainability is also seen in the sets of actions and responsibilities that the company must undertake to earn respect and recognition of its social and environmental maturity, allowing it to generate its business in a way that does not harm or endanger the environment. As stated by Azevedo (2006), constant economic, political and social external pressures are compelling companies to focus on the management of their businesses with sustainability in mind; he observes that groups of companies recognize that companies have a duty to plan their actions not only in relation to the environment but also to their employees and the community in which they are placed.

According to Furtado (2005), the right path to a sustainable business can be initiated and directed in different ways, such as organizational learning, building a global vision of sustainability or attaining it through the sequence and form of the tasks or actions selected and adjusted to the interests and conditions of the organization. The practices adopted should make it possible to improve the corporate image, the environmental conditions of the planet, the satisfaction of employees and shareholders, and the economic reduction of production costs.

However, the criterion of organizational sustainability is the well-being of society within the limits established by legal norms. Moreover, organizations respond to charitable demands and the claims of various social actors. The motivation for sustainable action lies in perceiving it as something imposed, an obligation or a correct behaviour (Munck & Souza, 2009).

2.2 Practices of Corporate Sustainability

Sustainable practices are very important since they enable a company to modify its image with the consumers in a positive way and can be very profitable when used as a strategy to increase its competitiveness while contributing to the well-being of humanity.

Companies have highly relevant embedded features, such as social responsibility, sustainability and socio-environmental responsibility (Razzoto, 2015). The following Table 1, presents examples of the sustainable practices undertaken by responsible enterprises.

Table 1. Examples of sustainable practices applied by responsible enterprises.

Company	Practices	Benefits
Natura	Pet Recycled post-consumption (2007)	Uses post-consumer recycled plastic (PET) in Ekos sub. - Promoting a continuous and significant reduction of greenhouse gas (GHG) emissions at all stages of the production process, from the extraction of raw material to the destination of the containers after consumption.
Pedroso	Segment of paper and pulp	Adopts the vision of sustainable development in its operations, highlighting the reforestation model of eucalyptus plantations.
Masisa	Relations with the community	Each community has unique characteristics; each of them has developed relationship plans, with open and systematic
Philips	Energy efficiency (2010)	Replaces conventional products with low consumption products by innovations that add more value to customers and consumers.
Walmart (2009)	Sustainable Meat Project: From Field to Table (2015)	Disseminates best socio-environmental practices in Amazonian cattle ranching, ensuring the conservation of forests, soils, and rivers, offering technical support to producers to increase their productivity and profitability without the need for new deforestation. Reduces the number of plastic containers and bags and reduces waste disposal to sanitary landfills, as well as
Malwee	Innovation in raw materials (2014)	Develops new processes for the use of materials that have a lower social and environmental impact, such as the use of PET and defibrated cotton.
Gramazon (2016)	-Health and safety at Work. -Purification and reuse. -Donation of leftovers. -Reforestation	- Shows concern for the health of employees with specialized professionals caring for their well-being, as a follow-up of general practitioner and psychologist. -Purifies and reuses water in production by a decantation process and storage in dams. -Uses the output of production leftovers (clay, earth) for landfills. -Supplies reforestation in degraded areas with tree plantations and pasture to reduce environmental impact.

Source: Adapted from Natura (2007), (2013), Pedroso (2007), Masisa (2015), Philips (2010), Walmart (2009) and (2015), Malwee (2014), Gramazon (2016).

Innovative ideas and practices are essential conduits, aimed at better results, which promote environmental and social respect. Coral (2002, p.31) highlights some business sustainability practices, such as: "the implementation of effluent and waste treatment systems in compliance with the current environmental legislation, the adoption of environmental management systems (EMS) and ISO 14001 certification."

The company's responsibility to the environment is necessarily a commitment to improving its quality; what is implied is education, awareness, and commitment to the micro and macro environment of which the company is a part, with support for sustainable environmental initiatives and practices. Support for

research projects, life cycle management of the impact of products or services, minimizing a company's environmental impact by the efficient planning and monitoring of production residues (Razzoto, 2015). Companies that assimilate a new environmental and social consciousness pay attention to different stakeholders and not just to investors by modifying their actions and benefits; they recognize and enforce the laws promoting an integrated approach based on sustainability. If a Social Report and environmental declarations or reports have been voluntary, then the legal and regulatory initiatives that encourage and urge companies to disclose non-financial information become more frequent (Dias, 2009).

2.3 Strategy: Concepts and importance in the business context

For Oliveira Thompson, Strickland and Gamble (2011), strategies in companies are concerned with the direction of competitiveness and the managerial approach, who use them for business growth, for attracting and satisfying clients, competing successfully to reach the optimum levels organizational performance.

Organizational strategies are affected not only by environmental forces and strategic capacity but by the values and expectations of those who have power inside and outside the organization. Whether the organization is expansionist or is more concerned with consolidation and if boundaries are set established on organizational activities can reveal much about the values and attitudes of those who, as stakeholders, have the power to influence the strategy of the organization (Johnson, Scholes & Whittington, 2007).

In Oliveira's (2007) conception strategy is significant for the company, which knows that the executive must recognize that choosing the most propitious moment to implement a strategy is as critical as the strategy itself, the plan of the best paths to follow to meet the companies objectives and overcome its goals, and challenges. Strategy is imposed on a company as the art of using things appropriately. Deciding on a course of action is necessary for a company when it debates which paths to follow in determining its business strategy.

Piacentini et al. (2018) focus on strategy in the context of improving the production practices traditionally developed in sensitive ecological environments. For these authors, a sustainable approach when facing new commercial demands involves the reviewing of knowledge, technologies, and methods according to precepts which protect the environmental and social context,

Finally, strategies are conceived as a central framework for entrepreneurs to manage their businesses, a way of planning a set of methods and practices that will form the primary focus of their actions, and one that can be applied and characterized by companies in different ways to target and determine for themselves their own competitive behaviour in the market (Oliveira, 2007).

3. Methodology

The present research is of the applied type, follows the deductive method and takes a primarily qualitative approach. It starts with the analysis of data from documents about the Brazilian companies that were ranked as more sustainable in 2016. For this purpose, it was used to interpret a specific content, which focused on the categories of sustainable practices identified in the literature review (Appolinário, 2006; Gil, 2008; Martins & Theóphilo, 2007; Gerhardt & Silveira, 2009; Piacentini, 2017).

The research has an exploratory and descriptive character, which sought to know the theoretical

possibilities of certain categories and then to classify, describe and compare the sustainability practices implemented by the most sustainable companies in 2016.

Following Piacentini et al. (2017), the qualitative approach in the present study seeks to discover and classify the variables according to their relationship, and the exploratory objective binds with the theme to make the problem explicit.

The ranking by the national magazine 'Exame de Sustentabilidade' was adopted to improve the comparison of these companies to the international classifications in the global list of the 100-Most Sustainable Corporations in The World, which listed two Brazilian companies as the most sustainable in Brazil in 2016. Information about sustainable practices was collected from the reading and identification of categories according to the findings in the Guia Exame de Sustentabilidade. The variables thus identified and analyzed were the sustainability practices of Natura, Avon, and Boticário, three firms in the cosmetics sector.

4. Analysis and Discussion of Results

In this section, the data collected in the documentary research are summarised.

4.1 Natura

Founded in 1969, Natura is a Brazilian multinational company in the cosmetics, hygiene and beauty sector, with a commitment to develop products that represent values and behaviours that are more sustainable in the network of relationships. It is considered one of the ten most innovative companies in the world with 7,000 employees, 1.5 million consultants, and its suppliers and partners and has established itself in France and six countries in Latin America (Natura Annual Report, 2016).

Natura invests in innovation as one of the main pillars to reach a model of sustainable development, seeking to create values for society in social, economic and environmental terms. The transformation of Brazilian biodiversity into products is already a trademark of the Natura and its relationship with the Amazon Forest dates from the year 2000, with the launch of the Ekos line. The company's philosophy is that, by using renewable raw materials that generate income for indigenous communities, it can intercept predatory cycles and creating a stable forest economy (Revista Exame, 2016, p.110).

To reach Ucuuba's new line of butter-based cosmetics, for example, Natura devoted six years of research to identifying a sustainable way to use Ucuuba and the most appropriate method for extracting and transforming it into cosmetics such as moisturizers and soaps. The primary challenge to this process was to change the customs of the local population, because the firm's intention was to show that harvesting the fruits yielded more than could be gained from cutting the trees down. Preserving the trees was three times as valuable as destroying them (Revista Exame, 2016).

The organized cooperatives are now directed to harvest only 50% of the fruits so that the remainder can fall into the rivers and be carried away to germinate. The Ucuuba harvest is gathered by 15 communities, totalling 600 families, in the state of Amazonas and Pará. The packaging of the Ucuuba line has been made recyclable, with 50% green vegetable PET, and 50% recycled PET. The company claim to "seek a model in which the use of Brazilian biodiversity in cosmetic products can help strengthen not only the region's economy but also social progress and awareness of the importance of the forest to the planet" (Revista

Exame, 2016, p. 110). Pedroso (2007) says that organizations which employ sustainable practices must ensure three dimensions, environmental, economic and social, at the same time.

4.2 Avon

Avon is a company that supports 6 million resellers in more than 100 countries. It has operated for more than 130 years, working for beauty, innovation, optimism, above all for women (Avon, 2017). Avon has several sustainable movements that differentiate it from other companies, since it commits itself to developing both people and the environment.

Avon has a long-standing commitment to managing its environmental footprint. Addressing essential impacts on other companies and focusing on continuous improvement, with particular emphasis on the areas that most important to itself, to society and to the planet, it has a global network of associates dedicated to environmental stewardship and applying the principles of sustainability to its daily work (Avon, 2017).

Avon invests in its internal structure in a way that guides and stimulates the innovation process. Based on the guidelines from and priorities of the business, a team of eight people is responsible for capturing initiatives in different areas, offering technical training so that proposals can materialize. Each effort to improve is collective, formed by each employee's vision in various regards, such as processes, the use of natural resources and financial management.

A strategic vision of the opportunities for improvement contributes to the company's integration of actions and results. One example of an outcome is the Out of the Box project, born of the proposal for changing the packaging of a specific line, but spreading to all areas of production. The packaging was redesigned to avoid the former waste of space and material in the manufacturing stages, and also in the storage and transportation. a closed relationship circle with suppliers was created, using pallets and reusing or recycling cardboard boxes. These changes and innovations contributed to reducing by 88% the generation of waste wood pallets, saving 1,000 tons of cardboard.

Contributing to the product's integration with the supply chain was the reorganization of the transportation route, which has made it possible to withdraw 1500 trucks since 2013. It ceased to run an unnecessary 2 million kilometres and reduced its greenhouse gas emissions by 660 tonnes.

4.3 Boticario Group

The Boticario Group is formed by the companies O Boticario, Eudora, who said, Berenice? and The Beauty Box and maintains the Apothecary Group Foundation for the Protection of Nature. It was created in 2010, with the vision of generating complete and innovative solutions for its consumers (Grupo Boticário, 2017). One of the principles of Grupo Boticário is to avoid testing its products on animals. It has developed alternative tests, making it the first cosmetic company in Brazil to create 3D skin technology, and has adopted a technological chip which simulates human organs for testing its products. From the exploration of raw materials to the development of packaging, its processes all respect sustainability. In addition, it uses alternative energy sources and has reduced its water consumption in its daily practices (Grupo Boticário, 2017).

Its 21 cooperatives, located in the cities of S o Paulo, Mesquita (RJ), Itumbiara (GO), Feira de Santana (BA) and Ji-Paraná (RO), received new equipment and its management had technical assistance in the process of greening the firm. 110 workers, 73 of women have benefited from this change.

These initiatives have contributed to the promotion of the recycling market. Support was also given to the firm's cooperatives with training, improved management and increased production, a decision which contributed to raising the average income of these organizations by 28 last year, reaching 840 reais per month (Revista Exame, 2016, p. 115).

With its accumulated experience, the Boticário group as it developed its products began to worry even more about post-consumption use. According to those responsible, "Our objective is to use more and more material of less environmental impact. When this material is discarded, we want it to find a favourable recycling scenario, especially with regard to cooperatives" (Revista Exame, 2016).

4.4 Business Practices

Table 2 was elaborated to illustrate the reported aspects of the actions performed by the companies Natura, Avon, and Grupo Boticário, in order to compare and analyse the results of their practices.

Table 2. Sustainable practices in the companies surveyed.

Companies	Sustainable Practices	Results and Contributions
Natura	Avoid deforestation and generate income for communities in the Amazon.	<ul style="list-style-type: none"> - Encouragement and support in changing indigenous practices with regard to ucuuba trees, showing that the gain from the fruits is more profitable than that from the cut trees. -Orientation to the cooperatives in the harvesting of only 50% of the ucuuba fruit, letting the remainder fall into the river and be swept away to germinate. -Investment in the improvement of plants that benefit the community – Manufacture of packaging made of 50% green PET of vegetable origin, and 50% recycled PET.
Avon	Construct green buildings; Reduce emissions; conserve energy and water; and improve distribution. Reduce waste; plan recyclable packaging.	<ul style="list-style-type: none"> - Support sustainable building practices; By 2020, reduce absolute GHG emissions from Avon operations by 20% and reduce water consumption per Avon manufacturing unit by 40% from baseline levels in 2005. - By 2020, reduce waste by 30% per base-waste unit per Avon manufacturing unit. In 2015 the recycling rate was 88.6%; next, reduce waste by 7%. - Avon Paper Promise, a comprehensive policy to promote responsible forest use and protect forests.

	Reforestation	
Group Boticário	<ul style="list-style-type: none"> -Don't use animals in tests. -Energy alternatives and reduction in water use -Project recycling 	<ul style="list-style-type: none"> -Development of technology organs on a chip for testing products that simulates human organs. - Reducing by 71% the time needed to manufacture products; reducing the consumption of electricity by 70%, the cost of processing by 15% and the cost of raw materials by 10%. -Recovering and delivering the packaging in cooperatives -Investing in improving the conditions in five new cooperatives

Source: Survey data (2017).

The practices of Natura, Avon and Grupo Boticário reveal attitudes that produce benefits in the medium and long term, formed of interconnected strategies and processes generated and applied sustainably. The organizations in question provide their products and services strategically allied to the dimensions of the economy, society and the environment.

Pimenta (2010) points out that pure entrepreneurship, the adoption of one or another assessment tool or mechanism focused on sustainability does not always mean that the company has reached its full potential for corporate sustainability. This is manifestly justified as a comment, since each initiative must be seen as a process of continuous learning, and the participation of government and society may be seen in this process.

The actions carried out by the companies Natura, Avon, and Grupo Boticário are parts of active processes, with favourable results that develop sustainability every step. Such actions as reforestation, the use of recycled materials, emission reduction and the reduction of water and light consumption are both varied and similar. It should be emphasized that the practices of these companies are varied, but have similar objectives, that is, to preserve and encourage the use of new actions and attitudes to the environment.

Furtado (2005) affirms that sustainability must be applied from adequate practices, from the economic and socio-environmental point of view, including the extraction and use of necessary materials (including water and energy); the production, distribution and marketing of goods and services; the disposition and environmentally friendly disposal of non-products (waste), packaging, [...], always taking into account the obligation to prevent the wasteful destruction of natural, social and human resources.

5. Conclusion

The objective of this research was to identify and describe the sustainability practices implemented by Brazilian companies classified as the most sustainable in 2016, and also to compare sustainability practices of companies and evaluate whether they can be considered sustainable competitive strategies.

According to the research study, the three companies Natura, Avon and Grupo Boticário aggregate strategies for sustainable actions and projects that aim to mobilize and incentivize conduct in a socially

beneficial way. This allows them to contribute not only to following the country's environmental legislation, but also to producing their goods with a sustainable vision, adopting practices that replace what they take out of the environment. Awareness of a sustainable vision delivers many advantages for a company that uses natural resources as its raw material, such as Natura, Grupo Boticário and Avon, because they are committed to managing their supply chain without the risk of degradation or the violation of the environmental laws; even if this risk is disregarded by the business world, the advantages of not taking it lie in good management and having a good image in the eyes of society, in particular all other stakeholders.

Comparing the sustainable practices applied by the companies Natura, Avon, and Grupo Boticário reveals that they have sustainable actions in common. Even their important innovations imply the same goal: to produce and guarantee environmental, social and economic responsibility. These actions are the same for many companies because the purpose of these practices has the same goals, even when the companies vary in consumer needs, awareness, and strategic tactics.

The most frequently recurring practices among the selected companies are investment in renewable raw materials, emission reduction, the use of recycled materials and packaging, water and energy conservation, reforestation and the non-use of animal testing. These are the activities requiring the greatest consumption and the ones that most need to be made sustainable; that is, they are products or services made daily in the companies that require a strategy of reduced consumption or more sustainable practice.

As for the evaluation of sustainable practices in relation to viable competitive strategy, it is observed that the attitudes of management in the companies Natura, Grupo Boticário and Avon, have been adopted in order to compete in practice and in more sustainable approaches/ Their actions should be strategically well-designed and they should offer companies the excellent prospect of being durable and exemplifying values that society might embrace. However, it is noted that companies view sustainability not only as a strategy for becoming competitive but also as a challenge to aggregate and always develop afresh in sustainable actions, without degrading ecological resources. Sustainability as a competitive strategy is a routine in companies, but it requires more awareness and truthfulness in companies' actions, not merely their marketing ploys.

Given the results, it was verified that companies are becoming aware of and restricting themselves to sustainable attitudes and the required to put them into practice. However, they still have some way to go, since in general, not all companies are aware of the importance of these actions, or often propose to merely to conform to environmental laws and regulations, not worrying about the fact that the environment is not infinite. Thus, the results of the research make it clear that companies should set themselves a single objective, to produce their products and services with the awareness that they must work out their steps in relation to the environment if they want to guarantee the medium and long term sustainability of the world, since what is withdrawn from the ecosystem must be replenished in a way that does not compromise the ability of future generations to meet their needs.

It should be noted that the practices developed by Natura, Avon and Grupo Boticário address all three dimensions, economic, social and environmental, since they have medium and long-term strategies to achieve it although some of these companies generally develop piecemeal, improving now in one

dimension and now in another, evolving faster than their competitors only in certain respects. Each practice developed by companies, regardless of size, will benefit its competitiveness, since each action or attitudes developed contributes to the protection of the environment, and signifies right social and economic conduct that generates good environmental awareness and actions.

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Intrepid Teacher Abroad: Advancing Teacher Knowledge and Professional Achievement through A Short Term, International, Early Field Experience Teaching Place-Based Art in Japan

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Abstract

This study describes advancements in teacher knowledge and professional achievement through a short term, early field experience, for preservice teachers who taught place-based art lessons in a community-center in Japan. Eight U.S. undergraduate, pre-credential students participated in this study. The author of this paper, a participant observer, collected and examined pre- and post-questionnaire responses, participant observation field notes, photographs, and one three-years-after reflection, through constant comparison, thematic analysis, and explanatory case study. This study found no negative outcomes for preservice teachers. Findings from this study concur with a growing body of literature that explores how a short-term, international, early field experience can foster the development of teacher knowledge, including pedagogy, subject matter, students and environmental context, and further suggest that short term, international, early field experiences teaching place-based art can foster professional achievement.

Introduction

Early field experience (EFE) refers to teaching experiences that occur prior to the teaching practicum that is a part of a formal teacher preparation program (Smalley & Retallick, 2012). This qualitative study explores teaching place-based art in a short term, international EFE placement in Japan. EFE teacher questionnaire responses suggest that this experience can influence development of teacher knowledge and a three-years-later reflection from one of the eight teachers who participated further suggests that short term international EFEs can also foster professional achievement. Approval for this study was granted by the Human Subjects Review Committee. Participants gave informed consent.

EFE abroad combines two endeavors for which only the intrepid need apply, teaching without experience and traveling internationally. Place-based art education blends two content areas: place-based and art education. The term, “place-based,” also referred to as, “community-based” (Smith & Sobel, 2010) and “place-conscious” (Budge, 2016 and Gruenewald, 2003), includes cultural, social, natural and built environments, and the flora, fauna and minerals that exist in environments. Place-based can also include past, present and future contexts of a place.

Current research in place-based art education supports curricula that combine location, current issues and the arts (see Bequette, 2014; Bertling, 2015; Paatela-Nieman et al, 2016; Powell, 2008 and 2010, Power &

Bennett, 2015; Rex & Woywod, 2014; and Rolling, 2012). Naturalist Gary Snyder writes about the “commons,” or a, “locally held in common place” (pp. 27-51), and its relationship to its inhabitants and to the larger regions of which it is a part. Snyder writes, “To know the spirit of a place is to realize that you are a part of a part, and that the whole is made of parts, each of which is whole. You start with the part you are whole in” (Snyder, 1990, p. 41). For Snyder the importance of gaining deeper understandings of the self and the local supersedes understandings of the other or the distant.

The environmental context of a place may include many cultural perspectives. Cultural perspective facilitates recognition of the complexities of what is understood as culture in the 21st Century and includes perspectives that draw from and/or contribute to knowledge and experience (Handa & Tippins, 2012). EFEs can provide future teachers with understandings of the teaching profession including teacher knowledge (Egeland, 2016, Smalley & Retallick, 2012 and Ingersoll *et al.* 2014), professional identity (Fletcher & Luft, 2011 and Welsh & Schaffer, 2017), and the role of culture in teaching and learning (Coffey, 2010; Fitts & Grossel, 2012; Handa & Tippins, 2012; McCadden & Rose, 2008 and Richards *et al.*, 1994). Teacher knowledge, is an active, rather than static set of understandings that teachers have and continually develop that include, “knowledge of pedagogy, subject matter, students, and environmental context” (Cochran *et al.* [1993] as cited in Ingersoll *et al.* 2014).

In the arts, international EFEs can be particularly robust because the arts themselves are languages that have distinct characteristics from spoken and written languages and, therefore, teaching and learning in the arts can transcend some spoken and written language barriers; however, there is little research on international EFE *in the arts* (Henry & Costantino, 2015). Emmanuel (2005) studied pre-service music teachers in a short-term, intercultural, culturally diverse immersion and found that, though brief (3 weeks), the experiences had dramatic effects on future teacher participants’ cultural and pedagogical attitudes and beliefs. Power (2013) conducted a case study of one pre-service music teacher in a long-term (one year) international EFE placement in Malaysia and found, “growing self-confidence with cultural interactions” (p. 69), as well as understandings of teaching and learning barriers, such as a limited role of music in the school setting and a predominance of musical influences on the students from YouTube. Building on a framework of visual art as a language that can transcend and bridge some language barriers, Henry and Costantino (2015) studied a cohort of future visual art teachers in a semester-long international EFE in Italy. They found long-term effects for the future teacher participants in terms of their re-examination of taken-for-granted cultural beliefs and of second language learners in the art classroom.

EFE gained acceptance as a component of teacher education in the 1980s (Pence & Macgillivray, 2008). To be effective, EFE programs must provide supervision, structural organization and classroom contexts (Darling-Hammond, 2006; Grossman, Hammerness, & McDonald, 2009; Myers, 1996; Ziechner, 2010 as cited in Heafner & Plaisance, 2012). EFE is required in most teacher education programs although the duration of time, the amount of supervision and the types of teaching locals vary (Darling-Hammond, 2006). EFE experiences are recognized as supporting growth of teacher knowledge, for example,

“developing pedagogical skills, a sense of self as teacher, and positive dispositions towards different groups of children” (National Council for Accreditation for Teacher Education [NCATE], 2008, as cited in Fitts & Gross, 2012).

For EFE placements to benefit pre-service teachers, they should be well-planned and take place in positive learning environments with quality educational professionals” (Freeman, 2009-2010, p. 20 and Goodman, 1988). The EFE teacher participants in this study worked closely with U. S. art educator supervisors in preparation for their travels, including selecting and planning their place-based art lessons. The participants designed lessons that utilized themes, techniques and arts media with which they felt comfortable. The supervising art educators and members of a Japanese non-profit organization (NPO) prepared the site and materials and supervised the lessons. International EFE teachers face challenges posed by both their relative lack of teaching experience and by challenges that accompany international travel including culturally and linguistically unfamiliar settings (Coffey, 2010 and Fitts & Gross, 2012). However, through traveling abroad, one gains first-hand experience with different cultures that cannot be gained through secondary sources.

Research on EFE and teacher preparation programs in international service-learning placements (King, 2004; Knudson Miller & Gonzalez, 2010 and Talbot, 2011), in urban classroom placements (Richards et al, 1994) and in community-center placements (Case & Traynor, 2016; Handa & Tippins, 2012 and McDonald et al, 2011) suggests that these contexts provide amplified opportunities for future teachers to gain teacher knowledge. While longer-term, international EFEs (a full-term and in some cases over a year) have the obvious advantages of quantity of time (see Mahon, 2007; McCadden & Rose, 2008; and Talbot, 2011), extended travel abroad can be cost prohibitive for students and educational institutions. In studies of short-term, international EFEs (less than a full school term), current research finds that, while brief, they can provide robust learning environments for future teachers (Bonnett, 2015; Campbell & Walta, 2015; King, 2004; Pence & Macgillivray, 2008 and Willard-Holt, 2001).

Setting

The location for this three-summertime-long project that brought 8 American college students to Japan to teach art was an island midway among a string of islands between the Japanese mainland in the north and the island of Okinawa in the south. The population of the town is about 73,000. The director of this project provided Japanese-English translation during each of the art lessons.

The community center where lessons took place provided large, well-lit classrooms with ample sinks, electricity, large tables, etc. The art classes taught by the EFE teachers were free to the students and advertised locally. The students were Japanese, were only fluent in Japanese, and most lived within walking distance of the community center.

Supervision and structural organization of EFE programs is central to the success of the programs (Cruickshank & Armaline, 1986 as cited in Heafner and Plaisance, 2012). While the EFE teachers were ultimately responsible for their own lessons, the U. S. university supervisors provided guidance throughout the process. Teamwork among the supervisors (including this author), community volunteers from Japan, members of the NPO and among the EFE teachers themselves, supported the outcomes of this project.

The NPO provided housing and financial support towards travel for each of the U.S. EFE teachers. Accommodations included staying with a family or staying in a home that was not currently otherwise occupied. These residences were within walking distance of the town center and the community center. In addition to having time to prepare their lessons, the teachers were treated to a variety of local excursions, including nature preserves, beaches and museums, and meal-time gatherings/celebrations in their honor.

The EFE teachers taught seven different art lessons: “Stain Glass” Windows (it was actually translucent plastic sheets on clear glass windows), Paper Lanterns, Painted Tote Bags, Spiral Staircase Mural, Relief Printmaking, Paper Clay Animal Sculptures, and Comic Books (Plates 1-7). Three participants co-taught two lessons and five lessons were taught by one teacher each, thus there were eight EFE teachers and seven lessons.

Plate 1 “Stain Glass” Windows



Plate 2 Paper Lanterns



Plate 3 Painted Tote Bags



Plate 4 Spiral Staircase Mural



Plate 5 Relief Printmaking



Plate 6 Paper Clay Animal Sculptures



Plate 7 Comic Books



Participants

A Japanese NPO supported this project, which took place over three consecutive summers (2012-2014), as a component of the NPO's efforts to increase exposure to culture and English language for residents of a small town on this small island.

The director of this project is a founding member of the NPO and also the EFE teachers' professor in the United States. She participated each summer. This author, also the EFE teachers' professor, co-supervised the EFE teachers' lesson planning in the U.S. and co-supervised the lessons in Japan during the second of the three summers.

The eight EFE teacher were selected by volunteer committees who reviewed and ranked their written statements of interest. Five of the EFE teacher participants were female and three were male. Each was in her or his early-to-mid-twenties. Seven were of European descent and one was of African descent. Each participant was an undergraduate senior with little or no prior teaching experience. Six were art education majors (BA), (one of these was also a BFA Studio major), one was a BFA Studio major, and one was an Anthropology major.

Twenty to 25 local residents of the Japanese town participated as students in each lesson. These students' ages ranged from elementary school age (ages 7-13), to adults (18-49), to older adults (50 and older). Each lesson had one to three teen, adult or older adult participants and the rest were elementary school age.

Theoretical Framework

Place-based art lessons were central to the EFEs described in this study. Critical social theory posits that humanity shares responsibility for the wellbeing of the planet and its inhabitants. Critical social theory prioritizes social justice over individual goals (Savin-Baden & Howell Major, 2013, pp. 59-61). Place-based education is a form of social justice as the curricula focus on the wellbeing of a particular place and its inhabitants towards the wellbeing of contiguous places and peoples, and, ultimately, beyond. Place-based education begins with the familiar and works its way to the less-familiar and to the non-familiar.

International travel provides first-hand experiences with different cultures. The arts (in school and outside of school) can provide insights, including insights into different cultures, that are different from those that can occur through other disciplines and other human endeavors. The level of creative engagement and open-ended endeavors with the arts are, in many ways, unique to the arts (Eisner, 2002). In this spirit of open-ended endeavors, inductive analysis (Patton, 1990, p. 40) in this study allowed for an open-ended approach to arriving at new understandings about the experiences future teachers can have when they teach place-based art lessons in a short term, international EFE.

Methodology

Pre- and post-EFE questionnaire responses, a three-years-later reflection, participant observation field notes, and photographs of events provided data for this study. The data collection and analysis in this study were guided by the above-mentioned paradigms of critical social theory and inductive inquiry, and by the existing body of research on place-based education, place-based arts education, EFE and international EFE reviewed above. Current research on EFE in community center placements, EFE in urban placements and EFE in international placements (reviewed above) has used the following data sources: participant observation field notes, questionnaires, reflections, interviews, journals, post EFE lessons taught and one-or-more-years-later interviews or reflections.

Photographs provided visual references to the EFE lessons. In art education research, photographs serve to inform or remind us of details about teachers, students, art projects and classroom settings. Photographs can help us to see and better understand complex experiences, such as those found in classroom settings (Keats, 2009, as cited in Snyder, 2012 and Rose, 2007, as cited in Powell, 2010). Photographs can vividly capture dynamic settings and events (Creswell, 2003, pp. 181-188, Eisner, 1991, p.187, and Patton, 1990, p. 247).

Participant observation field notes included notes from meetings with the EFE teachers during initial lesson planning, from their final planning and preparation on site, and from observations of two lessons taught in the second of the three summers.

The pre- and post-questionnaire responses and the three-years-later reflection comprise the primary body of data used in this study. One participant, Jackson¹⁰, provided a three-years-later reflection. He was asked to reflect upon his experience in Japan and his original responses to the pre- and post-questions. He was also asked to describe how the EFE had influenced subsequent events in his life. An explanatory case study explores a pattern that is noted in a given context (Yin as cited in Savin-Baden & Howell Major, 2013, p. 156). In this study, the explanatory case study of Jackson compares patterns found in the questionnaire responses from all of the EFE teachers with Jackson's responses three years after his EFE experience.

The pre- and post-questionnaire responses comprise the primary body of data used in this study. Coffey (2010) found that EFE teacher reflections provided the most powerful narrative of the experiences they had. The questionnaire responses, while not narratives, embody participants' reflections on the EFE in Japan. Each novice teacher completed a pre-EFE and a post-EFE questionnaire via email. Six questions were posed in the present or future tense for the pre-EFE and in the past tense in the post-EFE.

Pre- and Post-Questions

1. In what ways is/was your event relevant to culture?

¹⁰ Names of participants, groups and places in this study are pseudonyms.

2. In what ways is/was your event relevant to community?
3. In what ways is/was your event relevant to place?
4. In what ways will/did your students become better inhabitants, better stewards, of their community and region through this event?
5. In what ways will/did your students have opportunities to look inside themselves and learn about themselves in this event?
6. In what ways will/did the concept (literally and figuratively) of, “the classroom” come into play in or be removed from your event?

Questionnaire response coding included: Pre- or Post-, initials of the participant, the year in which the participant taught, and the question number (1-6). A response to one question often presented more than one idea, therefore each discrete idea received its own designation. Constant Comparison and Thematic Analysis guided inductive coding and analysis. Constant comparison, “codes text for words or phrases that stand out while constantly comparing codes with each other in search for concepts and themes. . . Thematic analysis involves reading and rereading text and searching holistically for themes” (Savin-Baden & Howell Major, 2013, pp. 43-4). Constant comparison and thematic analysis provided an approach for identifying and examining themes inductively, as they emerged in the data.

Notation of frequency of responses that fit into the emerging categories for each of the six questions in the pre- and post-EFE questionnaires provides a distillation of the content of the participants’ responses.

Findings

The questionnaire data analysis summaries identify and describe growth in participants’ teacher knowledge through the number of occurrences within a category and by number of emerging categories. An explanatory case study of Jackson, offers further illustration of development of teacher knowledge three years after this EFE experience and also indicates professional achievement that may be attributed to this EFE experience. As stated above, teacher knowledge includes knowledge of pedagogy, subject matter, students, and environmental context, or place. The findings presented below suggest that the EFE art teachers developed teacher knowledge as a result of their experiences in Japan and that a short-term international EFE can foster future professional achievement.

Teacher Knowledge of Students and Place

Questions 1, 2 and 3 drew participants’ attention to the relevance of culture, community and place in their lessons (Table 1). For each of these questions, the number of responses increased from pre- to post-EFE. Comparison of pre- to post-responses suggests development in knowledge of environmental context. For example, in responses to Question 1 regarding the role of culture in the lesson, the somewhat generic wording of the pre-EFE responses regarding students, such as, “their favorite aspects of culture,” shifts in post-EFE responses to more developed sense of environmental context, referring, in four instances, to the,

“unique qualities of place.” Responses to Question 3, regarding place, indicate development of teacher knowledge about students and environmental context from pre- to post-, for example:

(Pre-) Students will be encouraged to increase awareness of the “space” they live in, by creating, by hand, an animal sculpture that is found in [their island],

(Post-) The participants were also asked to create images of things that were significant in their personal lives. At the end of the workshop, participants shared the images they had created with the rest of the group. The intention was to show the diverse interests, and common elements, that play a part in identity of a community and its members.

Other examples of development of teacher knowledge of students, from responses to Question 3 include a comparison of pre-questionnaire responses, such as, “increase awareness of place,” to more developed ideas found in the post-questionnaire responses to Question 3, including noting specific aspects of the natural environment, noting features that are considered unique to this environment, noting students’ love of particular aspects of the environment, and noting that members of this community have commonly shared knowledge of their local environment (Table 1).

Table 1

Questions	Pre-EFE	Post-EFE	Summarizing Interpretation
1. In what ways is your lesson relevant to culture?	5 culture as a component of place 2 compare/contrast cultures 1 favorite aspects of culture 1 traditional materials 1 religion 1 participant-driven choice	4 culture as a component of place 4 unique qualities of place 4 compare/contrast cultures 4 religion 2 historical context 1 community coming together as a culture	<ul style="list-style-type: none"> • number of responses from pre- to post- increased from 11 to 19 • 3 categories appear in both pre- & post- • from pre- to post-, novice-level teacher knowledge such as “favorite aspects of culture” are replaced by more developed-level teacher knowledge such as, “community coming together”
2. In what ways is your lesson relevant to community?	5 teaching and learning about place 4 people coming together 1 not taking place for granted 1 pride of place 1 not sure	8 teaching and learning <i>in</i> and about place 7 people coming together 2 learning English 1 pride of place 1 learning and sharing about oneself in the community 1 local community welcomed the foreigners	<ul style="list-style-type: none"> • number of responses from pre- to post- increased from 12 to 20 • 3 categories appear in both pre- & post- • from pre- to post-, novice-level teacher knowledge of teaching and learning about place grew in frequency and became more developed-level teacher knowledge of learning <i>in</i> place

3. In what ways is your lesson relevant to place?	<p>2 natural surroundings</p> <p>2 images to be created in artwork</p> <p>1 participants' opportunities to reflect on their time in place environment</p> <p>1 increased awareness of place</p> <p>1 group-driven decisions</p> <p>1 not sure</p>	<p>4 natural surroundings</p> <p>1 images to be created in artwork</p> <p>4 unique features of place</p> <p>1 participants' love of particular aspects of place</p> <p>1 aspects of place that are commonly known among participants</p>	<ul style="list-style-type: none"> • number of responses from pre- to post- increased from 8 to 11 • 2 categories appear in both pre- & post- • "nature" and "place" are strongly featured regarding "place" • from pre- to post-, one mention of novice-level teacher knowledge, "increase awareness of place," became a more developed-level, specifying participants' "love of particular aspects of place" and recognizing what is "commonly known" to participants about place
4. In what ways will participants become better inhabitants, better stewards of their community and region through this lesson?	<p>5 people coming together and learning about one another</p> <p>3 artwork as a way of expressing understandings and learning new understandings of place</p> <p>2 learning more about place</p> <p>1 not taking place for granted, 1 continued practice of sharing new perspectives on place</p> <p>1 refers to developing a desire to protect place natural habitat</p> <p>1 refers to not being sure</p>	<p>11 people coming together and learning about one another</p> <p>4 artwork as a way of expressing understandings and learning new understandings of place</p> <p>4 desire to protect the natural habitat</p> <p>2 project as a gift to place community</p> <p>1 learning English</p> <p>1 art project as a continuing reminder of the beauty of place</p> <p>1 art project as a celebration of place</p> <p>1 creating a new role for place among neighboring locals</p> <p>1 reinforcing respect for place</p> <p>1 meeting foreigners (the EFE teachers)</p>	<ul style="list-style-type: none"> • number of responses from pre- to post- increased from 13 to 27 • 2 categories appear in both pre- & post- • number of categories increases from pre- to post- from 6 to 10 • increased attention from pre- to post- on community members getting to know each other and to art as catalyst for teaching & learning

Question 4 drew participants' attention to how their lesson might affect students' future engagement as stewards of the place where they live (Table 1). The number of responses more than doubled from pre- to post-, 13 to 27, and the number of categories increased from 6 to 10. These increases suggest that the EFE

teachers gained knowledge of students and of environmental context in terms of how the art lesson could have a positive influence on students as future inhabitants of a place.

In addition to quantity, the quality of teacher knowledge of students and place increased as noted in pre- to post-responses to Question 4 that include references to the “importance” of natural elements and the “understanding” of students, for example:

(Pre-) Hopefully, through the investigation and discussion of important natural elements . . . , participants can better understand what things need to be safeguarded in their cities and rural areas.

(Post-) [My] students will become better inhabitants, better stewards . . . because they will have this constant reminder of how beautiful [the city that they live in] is. Every time they see the windows, it will remind them of the wonderful plants and animals that they share their island with, and what a wonderful gift that alone is. They are blessed with living in such a beautiful city and hopefully they can appreciate all the little plants and animals that they live with.

Responses to Questions 1-4 regarding culture, community, place and stewardship show development in quantity and quality of teacher knowledge of students and environmental context, or place.

Teacher Knowledge of Subject Matter and Pedagogy

Question 5 (Table 2) drew participants’ attention to what the Japanese students might learn about themselves as a result of participating in the lesson. Responses to Question 5 describe a variety of ways in which the EFE teachers’ thought that their students could and did learn about themselves through making art. While Question 5 did not specifically ask for art subject matter-specific responses, in the pre-EFE responses there are 2 references to art content in terms of creative self-expression and in the post- there are 5 references to art and making art and 2 to comparing and contrasting different cultures, culture being recognized here as a potentially thematic and aesthetic component of art.

Table 2

Question	Pre-EFE	Post-EFE	Summarizing Interpretation
5. In what ways will participants have opportunities to look inside themselves and learn about themselves in this lesson?	<p>3 through awareness of what they love about their city</p> <p>3 through awareness of themselves as viable members of place</p> <p>2 through awareness of creative self-expression</p>	<p>5 through art and art making</p> <p>3 in juxtaposition with the uniqueness of place</p> <p>2 through collaboration</p> <p>2 through compare/contrast of their culture with other cultures</p>	<ul style="list-style-type: none"> number of responses from pre- to post- remained the same, 12 categories in pre- & post- are different from each other, with exception of attention to “group setting”

	<p>2 through awareness of how they work in a group setting</p> <p>1 through awareness of being a product of place</p> <p>1 through compare and contrast of themselves and other people</p>		<p>and "collaboration," which appear in both</p> <ul style="list-style-type: none"> number of categories decreases from pre- to post- from 12 to 4 pre- & post- responses, are strongly tuned in to the role of art and creativity-5 responses in post- and 2 in pre- place is strongly featured in pre- collaboration is strongly featured in post-
<p>6. In what ways will the concept (literally and figuratively) of "the classroom" come into or be removed from your lesson?</p>	<p>Classroom:</p> <p>2 the concept of classroom as less pertinent in art education</p> <p>1 each (total 13): the city being the classroom, the finished project as a classroom for those who walk by and see it, not wanting students to think of the space they work together in as a classroom, not expecting students to think of the space as a classroom, classroom as lecture, Power Point, inside, assigning, organizing, opening to new ideas, structure, strict confining, introduction to conceptual realm</p> <p>Not Classroom:</p> <p>1 each (total 10): fun, having some freedom, a little step-by-step, exploration encouraged, using tools, not instruction, students will be the teachers, guiding not teaching, collaborating, moving freely in the space</p>	<p>1 need for balance between classroom and not classroom</p> <p>2 classroom/not classroom is a conceptual idea</p> <p>Classroom:</p> <p>7 lecture about art</p> <p>5 organized/structured activities</p> <p>2 each (total 20): controlled art making, Power Point, lesson begins, lesson ends, traditional/typical, group critiques, teacher/aids authoritative, groups assigned w/open-ended discussion topic, time limits, is a conceptual idea</p> <p>1 each (total 22): teacher encourages students to ask questions, students are asked and expected to answer questions, teacher gives prizes for correct answers, teacher has students' attention, project overviews, distribute supplies, be on task, has a podium, vocabulary, instruction, guidance, language barriers are a problem, language barriers are identified, possibilities are introduced, teacher</p>	<p>• number of responses in pre- and post- are more numerous than in Qs1-6</p> <p>• number of responses increased from pre- to post- from 25 to 96</p> <p>• noting many single instance responses in pre- and in post-, the number of categories increases from pre- to post- from 24 to 57</p> <p>• in pre- and post- there are more descriptions of classroom than not classroom</p> <p>• post- responses include richer descriptors than pre- to describe effective environments for teaching and learning, such as, possibilities, feeling comfortable, lighten-up and reflection</p>

		<p>introduces herself, place where students make art, place where students make presentations, place where students feel comfortable with creative expression, place where students feel comfortable talking about art/artmaking, place to spend less time in, place that feels restrictive, place defined as classroom</p> <p>Not Classroom:</p> <p>3 each (total 6): up-to-students art making place, place where class session ends up</p> <p>2 each (total 8): art making place, is a conceptual idea, place where teacher/aid is not authoritative, a place for individual problem-solving</p> <p>1 each (total 25): the community center lobby, the community center library, a place that is like a classroom, a place the classroom transforms into, teacher moves freely, students move freely, integrated, freestyle, student decision making, feels unrestrictive, a place in which to lighten-up, nontraditional, a place successful teachers bring students to, a place where you want to spend more time, artistic freedom, reflection, more collaborative place, more self-directed place, a more open place, a place where you are resourceful, a sandbox, a place of discovery, a place of exploration, a place of creativity, a place to decide how to express</p>	
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Both pre- and post- sets of responses to Question 5 allude to some form of group dynamic: membership in a place (3 instances in pre-), group setting (2 instances in pre-) and collaboration (2 instances in post-). These indicate awareness on the part of EFE teachers of pedagogy in terms of group versus individual

classroom practices. While there are 5 such references in pre-EFE responses and only 2 in post-EFE responses, the unsolicited attention to group dynamic as art pedagogy that diminishes in quantity from pre- to post-EFE responses may point out that the EFE teachers had anticipated but had not achieved collaborative pedagogical practices during their art lessons. In formal education, pre-service teachers are encouraged to plan for and practice groupwork, for example, peer group critique, but this can be among the most difficult aspects of teaching art. Further, art students usually do their own creative work. Group projects can be difficult for art teachers to plan for in comparison to the more traditional individual art projects. Perhaps the EFE teachers learned that collaboration pedagogy is not as easy to achieve as they had thought before the EFE.

Question 6 (Table 2) drew participants' attention to their concept of the classroom itself. While pre-EFE responses attend to specifics of what art classrooms are like and are not like, post-EFE responses suggest that participants saw the art classroom as one physical space that changes when classroom practices shift:

When it was time to work, we worked right in front and on the windows in the front, first floor lobby and library areas. The classroom came back into play when we asked each group to talk about their work.

The art classroom is further described in post-EFE data in terms of shifting perspective:

The event took place in, quite literally, a classroom. The event began when I gave a lecture and a Power Point. Participants were encouraged to participate in the form of asking questions, answering them, and even competing for free leftover materials if they got questions from my lecture correct. In the end, each participant presented their project and their animal, one by one, much like a classroom setting.

and,

In the middle of the exercise, however, the project transformed from a typical classroom setting into an open sandbox setting of exploration and discovery. Each individual had to figure out, in their own way, exactly how to make their animal. They also had to use their own resources and creativity to design the platform completely, themselves.

The number of pre- and post-EFE responses to Question 6 is notably higher than the number of responses to the other questions, 25 in the pre- and 96 in the post-. It is strongly suggested from this increase in the number of responses and in the increase in the number of categories of responses from pre- to post- (from 3 in pre- to 9 in post-) that the EFE teachers acquired knowledge of new and numerous forms of pedagogy in terms of the classroom itself as a malleable pedagogical agent. With few exceptions, they thought of lectures/instruction, classroom management, and indoor spaces, etc., as classroom environments; and, they thought of a variety of unstructured experiences, such as, self-direction, exploration, and choices, as non-classroom environments, or at least as non-traditional classroom environments. The number of post-responses to Question 6 is more than triple the amount of any other set of pre- or post-EFE responses and they included many rich descriptions. One teacher wrote:

In the middle of the exercise, however, the project transformed from a typical classroom setting into an open sandbox setting of exploration and discovery.

The participants left the EFE experience with many ideas about the successful art teacher's responsibility as one of designing learning experiences that gradually lead students from a passive and structured experience to an active, unfettered, self-directed, exploratory and playful experience as learners.

Jackson: An Explanatory Case Study of Teacher Knowledge and Professional Achievement

Jackson is one of the two EFE teachers this author was able to observe teaching in the second summer in Japan and he had also been a student in two of my classes prior to the EFE. The following is a narrative description of Jackson, in the form of an explanatory case study. This case study uses Jackson's three-years-later reflection as a hermeneutic to further explore and illuminate the findings above, by creating a picture of one future teacher that illuminates the teacher knowledge and professional achievement that the EFE fostered.

Jackson started university studies 500 miles from home as an Art Education major after completing his AA degree in community college near his home town. Jackson was the kind of student this author remembers for a variety of reasons, but those that stand out most are that he is a skateboard enthusiast, has a silly sense of humor, and his art media of choice, at the time that he came to university and at the time of his international EFE, were printmaking and fabric (using a sewing machine).

By the time he was nearing completion of his BA in Art Education, Jackson applied and was accepted to the Studio Art BFA. At the time of his EFE, the summer before his last year as an undergraduate, he had not traveled abroad and he had never taught. However, he brought extensive art subject matter knowledge and some ideas about art pedagogy from his undergraduate studies with him to Japan. Jackson had high expectations of his Japanese students, specifically how much they would know about their island, and he hoped that he could inspire them to bring that knowledge to the art lesson, "Painted Tote Bag" project (Plate 3).

The students will prove to be much more knowledgeable about [the island] than I am, so I hope that by referencing the importance of their cultural identities in the slide show they will want to include imagery and ideas about the pride they have in their island culture within their paintings.

He also had clear ideas about his pedagogical approach with place-based art.

This is going to be a classroom assignment, but I'd rather the students didn't think of it in that way. I want them to have fun but at the same time I want them to be open to new techniques, so there will have to be a definite underlying classroom structure. This structure will be something I am aware of, but will be something I don't think that students will notice, or have to worry about.

Jackson had accurately anticipated his students' vast knowledge of their island, but he learned more about his students through teaching his lesson, for example, their pride.

If there is one thing the people of [this island] are proud of, it's culture. I was fortunate to have looked up quite a bit about [their] culture before I left for the trip. I wanted to know a little bit about who these people were before I started asking them to paint [place]-specific imagery as one of the guidelines to the exercise. As it turns out, much of the information I learned about beforehand, they chose to use and to create from once the lesson began.

Jackson clearly recognized that *pride in the natural environment* was an important part of the place in which he taught. As a result of his international EFE experience, Jackson also developed more specific pedagogical ideas about the art classroom atmosphere that he felt supported art subject matter learning.

What I wanted most for the people in the classroom was for them to feel comfortable expressing themselves through a physical medium [painted images and sewn fabric tote bags (Plate 3)] so that they might feel more comfortable expressing verbally what it is they were thinking while they were at work. By the end of each session it seemed that, for the most part, the students weren't terribly affected by the fact that they were in a classroom setting. It was important for me to see that the students could lighten up nearing the end of the day. It allowed me to feel like I succeeded somewhat in removing some of the more traditional concepts associated with a classroom setting.

The summer after the EFE Jackson traveled to Mexico as a volunteer art teacher. Some of his classes took place at a community center (as they had in Japan) and, in the case of a public mural project, out in the city.

Because we were working in one of [the] more impoverished neighborhoods we felt it was necessary to carry out a similar place-based method of teaching that I had used the summer prior in Japan. The students and I painted a mural consisting of imagery that represented their community. . . I also led the same hand painted tote bag lesson. We also brought multiple skateboards to the center so we could give skate lessons. We left the skateboards at the center for the children to use after we left.

After the trip to Mexico, Jackson was accepted, with full scholarship, to a Studio Art MFA program. As an MFA student, in addition to his coursework he teaches and, "play[s] a major role in helping to maintain a prosperous group of undergrad printmakers through [his] duties as an instructor of record and teacher's assistant."

The summer after completing the short term EFE in Japan as an undergraduate, Jackson independently organized and completed his own international teaching experience in Mexico. He then was awarded a full scholarship for his MFA studies. This case study begins to paint a picture of how an international EFE can promote development of teacher knowledge and can help to foster future professional achievements for art teachers. Jackson's reflection suggests that his experience in Japan prepared him for his subsequent experience in Mexico. Further, both of these international teaching experiences may have helped his

application to graduate school stand out among others, which resulted in a full, three-year scholarship. The enthusiasm he expresses for his teaching in Mexico and, later, as a graduate student, his teaching and leadership with undergraduate art students, may also have been sparked by the EFE in Japan, his first teaching experience.

When Jackson wrote his three-years-later reflection, he was still an MFA student and in Japan again, on a grant-funded art research project titled, “Japanese Sidewalks as the Open Road.” As this author put these words to paper, Jackson was experiencing Japan through the lens of an MFA art student/skateboard enthusiast. The opening lines of his application for this grant, which brought him back to Japan, this time as an MFA student researching his own conceptual art, read:

I am an explorer. My skateboard functions as the vehicle for my expeditions and the sidewalk as the conduit I flow through to become immersed in a myriad of urban settings. Experiencing urbanity through this lens is essential to understanding how both my body and the world around me operate and exist together. . . I propose to return home with observations and drawings that will relate to ways Japan's symbiotic past has prepared its modern society to be more accepting of environmentally progressive ideas. Paving the way for Japan's bright future, while also challenging the way of life for billions across the globe.

Like the other teachers in this study who taught a summer art class in Japan as a pre-service EFE in teaching, Jackson gained knowledge about students, art content, pedagogy and environmental context (place) as a result of his participation. Where earlier studies have seen EFE as vital to transforming theoretical knowledge to pedagogical knowledge (e.g. Heafner & Plaisance, 2012), this study suggests that short term, international EFE can help transform teacher knowledge and bolster professional advancement.

Limitations of the Study

The number of EFE teachers in this study is small. While many people participated in this project in many ways, the focus of this study is restricted to the development of teacher knowledge and fostering of professional achievement. Each of the EFE teachers taught lessons that lasted 3-4 hours, in addition to helping their peers to plan and, in some cases, to teach a lesson. A more extended period of time in an EFE and a larger group of pre-service teacher participants could provide further insight into international EFE.

Explanatory case study, constant comparison and thematic analysis gleaned insights into the questionnaire and years-later data, however, additional data, including interviews, journals, post- EFE lessons observations, and additional “years-later” reflections would strengthen the findings in this study. Analysis was narrowly focused on development of teacher knowledge and professional achievement. Additional data sets and analysis methods could broaden the focus and understandings in further EFE research.

Finally, the EFE teachers and this author were not able to attain competency in the Japanese language prior to the teaching experience. All of the lessons had an interpreter, nevertheless, teacher-student interactions, while enabled through the visual language of art, were limited by language barriers.

Discussion

The Mechoopda Maidu Indians are the First Nation people from the region where this author lives. One of their elders, Henry Azbil (1899-1973) is noted as saying, “You have to know who you are” (<http://www.mechoopda-nsn.gov/>). Wherever we teach, maintaining some curricular focus on place can help teachers and students to know who they are in new and different ways. This study suggests that the EFE teachers learned that place-based art lessons can help students to developed more complex understandings of the interrelationship between humans and the rest of the environmental context:

(post-) Relating the artwork to the surrounding area allowed students to start paying particular attention as to what makes their area unique. This allowed people who may have not known or simply forgot about the uniqueness of their environment and made it relevant for them.

“Place,” was considered to mean essentially just, “nature,” in this participant reflection and suggests further work to be done on teachers’ broader understandings of place-based art education.

Traveling abroad and certainly teaching abroad are challenging and rewarding experiences. In *Experience and Education*, Dewey (1938) described disequilibrium as a critical component of learning. He proposed that students must feel disequilibrium in order to desire to return to equilibrium. Novice teachers are in a state of disequilibrium when they teach because they do not yet know who they are as teachers, nor do they know what will and will not work for them in the classroom. They will work hard at teaching in their desire to regain equilibrium. Short term, international EFEs offer *intrepid* future teachers an abundance of opportunities to feel disequilibrium and to regain a new and enhanced equilibrium.

This short-term international EFE experience in a community center setting in Japan invited novice art teachers to think of classroom, in broad terms. Though they planned highly-structured lessons, they also wanted their students to feel freedom in their place-based art explorations. The setting encouraged the teachers to think outside the classroom box. Gandini (1989) examines the Reggio Emilia concept of the classroom itself as third teacher, the first being the teacher and the second, the students. The community center space in Japan proved to be an effective third teacher for the eight American EFE teachers.

This study echoes the old adage, teaching *is* learning. Especially in the arts, where the languages of the arts can transcend spoken language barriers, more international EFE opportunities and further studies are needed. Travel abroad can include many stresses that can inhibit or distract from learning. This study shows that with planning and support, short-term, international EFE teaching place-based art education can enhance teacher knowledge and foster professional achievement. Availability and funding for more short-

term international EFEs and research will benefit future teachers. The best way to get started is to channel the intrepid teacher inside oneself.

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Knowledge of the population of the northern state of Espírito Santo and Northeast of the state of Minas Gerais on Herpes Viruses and Perspectives of Care of Dentistry

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SUMMARY

This study aimed to measure the level of knowledge of HZV in northern municipalities in the state of Espírito Santo and Northeast of Minas Gerais in order to analyze and compare the variables investigated on the herpes virus. Specifically aims to understand the perception of this population about the forms of contagion, activating factors of the virus and the mechanism of access to information. Therefore, we carried out a literature review and research linked to it through the study method of approach to the case. In selected areas, individuals from 10 cities in the North of the Holy Spirit and Northeast of Minas Gerais, participated answering structured questionnaire. The results showed that a significant percentage have little information or complete ignorance about the disease, modes of transmission and its consequences for health. Much of the sample is unaware of the importance of the dentist to provide information and to treat cold sores, in addition to a lack of health services have been observed to provide information about the disease, its clinical signs and prevention, through educational activities for the population and 19% of the population has herpes labialis. Thus, it is concluded that most educational measures should be carried out, understanding that the greater the knowledge, the lower the infection rates, leading individuals to prevent and to treat when detected the expression of pathogenic signals. in addition to a lack of health services have been observed to provide information about the disease, its clinical signs and prevention, through educational activities for the population and 19% of the population has herpes labialis. Thus, it is concluded that most educational measures should be carried out, understanding that the greater the knowledge, the lower the infection rates, leading individuals to prevent and to treat when detected the expression of pathogenic signals. in addition to a lack of health services have been observed to provide information about the disease, its clinical signs and prevention, through educational activities for the population and 19% of the population has herpes labialis. Thus, it is concluded that most educational measures should be carried out, understanding that the greater the knowledge, the lower the infection rates, leading individuals to prevent and to treat when detected the expression of pathogenic signals.

Key words: Herpes virus. Health Education. Care. Dentistry

INTRODUCTION

The herpes zoster is a highly prevalent viral infection in the orofacial region, mainly caused by herpes simplex type 1 (HSV-1), a global public health problem that affects about 20-40% of the general population, with the highest prevalence between the lowest socioeconomic groups (aL-MAWERI et al., 2014).

The lip and perioral areas are the most common sites of infection, although the lesions may also appear elsewhere. Transmission of the disease occurs through direct contact with an infected individual and the primary infection is usually acquired in early childhood, with the virus latent remaining in the nerve ganglia, usually in the trigeminal ganglia (ARDUINO; 2008).

internal or external stimuli, such as immunosuppression, stress, menstruation, fever and prolonged exposure to sunlight, cause the reactivation of viruses and their migration to the skin and mucosa, resulting in a secondary clinical episode or recurrent herpes infection, especially in areas perioral (ARDUINO; 2008).

The transmission of the virus infection depends on the intimate and personal contact of a susceptible individual with someone excreting the HZV. The six people infected, one no symptoms, but have the active virus and can infect others through secretions. The problem lies in the fact of ignorance of the disease and complications caused by it are proliferation factors, and important health education actions in order to clarify about the disease, symptoms and prevention, especially among populations with less access to services health and information.

The growing number of people with herpes justifies the preparation of this study as well as the quantity of active cases due to non correct control of the carriers of this disease. It is known that the complications of this critical illness interfere deeply with the well-being and quality of life of patients.

In this, the relevance of this article is to gather statistical samples in order to raise indicators for the development of strategies of health services, and the performance of paramount dental professional to strengthen health promotion and contribute to proposals aimed at preventing the adjustment of existing interventions making it possible, interfere with more efficiency in the promotion, protection, dispensing care to existing cases and prevent new cases.

Given the above, the objective of this bibliographic research and case study were to measure the level of knowledge of HZV in northern municipalities in the state of Espirito Santo and Northeast of Minas Gerais in order to analyze and compare the variables investigated about herpes virus. Such knowledge is of vital importance for the strengthening of educational, preventive and curative actions excelling in the contribution of dental professionals.

RESULTS AND DISCUSSION

The study sample was made up of people from 10 municipalities in the North of the Holy Spirit (Ecoporanga, Mucurici, Mountain, Point Belo and Pedro Canary) and in the Mucuri Valley, in Minas Gerais (Aia, Carlos Chagas, Nanuque and Serra of Aimores). The choice of regions took place due to the socioeconomic and cultural characteristics, which are factors directly related to the care and directly interfere with the outcome of the treatment.

Municipalities analyzed add up to a total population of 191 913 inhabitants, 107 865 and 84 048 miners Espirito Santo. Of this group, there was selection of 200 residents of the municipalities in the state of o Santo and 200 residents of the municipalities of Minas Gerais, for a total of 400 respondents.

For the case study, structured questionnaires were distributed, containing 33 objective questions, applied by resident researchers in the 10 municipalities that were part of the scope of this study. According to Yin (2015, p. 32), this method of approach constitutes an "empirical research that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly defined" .

This instrument first analyzed the sociodemographic characteristics and subsequently of respondents knowledge about the disease, transmission and self-care mode and the information obtained about the herpes virus in health care and dentists. Note that all respondents were informed about the purpose of the research and, upon acceptance to participate, they signed an Informed Consent.

The process of data analysis was supported on the concept of content Bardin (2009), which operates in three main poles: the pre-analysis, exploration of the material and results, based on inference, and interpretation. It is noted that the organization holding the material and coding categories, filtered over that found meanings parallel literature on the subject of this study.

Subsequently, they were tabulated and analyzed by descriptive statistical variables in order to identify the profile of the sample. Detailed examination proceeded through absolute and percentage frequency in the variables.

Table 1 - Social Variables

Variable	Minas Gerais		Holy Spirit		Total	
	n	%	n	%	N	%
Genre						
Male	96	48	87	43	183	46
Female	104	52	113	57	217	54
Age						
<17 years	2	1	0	0	2	1
17 and 20 years	41	20	51	25	92	23
21 and 25 years	34	17	38	19	72	18
26 to 35	48	24	49	24	97	24
36 to 40	28	14	13	7	41	10
41 years or more	47	24	49	25	96	24
Education						
Illiterate	0	0	0	0	0	0
Incomplete Elementary School	7	3	14	7	21	5
Complete primary education	17	8	16	8	33	8
Complete high school	51	26	93	46	144	36

Incomplete higher	74	37	44	22	118	30
Graduated	51	26	33	17	84	21
Marital Status						
with fellow	102	51	91	45	193	48
No companion	98	49	109	55	207	52
Total	200	50	200	50	400	100

When analyzing social variables of the sample with respect to gender, the female population made up a greater percentage in the two regions, a total of 54% (n = 217). As to the age of the sample, a higher number of respondents in age from 17 to 20 years (n = 92; 23%), 26 to 35 years (n = 97; 24%) and above 41 years (n = 96; 24%). As for education, 36% of the sample had complete and incomplete higher Secondary (n = 1182; 30%). Regarding marital status, respondents predominated without partners (n = 207; 52%).

When comparing the two regions, it is observed that the Holy Spirit there was a greater number of female respondents. Regarding age, except for the age group 17-20 years with a higher percentage in the Holy Spirit, and between 36 and 40 years, with the largest number of respondents in Minas Gerais, the percentages of the two regions were very close.

As for education, you can see that in the Espirito Santo region most of the sample has completed high school, while in Minas Gerais has the highest percentage complete higher education. No interviewed declared illiterate. Regarding marital status, there was no significant difference between the two regions, though, in the Holy Spirit have been a slightly higher number of people without a partner.

In a second step, the questionnaire is returned to the knowledge of the studied population about the cold sores. Regarding the knowledge of the disease, the percentages are contained in the table below.

Table 2 - Knowledge transfer and self-care

Variable	Minas Gerais		Holy Spirit		Total	
	n	%	n	%	N	%
Know the mode of transmission of cold sores?						
Yes	143	71	152	76	295	74
Not	57	29	48	24	105	26
Do you know what the necessary care for a person with cold sores?						
Yes	65	32	107	53	172	43
Not	135	68	93	47	228	57
You know that the manifestation of herpes labialis is related to stress?						
Yes	74	37	44	22	118	30
Not	51	26	33	17	84	21
You know what the correlation of cold sores with the patient's immunity?						

Yes	64	31	95	47	159	39
Not	136	69	105	53	241	61
The virus can be transmitted by kissing?						
Yes	177	88	123	61	300	75
Not	23	12	77	39	100	25
You know that frequent exposure to sunlight can turn cold sores?						
Yes	96	48	112	56	208	52
Not	104	52	88	44	192	48
The herpes virus can be transmitted sexually?						
Yes	133	66	131	65	264	66
Not	67	34	69	35	136	34
Total	200	50	200	50	400	100

When they asked about the knowledge they possess the form of transmission of herpes labialis, 74% (n = 295) of the total sample responded affirmatively. Of these, 75% (n = 300) are aware that herpes can be transmitted by kissing and 66% (n = 264) stated that the virus can be transmitted sexually.

Comparing the two areas surveyed, one can observe that the sample from the Espirito Santo region had a higher percentage of knowledge about the mode of transmission of herpes labialis and the necessary care.

As for herpes relation to stress and immunity, the Espirito Santo population showed greater insight into the region of Minas Gerais. However, when asked about the transmission of the virus through kissing, the mining region had the highest percentage of knowledge.

With regard to the relationship of the sun's rays with the reactivation of the virus and the sexual transmission, the two regions showed similar knowledge, with a significant percentage of ignorance.

In the total sample, when asked if they know what the necessary care for a person who has cold sores, 43% (n = 172) answered yes; while 57% (n = 208) knows that frequent exposure to solar rays can activate the virus.

When asked if they know that the manifestation of herpes labialis is associated with stress, 43% (n = 172) claimed to know this information, with 39% (n = 228) of respondents who have knowledge about the correlation of the disease with immunity of the patient.

While herpes is highly contagious, the virus is also very sensitive to the use of soap and water. Thus, frequent and thorough hand washing helps to mitigate the risk, if you have been in contact with the virus and it is present on the intact skin of the hands (BROWNING, McCarthy, 2012).

Generally, transmission occurs through direct contact with an injury or infected body fluids such as exudate active lesions or saliva or through infected objects such as towels, razors, forks and consumer goods. Individuals who have immature immune systems or who are low immunity are more likely to severe complications due to infection with herpes virus, so it affects more often in children aged between six months and five years and older (NÚÑEZ et al., 2013).

Some conditions such as exposure to ultraviolet light, old age, trauma, allergy, strong emotions,

systemic diseases, pregnancy and immunosuppression are directly related to reactivation of the virus (and GARCEZ, 2012).

In due course, the questionnaire is returned to the knowledge of the studied population about cold sores, to outline the symptoms, how it manifests itself, diagnosis, treatments and other relevant variables to awaken the population's interest in seeking further clarification, particularly in discovery signs that require investigation.

Table 3 - Knowledge of the disease

Variable	Minas Gerais		Holy Spirit		Total	
	n	%	n	%	N	%
You have cold sores?						
Yes	18	9	59	29	77	19
Not	182	91	141	71	323	81
Have you heard of cold sores?						
Yes	185	92	142	71	327	82
Not	15	8	58	29	73	18
You know what are the symptoms?						
Yes	99	49	111	55	210	52
Not	101	51	89	45	190	48
You know how the disease manifests itself?						
Yes	84	42	83	41	167	42
Not	116	58	117	59	233	58
Know how to treat?						
Yes	67	33	83	41	150	37
Not	133	67	117	59	250	63
You know how long the demonstration phase?						
Yes	26	13	42	21	68	17
Not	174	87	158	79	332	83
The disease has no cure?						
Yes	95	47	98	49	193	48
Not	105	53	102	51	207	52
Knows the complications that the disease can bring to the oral health?						
Yes	48	21	68	34	116	29
Not	152	79	132	66	284	71
You know what triggers?						

Yes	42	21	73	36	115	29
Not	158	79	127	64	285	71
You know the diagnosis?						
Yes	34	17	69	34	103	26
Not	166	83	131	66	297	74
You have someone in the family with cold sores?						
Yes	38	19	89	44	127	32
Not	162	81	111	56	273	68
Total	200	50	200	50	400	100

When the results obtained in the two regions are compared, it is observed that in Minas Gerais, although a smaller number of respondents claim to have cold sores, most have heard of the disease, with superior knowledge to the Espirito Santo region.

With regard to knowledge of the symptoms and how the disease manifests itself, it was observed that there is a lack of information in the two regions where a considerable portion of said ignorant of them.

Regarding the form of treatment and the duration of the demonstration phase, residents in the Espirito Santo region showed greater knowledge. This result can be considered contradictory, given the higher percentage that claimed to know the symptoms and manifestations or have heard of the disease. Even comparing the two regions showed similar results where less than half of the sample in both regions tell if the disease is curable. On the implications of the disease to oral health and the factors that trigger the disease, affirmative responses capixaba sample were slightly larger, however, the percentage was very low in both regions.

There was less knowledge of the inhabitants of the region of Minas Gerais on how the diagnosis is made, with only 26% responding affirmatively. This may be due to 32% of this same population claim to have someone in the family with cold sores.

In the total sample, 19% ($n = 77$) having said cold sores, results slightly superior to Varianni et al. (2017), who found a prevalence of 10 to 15% in the adult population. Of the sample, 82% ($n = 327$) said they had heard of herpes labialis, where 52% ($n = 210$) respondents know what the symptoms are.

It is observed in this last question that almost half of the sample is unaware of the symptoms of herpes labialis, including prodromal symptoms, a burning sensation, tingling and swelling in the injured area, developing vesicles subsequently to develop and progress to ulceration and crusting within 72-96 hours (aL-MAWERI et al., 2018).

When asked about the symptoms of the disease, only 42% ($n = 167$) answered affirmatively. It is vitally important knowledge of the clinical manifestations, as well as can prevent the emergence of major injuries and minimize discomfort. According Consolaro and Consolaro (2009), one can predict in advance up to 24 hours the appearance of vesicles and blisters, noting the symptoms at the site that first gets sore, making it about 12 hours later, slightly swollen, with burning and itching. Generally the place becomes warm, erythematous and the next day are the first bubbles and blisters.

Only 37% (n = 150) knew how to treatment, according to Silva (2018), based on the use of antiviral ointment or gel, may be used local anesthetics for relieving pain or systemic antiviral drugs, some for immunocompromised patients.

Only 17% (n = 68) of the sample said how long last the manifestations of herpes labialis that, according to Trinity et al. (2007), extends for five to seven days in mild cases, reaching up to two weeks in severe cases, but generally the episodes heal completely within 21 days, even without intervention.

When asked if the disease is curable, 48% (n = 193) answered yes, indicating that a significant portion of the sample is known that herpes a disease with onset and recurrence periods, with no cure for the same.

When asked if they have knowledge of the complications that the disease can bring to the oral health, only 29% (n = 116) answered yes, with a large portion of the sample (81%; n = 284) knowing that cold sores can cause latent infections. avers Bilderet al (2013) leakage may occur, especially in the oral cavity and regions, besides causing chronic periodontitis, aggressive periodontitis and gingivitis.

When asked if they know the triggers of herpes labialis, 29% (n = 115) answered yes, while 26% (n = 103) of the sample claimed to know how the diagnosis is made. Regarding cases in the family, 32% (n = 127) of respondents reported having someone with herpes in the family environment. The disease, although not hereditary, is highly contagious, which may explain the occurrence of several cases in the same household.

The survey also sought to detect information on the labial herpes transmitted to the population by the health services and the dentists and the results shown below.

Table 4 - Knowledge acquired in health / dental services

Variable	Minas Gerais		Holy Spirit		Total	
	n	%	n	%	N	%
Your dentist has advised on cold sores?						
Yes	9	4	31	15	40	10
Not	191	96	169	85	360	90
She has participated in some lecture awareness of cold sores?						
Yes	14	7	28	14	42	10
Not	186	93	172	86	358	90
You know you can get cold sores in the dental office, if the equipment is not properly sterilized?						
Yes	144	57	96	48	210	52
Not	86	43	104	52	190	48
Total	200	50	200	50	400	100

When analyzing the above results are possible to note that a very low percentage of dentists advise patients about cold sores, more significant results in Minas Gerais, where only 4% of the sample claimed to have been guided by this professional.

Also in relation to participation in a lecture on the topic, in Minas Gerais the percentage was lower than the Holy Spirit. As for the contagion in dental offices, although the results were similar, the Espírito Santo region showed less knowledge.

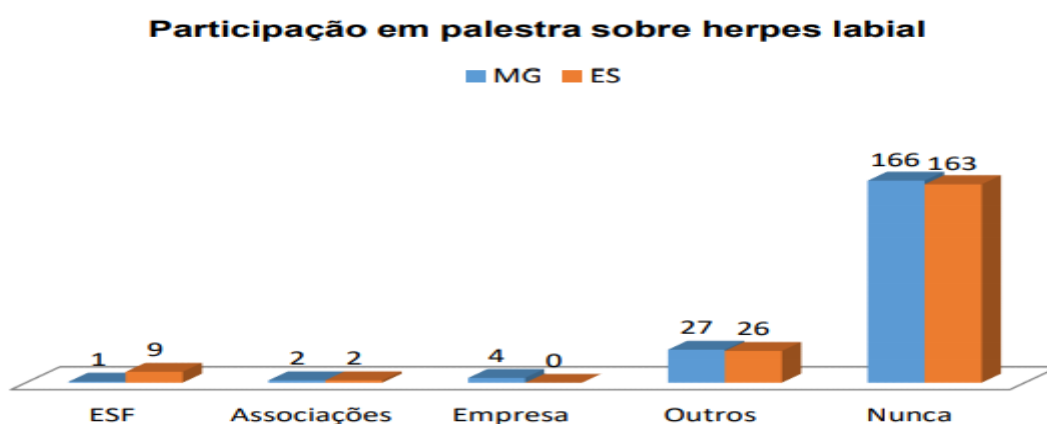
Finally, they were asked which professional feel more prepared to clarify herpes labialis, where 70% (n = 351) of the total sample cited the doctor; 4% (n = 9) nurses; 1% (n = 2) nutritionist; and 25% (n = 138) dentist. By observing the two regions separately, while in Minas Gerais, there were less respondents who consider the most prepared doctor to provide information about herpes in the Holy Spirit, although most have quoted the doctor, fewer people also mentioned the dentist.

Figure 1 - Professional qualified to report on herpes labialis



The doctor is a qualified professional to provide information, diagnose and treat cold sores, however, such as herpes infections commonly affect the anatomical area of responsibility of the practitioner, diagnosis and treatment of these infections end up being performed by these professionals, who are responsible the care of oral health, should understand the disease, its treatment, the impact of the disease or its treatment can have on the patient in order to provide qualified service (MOHAN et al., 2013). Now asked participated in educational activities on cold sores and, if so, where this occurred, 3% (n = 10) said they took part in the Family Health Strategy (ESF); 1% (N = 4) in different groups; 1% (n = 4) No company he works; 13% (n = 53) elsewhere; and a significant majority, 82% (n = 329) have never participated in educational activities on the subject.

Figure 2 - Location of participating in lecture on herpes labialis



Health education enables individuals to inform and develop skills to make healthy choices about their life by increasing their awareness of environmental and policy changes needed to improve their health (Cervera et al., 2012).

According to Duarte et al. (2012, 278 p.):

Health education is defined as a set of knowledge and guided practices for disease prevention and health promotion. It is a resource through which knowledge scientifically produced in the health field, brokered by health professionals, affects the daily lives of individuals, since the understanding of the determinants of the health-disease process provides subsidies for the adoption of new habits and health behaviors.

For Santos and Penna (2009), health education involves a combination of opportunities that may favor the promotion and maintenance of health, can not be understood only as a transmission behavior, content, and environmental hygiene and body, but primarily as the adoption of educational practices that aim the autonomy of individuals in their behavior, which may occur individually or in group form promoting the exchange of people who go through similar experiences, usually a rewarding and fruitful action.

Recommended by the Humanization Policy of the Ministry of Health (BRAZIL, 2008) and the inter-professional dialogue / user needs to be expanded. In this proposal all spheres of activity are sensitized; health projects are made suitable to the reality of the population served - including, in this sense, it is very important that the career choice a theoretical framework for use in healthcare practice. promotional health practices are encouraged; forms are established host and inclusion of the user; this tends to commit more and involve the responsibility.

In this context, the ESF constitutes a privileged space for the development of educational activities in health, which is one of the functions of the professionals of multidisciplinary teams working in these units (FIGUEIREDO et al., 2012).

Unable to discuss the results with other studies due to lack of studies aimed to assess the knowledge of people about the disease and the relationship of this knowledge with geographic, socioeconomic and age variables.

The limitations of this study should be considered in light of some, because of the particular regional aspects as well as the sample does not have dominance in all municipalities. Thus the discussion although connotes widespread content actually emphasizes the participating public, considering it is a study with primary data, addressing a large and representative sample of the population studied in small and medium-sized cities.

Remaining gaps in knowledge of the studied population, however, the study made clear the low knowledge of a substantial portion of the population on the labial herpes and should be considered a planning more effective promotion and prevention strategies on the part of health services with the collaboration civil society, ensuring a better understanding of these communities in order to promote self-care.

From the perspective of primary care, para improve health is to think about your current lifestyle and take healthy habits. Self-care is therefore a process of maturing. For if self-care is care that you yourself

are due to seek what are the needs of the body and mind, improving lifestyle, avoid bad habits, develop a healthy diet, know and control the risk factors that lead to disease and take steps to prevent these, according Orquiza (2011).

Knowledge is one of the self-care of the pillars, so it is relevant in this context, the dental team participate in adding to usual care, a space for the transmission of information to the patient, whose approach to the demand for health services, culminating in strengthening Primary role in promoting the prevention, considering the dental office is the propagation environment contamination.

On this, asserts Mohan et al. (2013), the herpes infections commonly affect the anatomical area of the dentist responsibility and the diagnosis and treatment of such infections fall often under the responsibility of the providers of oral health care. To manage competent care to patients with herpes, dentists should understand the disease, its treatment and the impact they can have on the patient and on the professionals themselves in the clinical care process.

It is important that prevention and guidance campaigns are carried out in order to reduce the number of contaminations, taking into account that the greater the knowledge, the lower the chances of contamination and, consequently, the health system spending.

It is suggested that more research is designed to detect the number of infected individuals and covering all municipalities in the regions, understanding that this study meant to be a contribution to the knowledge of the problem, more research is needed, continuing the investigation into the theme.

CONCLUSION

A significant portion of the world population carries the herpes simplex virus, and herpes labialis a common and recurrent manifestation. Treatment for herpes labialis aims regression of active lesions and decreased viral load, prolonging the complication period, being carried out with antiviral drugs, aiming at relieving the symptoms presented by the patient. It is well known in this area, the dentist's contribution as a skilled professional to diagnose early and properly treat cold sores frame, providing less discomfort and treatment time for the patient.

This study aimed to evaluate the knowledge of the population in the Northeast of Minas Gerais and northern Mato Santo on cold sores, signs of the disease, self-care and information obtained by professionals of health services on the problem.

The sample was similar with respect to age, gender, marital status, with no statistically significant difference. As for education, while the Holy Spirit was prevalence of individuals with a high school degree, in Minas Gerais, most have higher education.

A greater number of respondents capixaba region claimed to have herpes or have a sick in the family, which may explain the superiority of these in relation to knowledge about the disease, care, transmission and self-care, as well as a greater number of dentists offering information about the problem.

However, despite these differences in the percentages of the two regions, overall results showed that a significant portion of the total sample, despite claiming to know what is the disease, unaware of its signs and symptoms, treatment and prevention, as well as ways of streaming. It was also noted that only a small percentage had access to educational activities in health units, associations or company.

Thus, it is concluded that most educational measures should be carried out, informing the population about herpes, understanding that the greater the knowledge, the lower the infection rates, leading individuals to prevent and to treat when they detect signs of the disease, whose dental service has effective powers in this proposed strengthening of health education which until then does not come with proper applicability in primary care.

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Profile and Productivity of Researchers in The Area of University Management

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Abstract

This aims of this article is to identify the profile and degree of productivity of researchers in University Management in the periodical University Management in Latin America (GUAL), in the five-year time frame (2012-2017). For this purpose, the principles of Lotka's bibliometric Law, also known as the Lotka's Inverse-Square Law ($1/n^2$), as well as the adjustment of the Inverse-Square proposed by Price ($1/n^3$) were used methodologically to degree of productivity of researchers in the area. The information to trace the professional profile of the researchers was collected in the Lattes Platform of the National Council of Scientific and Technological Development (CNPq). The main results indicated that there is a strong collaboration between the authors in the development of the research and that the majority of researchers in the field are male. They also showed that universities are the institutions that most develop research on the subject and that there are indications of the existence of an elite of researchers on University Management. The results demonstrated that the studied researchers are mostly master and doctoral teachers, graduates or post-graduates in administration. The results indicate that the researchers are qualified and that they possess technical and / or scientific knowledge about the management of complex institutions, being able to contribute with the development of management models or management support tools.

Keywords: University Management; Higher Education Institutions; Professional Profile; Bibliometrics.

1. Introduction

The process of attracting the Brazilian middle class to Higher Education Institutions (HEI) began in the 1960s, due to the increase in the demand for specialized labor, caused by the expansion of the activities of

multinational companies in the national economy. It is in this socioeconomic context that the implementation of the University Reform of 1968 occurs that will profoundly mark Brazil's higher education, especially in relation to the expansion of the private education network. This Reform, perceived as necessary for the preservation of the so-called "Economic Miracle" (Almeida de Carvalho, 2007) was promoted by the Military Regime through Federal transfers and fiscal incentives.

Among the results of the implementation of the University Reform of 1968, the following stand out: i) the modernization of non-profit public and private universities, which occurred through a series of proposals focused on the articulation between teaching and research, postgraduate policies and the establishment of the teaching career; ii) the expansion of a business model focused on private higher education, formed by a series of isolated small enterprises. The unrestrained process of mergers between these small enterprises outlined the current model of the "market for educational services" characterized by large educational enterprises and private for-profit universities (Martins, 2009).

The current model of HEIs was also analyzed by Carvalho (2013), who highlighted the strategies of these institutions, especially the private ones, in the search for competitive advantages, such as the enterprise reorganization in conglomerates aiming at greater participation in the market; the adoption of aggressive marketing strategies focused on attracting new customers; the opening of capital on stock exchanges; the internationalization of companies by means of partial sale to international groups; and the professionalization of the management system.

Faced with a scenario marked by competitiveness and the absence of management tools specially directed to the sector, educational organizations started to import tools to support the strategic management of diverse business segments, such as strategic planning and Balanced Scorecard (BSC). Thus, the use of these tools began to be used in consortium with the main strategic management tool of Brazilian HEIs, the Institutional Development Plan (IDP). The IDP is a formal document that guides the actions of the institution for a period of five years, observing the consonance between the mission, objectives, goals and organizational strategies (Brasil, 2006; Meyer Jr, Pascucci, & Mangolin, 2012).

The effectiveness of HEIs in meeting the demands of their stakeholders and the pressures of the external environment depends, in large part, on the way their academic-administrative activities are developed. Therefore, the focus of university management is to promote the improvement and quality of its processes, seeking to respond, assertively, to the needs and expectations of the institution (Piñero, Bravo, & Carrillo, 2014).

Due to the importance of university management for the development of HEIs, researchers from different areas of knowledge see developing studies on the subject and publishing in periodicals around the world, which contributes to a wide and diverse scientific production. Despite the volume of scientific production that involves this subject, a challenge still to be overcome refers to the knowledge about the professional profile and the degree of productivity of these researchers.

As a way to overcome challenges of this order, bibliometry presents itself as an efficient tool in the production of quantitative information, able to parameterize the productivity of researchers quoted in several databases. It is based on statistical treatments on the volume of academic production, from variables such as authors, relevance of periodicals and keywords. According to Mueller (2013), bibliometric studies

are aimed at obtaining data on authorship and co-authorship, collaboration and networks in the development of scientific papers, literature evaluation and description, impact and indicators, production and productivity, authors and institutions visibility, citation and cocitation.

Centered in the quantitative data collection on the production, diffusion and application of information, bibliometric studies contribute to the development of scientific production, since they reveal the gaps, trends, as well as the state of the art of the different areas of knowledge (Medeiros, & Vitoriano, 2015). Among the main laws used in this type of study is the Lotka's law or Lotka's inverse-square law, focused on the analysis of the scientific productivity of authors in different areas of knowledge (Machado Jr., Souza, Parisotto, & Palmisano, 2016).

Lotka (1926) looked for to estimate the volume of the scientific production of the authors present in the Chemical Abstracts in a temporal snip of seven years - 1909 to 1916. In conclusion, the study pointed out that much of the scientific production in a certain area of knowledge is the result of the work of a select group of researchers, while a larger group contributes little to the development of science. In terms of volume of production, the small group of authors is equal to the performance of the many authors who present low productivity (Araujo, 2006).

Research that presents results to support the management of institutions, assisting in sustainability, as well as at improving internal processes aimed at are of great importance. Thus, this article aims to identify the profile and degree of productivity of researchers in University Management, seeking to highlight who are the researchers that discuss this issue in Latin America and to determine if there is adherence between their respective areas of training and/or qualification and the managerial aspects of complex institutions, such as Universities, University Centers and Colleges.

2. Methodology

This study is based on the foundations of the bibliometry. The defined methodological steps sought to be compatible with the objective of identifying the professional profile and the degree of productivity of the researchers on the University Management. For this, five main stages were developed: definition of the periodical for the collection of articles; selection of papers on the theme of research interest; search of the professional curriculum in the Lattes Platform of all selected authors; elaboration of spreadsheets for data recording and application of the principles of Lotka's Law and of the adjustment of the Inverse-Square proposed by Price

Among the journals that approach the theme of University Management, the University Management Journal in Latin America (GUAL) was chosen because of its comprehensiveness, focus and scope. The GUAL Journal aims to promote research and discussions on issues related to University Management and Higher Education in Latin America; publishes four annual editions, with fifteen articles each, totaling an amount of sixty articles per year. Their publications are indexed in Network of Scientific Journals of Latin America and the Caribbean, Spain and Portugal (REDALYC); Regional Information System Online for Scientific Journals from Latin America, the Caribbean, Spain and Portugal (LATINDEX); Directory of Open Access Journals (DOAJ); and Portal of Journals of the Federal University of Santa Catarina (GUAL, 2017).

After the identification of the journal, the selection criteria of the articles were defined. It was decided by a temporal snip of five years, collecting articles published between the years of 2012 and the first semester of 2017. were selected articles that presented in the title, abstract or keywords at least one of the following expressions: University Management; Management of Higher Education Institutions; Strategy; Strategic Management; Strategic Planning; Management Model; Institutional Development Plan, Competitive Advantage. The search also included articles written in the Spanish language.

After the selection of the articles, a search was made on the Lattes Platform of the National Council for Scientific and Technological Development (CNPq). The objective of this search was to obtain information about the professional profile of all the authors that published in the journal GUAL, in the temporal snip defined by the research. In this phase, was elaborated a structured script in Microsoft Excel (2016) contemplating twelve categories: year of publication; names of authors; authors' order (1st, 2nd ... 6th author); genre of the first author; area / training of authors; titration of the authors; institution to which the author is bound / affiliation; academic organization of the institution (Faculty, University Center or University); administrative category of the institution (public, private); current employment or institutional link of the author; position currently busy; and additional information (other information not included in the previous categories).

Finally, the principles of the Lotka's law, known as of the Lotka's inverse-square law ($1/n^2$) were applied, as well as the adjustment of the Inverse-Square ($1/n^3$) proposed by Price. The objective of this stage was to identify the degree of productivity of the authors and to verify if the productivity in the area of University Management if approaches the conclusions pointed out in the studies of Lotka or the of Price. This methodological step was realized with based on the study developed by Oliveira (1983), who calculated the productivity of the authors on the Jaca fruit, applying the principles of the Lotka's law ($1/n^2$), as well as the adjustment of this law proposed by Price ($1/n^3$).

According to Urbizagastegui (2008, p.89) "the number of authors who make n contributions in a given scientific field is approximately $1/n^2$ of those who make a single contribution." Thus, mathematically representing the Lotka's law, it could be presented as:

$$L_n = \frac{1}{n^2} p$$

L_n = number of authors who make " n " contributions;
 n^2 = square of the amount of contributions researched;
 p = number of authors who published only one article.

In the adjustment proposed by Price, the mathematical equation assumes a configuration similar to that of Lotka, modifying only the exponent applied to " n ". Thus:

$$P_n = \frac{1}{n^3} p$$

P_n = number of authors who make "n" contributions;
 n^3 = cube of the amount of contributions researched;
 p = number of authors who published only one article.

In this step, a spreadsheet was elaborated with the names of the first authors of the articles selected and applied the mathematical formulas of Lotka and Price. Subsequently, Table 1 was elaborated, with seven categories: number of articles (x); number of first authors (y); percentage of authors; total articles (x.y); percentage of articles; results obtained from Lotka's Law; results obtained from the Price adjustment.

3. Analysis and Discussion of Results

Considering the temporal snip and the search criteria, were identified 73 articles on University Management in the GUAL Journal. In absolute terms, 2013 was the year in which the journal had the highest concentration in the area studied (18 papers), registering a growth of 20% in relation to the previous year, when it published fifteen articles. In the following two years, the occurrence of articles on University Management fell to ten, in 2014, and to eight in 2015, being resumed in 2016, when the journal presented fourteen works in the area. In 2017, it was only possible to determine the publications of the first semester, totaling eight in total.

With the aim of to identify the researchers involved in this production, to later describe the professional profile and calculate the degree of productivity, it was possible to determine a quantitative of 245 authors and / or co-authors related to the 73 selected articles, linked to 63 different HEIs. However, this number represents a gross quantity since it was noted that the database included the names of authors who had participated in the preparation of more than one article, being your name counted more than once. This observation is important to avoid "contamination" of the actual quantity of different identified authors, although it does not invalidate its use in analyzes that require the gross quantitative, such as the number of authors and co-authors, for example, demonstrated in Figure 1.

Analyzing the database in detail, it was noticed that of the universe of 245 authors and / or co-authors, 18 of them were involved in the production of 43 articles. The distribution of the authors by article occurred as follows: thirteen participated in the preparation of two articles (resulting in 13 duplications); three authors of three articles (6 duplicities); and two authors of four articles (6 duplicities), that is, the net quantity of authors and / or co-authors will be obtained by subtracting the number of duplicities (25) from the gross amount (245), resulting in 220 authors and / or co-authors responsible for the production of the 73 articles.

After identifying the net quantitative of authors and / or co-authors (220), two types of analysis will be presented: one about the professional profile and the number of authors and / or co-authors involved in the production of the 73 articles selected and the other about the authors' productivity.

3.1 Professional profile of authors

The first variable analyzed was the number of authors per article (Figure 1). In this first analysis, it was sought to identify if the research in university management is being developed by multiple authorships or by unique authorships. For this, 245 was the gross amount of authors considered, a criterion that allowed to demonstrate the set of productions made by authors who participated in only one article, such as those who participated in more than one publication.

After analyzing the database, it was noticed that 93.2% of the scientific production of the area is being developed in partnership between two or more authors, as shown in Figure 1.

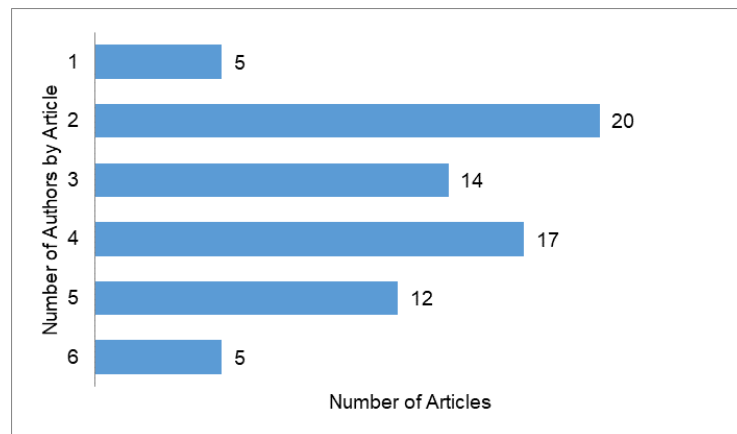


Figure 1: Number of authors by article

Source: Research Data

In addition to highlighting the supremacy of co-authoring work, the Figure 1 shows the predominance of articles developed in pairs (27.4%) or groups of three to five authors (58.9%), whose percentages, added represent 86.3% of production. Authors who developed individual researches or with groups of six coauthors, represented 6.8% each.

The confirmation that a large part of the scientific production of an area is developed by multiple authorship (coauthorship) was also evidenced in the work of Cernelós, Maingu , and Galdamez (2016). The researchers verified that the work produced in annals of Brazilian congresses and periodicals in the area of Accounting about Environmental Performance indicators has been elaborated jointly by three or more authors (74%). Disagreeing with the findings, Leite Filho (2008) verified that there is a predominance of single authorship in journals and that, normally, the higher averages of authors per article are found in annals of congresses.

Outlining the profile of the researchers regarding gender and considering only the first author of each article, there was a predominance of male authors, 58.0%, a difference of 16 percentage points in relation to the participation of the female gender in the development of research in university management, as shown in Figure 2.

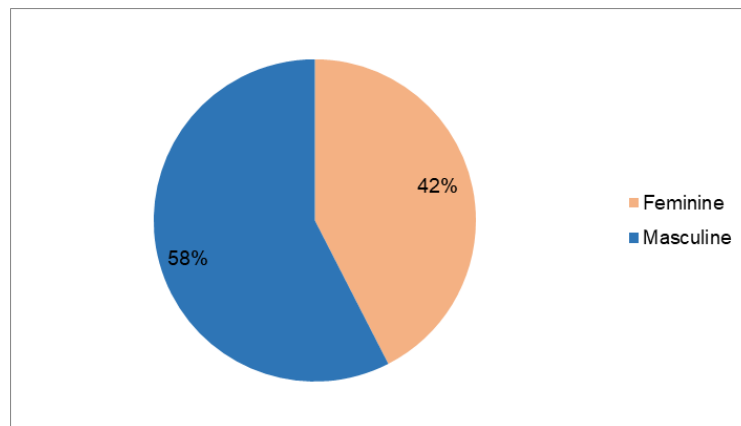


Figure 2 - Genre of the first author

Source: Research Data

Another interpretation that can be drawn from this percentage is that the participation of the female gender in the studied journal (42.0%) was more significant than those observed in other studies, such as those performed by Oliveira et al. (2011), who studied the profile and the scientific production of researchers linked to CNPq and in cardiology, and Mazzon and Costa Hernandez (2013) who researched Brazilian scientific production in marketing in the period 2000-2009. Oliveira, Ribeiro, Quirino, Oliveira, Martelli, Lima, Colosimo, Lopes, Silva, and Martelli-Jr (2011) verified that 72% of the researches in cardiology were produced by male researchers, a fact corroborated by Mazzon and Costa Hernandez (2013), who noticed the predominance of the male gender (66%) in the marketing area, however, highlighted a trend of increasing feminine participation in the scientific production of the area.

To report the percentages related to the academic qualification of the researchers, the net quantitative of authors was considered (220), disregarding the 25 authors and / or repeated co-authorship. The figure 3 shows that the doctoral (50.5%) and the master's degree (31.4%), together, represented 81.9% of the degree of authors and / or co-authors who published in the GUAL Journal between 2012 and the first semester of 2017. In addition, it was observed that, in the universe of articles selected, all had at least one author with doctorate. This was the title of the first author of approximately 43.0% of publications.

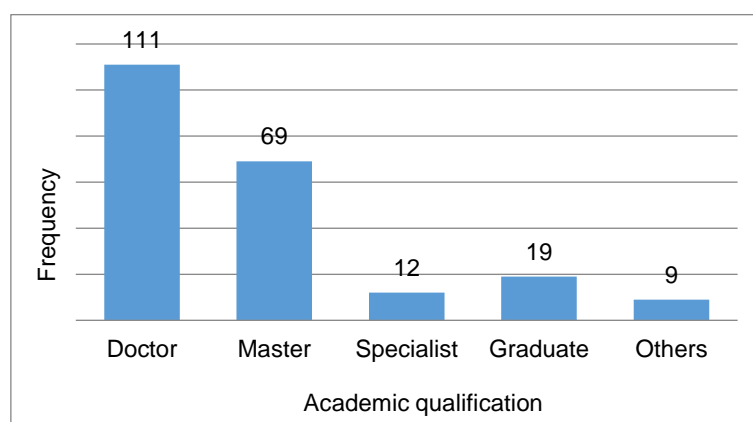


Figure 3: Authors' academic qualification

Source: Research Data

The studied universe also showed an evident dynamics in relation to the elevation of the titration of the authors. Of those who completed the master's degree in the year they published the article in the GUAL Journal, approximately 25.0% of them completed their doctorate at the date of analysis of the data of this research and 44.0% were in the process of doctorate. Among the authors with a doctorate, approximately 25.0% had already completed their postdoctoral training.

The wide participation of researchers with doctorate in the development of scientific research was observed in studies of different areas of knowledge. Perdigão, Niyama, and Santana (2010), who sought to analyze the characteristics and trajectory of the Accounting, Management and Governance Journal, in the period 1998-2009 highlighted, among other aspects, the concentration of doctors and masters, 43% and 24% respectively, among the authors who published in the journal. Rocha, Nagliate, Furlan, Rocha, Trevisan, and Mendes (2012) identified that 65% of the researchers who published on health knowledge management, whether in national journals or international journals, have a doctorate degree. Vieira Zanella, Groff, Oliveira, Kemp de Matos, Rocha Furtado, and De Assis (2013), when investigating the academic production between 2002 and 2011 on youth and public policies, published in Brazilian scientific journals that integrate the SCIELO database, observed the predominance of doctors among the authors, 60 % of total.

Analyzing the concentration areas of the authors' graduate programs (Figure 3), it was possible to determine that approximately 31.5% and 65.2% of the researchers with doctoral or master's degrees are, respectively, doctors and masters in administration. Furthermore, among the researchers who completed the master's or doctoral course after publication in the GUAL Journal, 69.0% did so in administration and 58.0% of those who had not yet completed their postgraduate, are enrolled in programs the same area of concentration.

Another relevant fact about the profile of the researchers in University Management is that, although they present training in different areas of knowledge, especially in the human sciences and applied social sciences, information collected in the CNPq platform, available in each author's Curriculum Lattes, indicate that 50.0% of them (110) have completed higher education in Business Administration, 10% in Accounting Sciences, 5.9% in Psychology, 5.4% in Economic Sciences and 5.0% in Pedagogy. The percentage corresponding to 16.4% refers to the authors who inform have formed in other areas, such as Social Sciences, Licenciatures, Law and Engineering; and 7.3% refers to authors who did not provide this information in their professional curriculum.

These percentages, added to those related to the concentration area of postgraduate programs, show that the research on the management of HEIs is being carried out by researchers who have knowledge about administrative and managerial processes, organizational environments and tools to support the strategic management of institutions.

Regarding the academic link of the 220 authors (Figure 4), it was verified that 97.2% of them are linked to universities. Of this universe, 68.2% have ties with public universities, 29.0% with public and private non-profit universities (community) and 2.8% with private for-profit universities.

As for the academic organization, the greater participation of the Universities in the scientific production on University Management was an expected reality. Its responsibilities in the processes of development of research and dissemination of knowledge are foreseen in article 207 of the Federal Constitution of 1988,

by the principle of inseparability between teaching, research and extension (Brasil, 1988). However, although expected, the broad participation of the universities verified in Figure 4 is something that stands out. Only 1.7% and 1.3% of the universe of authors studied declared to be linked to University Centers or Faculties, respectively.

This reference is symmetrical in the observations of Chiarini and Vieira (2012) in explaining that the Public Universities are, in fact, the HEIs that most support the development of research in Brazil, contributing to the processes of creation and dissemination of new knowledge and new technologies, through basic and applied research.

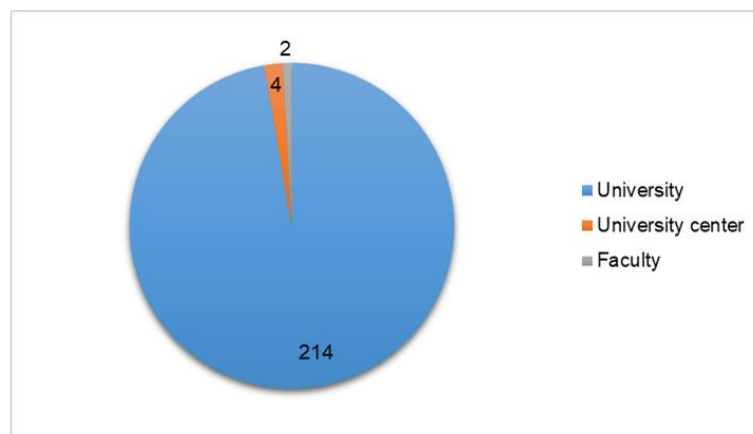


Figure 4: HEIs Academic Organization

Source: Research Data

After identifying the broad participation of the universities in the scientific production on University Management, HEIs were classified based on the frequency with which they appeared in the database prepared for this work, according to the declaration of the link of each author. For that, the gross quantitative of authors (245 authors and / or co-authors) was considered, since the objective was to understand which were the most representative institutions in the production of research and diffusion of knowledge on the subject. 63 different HEIs were identified, among Universities, University Centers and Colleges. It was decided to list the HEIs that appeared at least five times in the database, as shown in Figure 5.

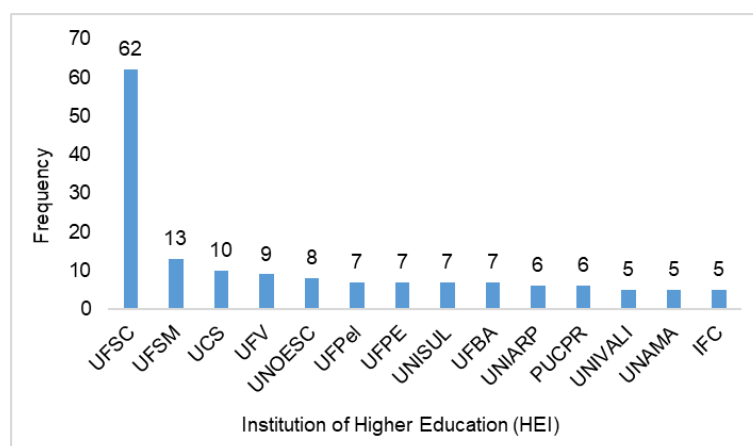


Figure 5: Academic affiliation of the authors (ranking of the universities that most appeared)

Source: Research Data

Figure 5 shows the 14 HEI (22.2%) identified as the most representative of the authors and / or co-authors according to the criteria defined by this study. The links of these HEIs with the total number of researchers considered (245) registered the percentage of 64.1%, that is, 157 researchers. The remaining HEIs, 49 (77.8%) were cited between four and one time by 88 authors (35.9%).

It is still possible to notice in Figure 5 that the Federal University of Santa Catarina (UFSC) was the HEI that most presented a link with the authors who published in the Journal GUAL during the period studied: 62 researchers (25.3%) signed the authorship and / or co-authorship of 21 articles (28.8%). These percentages indicate signs of endogeneity in the GUAL Journal. According to Valerio (1994), endogeneity occurs when the main holder of scientific authorship and production is the journal institution itself. These signs of endogeneity, perceived in the Journal GUAL can be understood as a reflection of the scientific productions developed by the professors and students of the Professional Master's in University Administration, as well as the researchers of the Institute of Researches and Studies in University Administration (INPEAU), both linked to UFSC.

It is worth mentioning that endogeneity may appear in different percentages in scientific journals. Researching the Accounting and Finance Journal of the University of S o Paulo (USP), Leite Filho (2008) found that approximately 74% of the publications had authors related to the institution. In relation to the Journal Unb Contábil, this percentage was 43%.

Another variable analyzed to compose the authors' professional profile was the role they play in their respective institutions (Figure 6). For this, analyzed the Lattes Curricula of 220 authors (net quantitative). Among the researchers it was possible to locate scholarship students, undergraduate and graduate students, professors and coordinators of Stricto Sensu graduate programs, occupiers of trust functions and positions in commission. In general, it was observed that the authors perform functions that are closely related to teaching and research activities in institutions, highlighting the importance of articulation between the two areas in the production, discussion and diffusion of knowledge.

Of the universe studied, approximately 53.2% have more than one function. Of the total of 220 authors, 146 are teachers, equivalent to 66.3% of this total. Figure 6 shows the different functional situations of the authors in relation to the origin HEI. Two phenomena are worth mentioning: the different functional conditions that the teacher assumes and the expressive percentage in which the functions were not identified or were identified as "Other", approximately 19.5%. This percentage represents the authors who did not report their role in their respective institutions, as well as authors who perform administrative functions, functions of trust and / or positions in commission, such as administrative assistants, analysts, administrators, accountants, directors and pro-rectors.

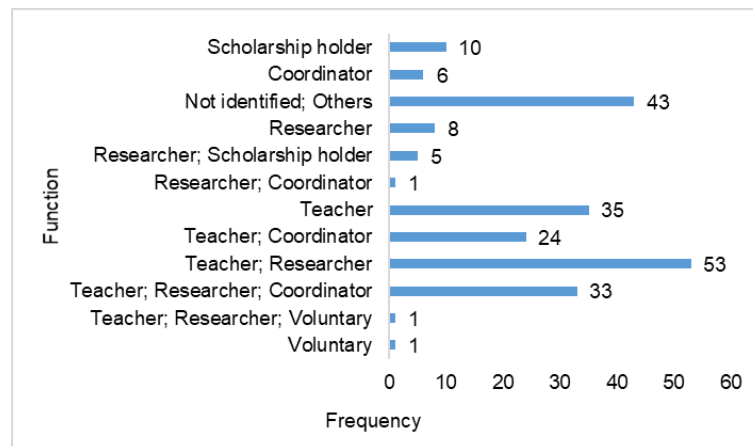


Figure 6 - Role occupied by authors in HEIs

Source: Research Data

The data presented in Figure 6 show that University Management is being considered and discussed by the various Stakeholders of HEIs. These data reflect the interrelationship and cooperation between several categories in the search for new knowledge that can aid in the administration and sustainability of the institutions.

3.1 Author's Productivity

In quantitative terms, what Lotka's Law establishes is that authors' productivity represents a proportion of the authors who contributed only one publication of a studied universe, corresponding to the inverse of the "n" square. Thus, "n" represents the number of publications to be searched (Machado Jr., Souza, Parisotto, & Palmisano, 2016).

In his study, Lotka (1926) considered only the first author of each article, ignoring the other authors who contributed in articles of multiple authorship. In applying the of the inverse-square law, Lotka noted that for every 100 authors who write only one article, 25 will contribute only two ($n = 2$; $100 / n^2 = 25$); approximately eleven will participate with three articles each ($n = 3$; $100 / n^2 = 11$); about six authors will cooperate with four articles each ($n = 4$; $100 / n^2 = 6$); so that the number of authors with "n" contributions is $1 / n^2$ of the number of those who contribute only one article (Oliveira, 1983).

Lotka's Law seeks to measure authors' productivity through a size-frequency distribution model in a set of documents (Vanti, 2002). However, since its formulation in 1926, several studies have been developed in an attempt to propose alternatives to the model which fit better the data set observed, as well as its area of concentration (Alvarado, 2002; Urbizagastegui, 2008). One of these studies was developed by Price, who adjusted the Lotka equation ($1/n^2$) to $1/n^3$ (Braga, 1974).

Table 1, which shows the degree of productivity of authors in the area of University Management, as pointed out in the methodology, was elaborated based on the study developed by Oliveira (1983). In this stage of the research, sought to identify the first authors of the selected articles, as well the number of times these authors appeared in the first author's condition. For this, the spreadsheet with the information of the 73 articles was analyzed.

It was noticed that the authors published between 1 and 3 articles in the condition of first author. In absolute

numbers, it was found that 66 authors published 1 article (reference value to the application of Lotka's Law and the adjustment proposed by Price); 2 authors published 2 articles (total of 4 articles); and 1 author published 3 articles (total of 3 articles), totaling 73 articles, as demonstrate in Table 1. Among the authors, none contributed with more than 3 articles, in the condition of first author.

Table 1: Number of authors in relation to the number of articles published on University Management in the GUAL Journal between 2012 and 2017.

Number of articles (x)	Number of first authors (y)	Authors (%)	Total articles (x . y)	Articles (%)	Lotka's Law	Adjustment proposed by Price
1	66	95,7%	66	90,4%	-	-
2	2	2,9%	4	5,5%	16,5	8,2
3	1	1,4%	3	4,1%	7,3	2,4
TOTAL	69	100,0%	73	100,0%		

Source: Research Data

Considering the method of counting authorship proposed by Lotka - first author only - (Urbizagastegui, 2008) and observing the data presented in Table 1, it can be seen that 90.4% of the total articles selected (73 articles) were written by the 66 authors who wrote a single article, in the condition of first author. This means that 95.7% of the authors (66 authors) contributed only one work on University Management in the period studied, 5.5% published two articles and 4.1% three articles.

One of the conclusions pointed out by Lotka is that the approximate proportion of authors who will contribute only one article to the theoretical production of a given theme is approximately 60% (Alvarado, 2002). It is noticed that in the scientific production in University Management the presence of authors with only one article (95.7%) was significantly higher than the percentage suggested by Lotka.

Continuing the authors' productivity analysis from the application of Lotka's Law, it was found that the percentages relative to the authors who published two or three articles also showed a considerable distance from the standards established by the law. While the ideal value for authors who publish two and three articles would be 16.5 and 7.3, respectively, the actual numbers verified showed that only two authors (2.9%) published two papers and one author (1.4%) contributed three articles.

Number of authors who, according to the Law of Lotka, would contribute to the area of University Management

$$L_n = \frac{1}{n^2} p$$

Contribution with two articles

$$L_2 = \frac{1}{2^2} 66 \Rightarrow L_2 = 16,5$$

Contribution with three articles

$$L_3 = \frac{1}{3^2} 66 \Rightarrow L_3 = 7,3$$

Number of authors who, according to Price's adjustment, would contribute to the area of University Management

$$P_n = \frac{1}{n^3} p$$

Contribution with two articles

$$P_2 = \frac{1}{2^3} 66 \Rightarrow P_2 = 8,2$$

Contribution with three articles

$$P_3 = \frac{1}{3^3} 66 \Rightarrow P_3 = 2,4$$

Still on the productivity of the authors, it was noticed that the literature on University Management presents values distant, also, of the standards pointed out by Price. Following the logic defended by Price, 8.2 and 2.4 authors would publish two and three articles, in that order. However, the proportions verified by the survey indicate that only two authors published two papers, and one author published three.

According to Price's observations, approximately 33% of the scientific publications (1/3) ends up being produced by 10% (1/10) of the most productive authors - on average, this productivity revolves around 3.5 publications per author (Braga, 1974). Considering that the most productive authors of the researched literature are those who wrote between 2 and 4 articles and that this production resulted in 43 publications, it could be concluded that the average production of this group was 2.4 publications by author.

Differently from the literature about Jaca studied by Oliveira (1983), which adjusted to the productivity standards suggested by Price, the productivity of the authors on University Management presented results different from those suggested by Price and Lotka. However, they are closer to the expected results by the adjustment proposed by Price, especially if compared to the values achieved with Lotka's Law.

On the discordance between the numbers expected from the application of the Lotka's Law and the real productivity of the authors in several areas of knowledge, what is perceived is that the results when confronted, sometimes reinforce the validity of the Law, sometimes invalidate, either in relation to its comprehensiveness or in relation to its applicability. Most of the time, they are contradictory, conflicting and inconclusive (Alvarado, 2002; Urbizagastegui, 2008).

As with the literature on University Management, others also did not conform to the productivity standards suggested by Lotka, such as the literature on Jaca (Oliveira, 1983); on information management (Rossoni & Hocayen-da-Silva, 2009); in the area of managerial accounting in hospitals (Zanievicz da Silva & Beuren, 2015); and strategic cost management (Voese & Mello, 2013). All of them presented percentages below the standards established by the law.

On the other hand, the study by Souza and Ribeiro (2013) in management journals in the area of environmental sustainability showed partial adherence to Lotka's Law. Researching in the area of

accounting, Leite Filho (2008) suggested that the total number of authors of the congresses and journals researched, could have a productivity statistically equal to the standards described by Lotka's Law.

4. Final considerations

In this study, were identified the profile and degree of productivity of researchers in University Management. The results of the research revealed a high collaboration among the authors in the development of studies in the area. There is predominance of the masculine gender in the scientific production on University Management and supremacy of teachers among the researchers.

The results also showed that a significant number of authors have master's degree or doctorate degrees and management knowledge, since many of them are graduates or post-graduates in management. In addition, it is possible to affirm that the Universities are in the vanguard of the development of researches in University Management and there are signs of the existence of an elite of researchers on the theme.

It was verified that many of the authors surveyed contributed with few studies in the area and that the degree of productivity of these authors presented values below the standards predicted by the Lotka's law, as well as by the adjustment proposed by Price.

In sum, the results evidence out that the researchers on University Management are qualified and have technical and / or scientific knowledge about the management of complex institutions. Thus, these researchers can contribute with the development of management models or management support tools which may be applied in HEIs. The practical application of these results may promote the improvement of the management processes, the efficiency in the service supply, as well as the sustainable development of the institutions.

It is suggested, for future studies, the analysis of a larger number of journals and a temporal snip broader. This will make it possible to broaden the results and apply the principles of Lotka's Law and the adjustment suggested by Price on a broader basis.

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i. Of the number of authors that participated in more than one research, approximately 55.5% reported being linked to the UFSC. This percentage reinforces the previous data that indicated signs of endogeneity in the researched journal and indicates to the existence of an elite of researchers on University Management linked to this institution.

Investigation of The DGs Effect on The Coordination Between Protective Elements in Distribution Network

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Abstract

Addition of Distributed Generators (DGs) to the electric network have more advantages to the network. It improves the voltage profile and the power flow in the network. In the last decade, DGs is used in power system, especially the distribution system. Coordination study for protective devices must be performed on the distribution network with DGs to reach selectivity with minimum clearance time of fault. Due to DG insertion to the electric system, the short circuit level is changed and coordination between protective elements should be done. This paper presents a technique to avoid the miscoordination problem between protective devices due to the impact of DG unit's insertion without any additional costs. The proposed technique depends on activating and updating the setting of network relays to achieve correct coordination. Also, it doesn't need any additional costs or any additional equipment to be installed in the electric network. This paper makes studies on a real radial system of power transformer with its feeders of a 66kV utility substation before and after adding DGs. ETAP software is used to simulate the network under study.

Keywords: *Coordination; Distributed Generators (DG); Relays; ETAP.*

1. Introduction

Selectivity and coordination of protection devices problems is one of the points linked to the effects of inserting distributed generators. These problems has an directly effect on the safety of equipment, persons and continuity of service. Analysis should be done to find out if the protective devices of the network should have a suitable coordination after adding distributed generators or not. Connecting the DGs to distribution systems gives several economical, environmental and technical advantages such as reduction of environmental pollution, reduction of electric losses, improvement of voltage profile, increasing of distribution system capability and increasing of system reliability [1]. The effect of insertion of DG of distribution network on the short circuit level is shown in papers [2-6]. This can cause directly effect on coordination between protective devices because of the generator capability to provide large fault currents to the faulted point. The impact of inserting DG on relay coordination has an effect on the operating time of relay. Thus, the coordination between main and back up relays isn't appropriate in the presence of distributed sources. Hence, the addition of DG in the distribution network causes negative effect on protection. The adaptive protective scheme of an overcurrent relays to obtain an optimal coordination with the network of inserted DG was proposed in [7], where new relay setting technique was applied for the load and the generation changes. The practical impacts of DG on fuse and the technique to overcome the DG impact is in [8]. This paper study the impact of DG on coordination between protective devices of a radial system of power transformer with its feeders of a 66kV utility substation. Due to DGs insertion to the network, miscoordination occurs between protective devices. This paper present the method to overcome the DG impact. The miscoordination problem is solved without changing any protective device or any additional cost and without changing the coordination method. It depends on activating and updating the setting of network relays to achieve correct coordination. Also, the fault analysis on feeder is discussed in this paper to test the coordination between protective devices before and after adding DGs to the radial system under studying by using ETAP software.

2. The Approach

2.1 System Under Study

The simulated network is a real radial system of an actual transformer with its feeders in the substation no.5 of 10th of Ramadan and Sharkia, Egypt as shown in fig.1. The network components are: power grid of 66kV, four buses, power transformer of 66/11 kV and feeders of shown load currents in table2. The data of the network components is in table1 and 2.

Main Components Rating	Utility		MVASC	Z%	kV	
			2000	10%	66	
	Busbars		Rated kV			
		Bus 1	66			
		Bus 2	66			
		Bus 3	11			
		Bus 4	11			
	Cables		C.S.A	Cable Type	Rated kV	
		Cable 1	380mm ²	Aluminuim	66	
		Cable 2	3x1x400mm ²	Aluminuim	11	
	Two-Winding Power Transformer		MVA	Turns Ratio	X/R ratio	Impedance%
			25	66/11	28.2	10%

Table 1. Network Components Rating

Protection Devices	Current Transformers		Turns Ratio of CT					
		CT 1	300/5					
		CT 2	1500/5					
	Circuit Breakers		A	KA				
		C.B 1	1250 A	31.5 kA				
		C.B 2	1600 A	31.5 kA				
	Differential Relay		Protected Component				Relay Model	Full Load Current
		R1	Power Transformer				Siemens, 7UT51	
	Overcurrent Relays	R2	Feeder13				Siemens, 7SDJ602	450 A
		R3	Feeder14					450 A
		R4	Feeder15					450 A
		R5	Feeder16					490 A
		R6	Feeder17					490 A
R7		Feeder18		475 A				
R8		Feeder20		475 A				

Table 2. Protection Components Rating

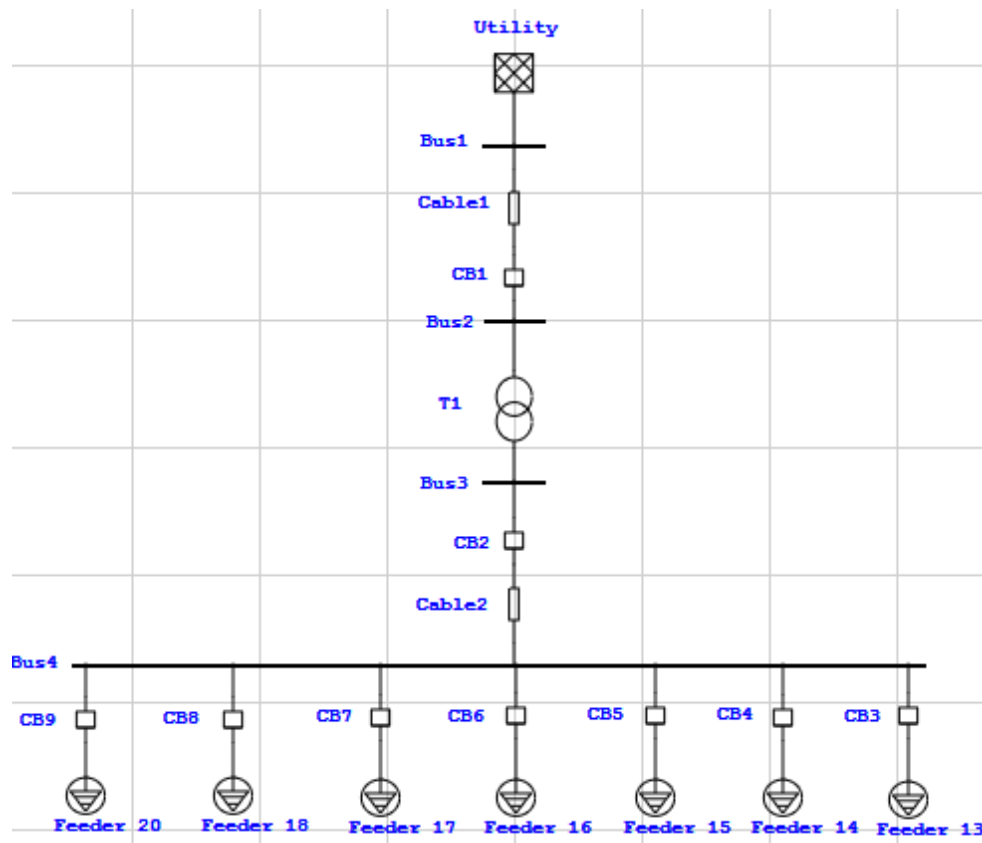


Figure 1. Single Line Diagram of the Network using ETAP

2.2 Coordination Study of the Distribution Network without DG

To obtain correct sequence of operation for the protective devices when a fault occurs on feeder, the setting of network relays should be adjusted to determine the primary protection of feeder and the back up protection of feeder. This sequence between protective devices is called coordination. For the network used, if a fault occurs on any feeder, an overcurrent relay of connected feeder should operate first to isolate and separate the faulted section from the healthy other parts of the network to achieve continuity of service for the system. And the differential relay of power transformer should operate after feeder overcurrent relay with certain delay time as a back up protection if feeder overcurrent relay doesn't operate due to damage or any failure. Table3 shows suitable setting of the network relays. Fig.2 shows the time current curve TCC of all network relays according to the relay setting of table3

Before Adding DG			
ID	Load Current	Pick up Current	Time Dial
Relay1	.....	150 A	7.29
Relay2	450 A	630 A	0.08
Relay3	450 A	630 A	0.08
Relay4	450 A	630 A	0.08
Relay5	490 A	686 A	0.11
Relay6	490 A	686 A	0.11
Relay7	475 A	665 A	0.09
Relay8	475 A	665 A	0.09

Table 3. Relay Setting of the Network Without DG

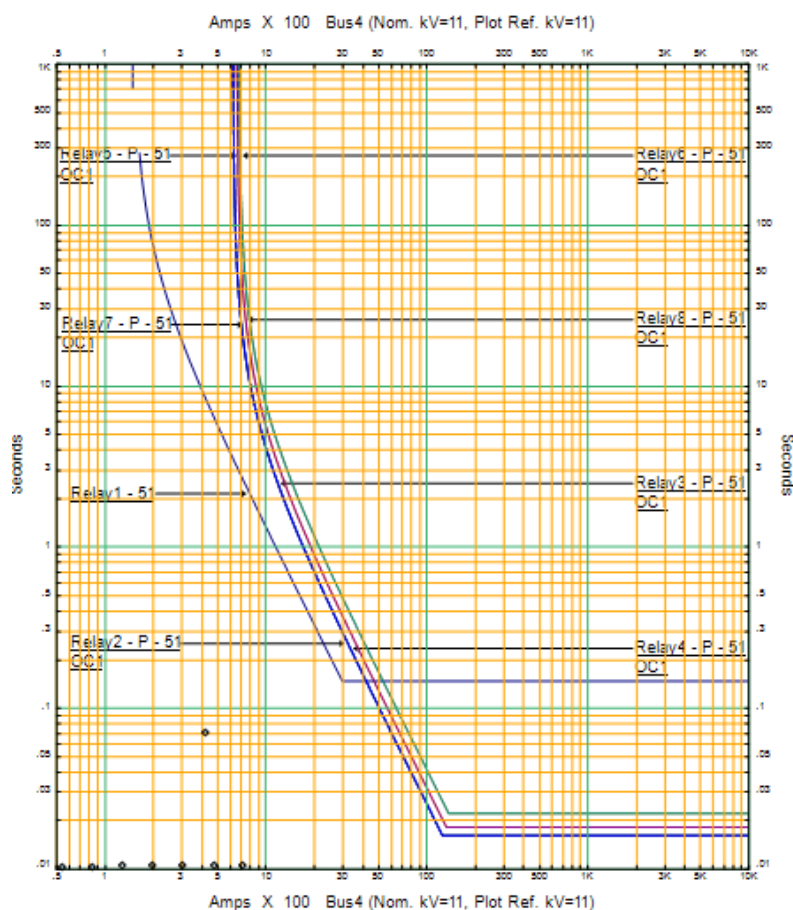


Figure 2. TCC Curves according to Setting of table3

2.3 The Effect of DGs on Protection Coordination

After adding two DG's at feeder16 and feeder17 as shown in fig.3, the drawing feeder currents and voltage drop at buses are reduced. So, adding DG's to the system improves the power flow and voltage. Also, the S.C level is increased. Hence, the coordination is affected as shown in table4. Fig.3 and fig.4 show the result of an actual case study due to three phase fault on feeder15 after adding DGs to feeders under the

relay setting of fig.2. Table4 shows the actual tripping of all network relays after adding DG. According to the actual tripping in the table4 due to inserting DG to the network, the network needs new coordination.

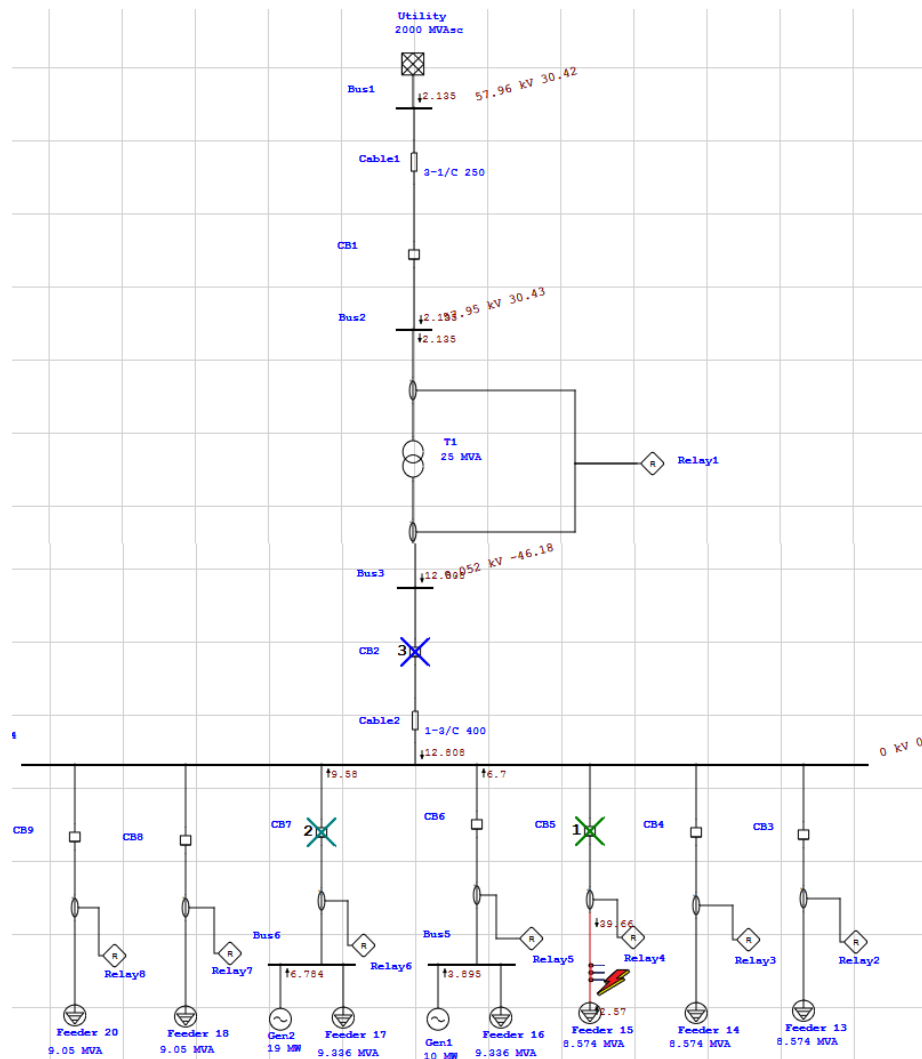


Figure 3. Fault Analysis on Feeder15

3-Phase (Symmetrical) fault on connector between CT5 & Feeder 15. Adjacent bus: Bus4					
Data Rev.: Base		Config: Normal		Date: 31-03-2019	
Time (ms)	ID	If (kA)	T1 (ms)	T2 (ms)	Condition
16.0	Relay4	39.661	16.0		Phase - OC1 - 51
36.0	CB5		20.0		Tripped by Relay4 Phase - OC1 - 51
45.4	Relay6	9.584	45.4		Phase - OC1 - 51
50.0	Relay1		50.0		Phase - 87
65.4	CB7		20.0		Tripped by Relay6 Phase - OC1 - 51
70.0	CB2		20.0		Tripped by Relay1 Phase - 87
80.0	CB1		30.0		Tripped by Relay1 Phase - 87
93.5	Relay5	6.696	93.5		Phase - OC1 - 51
113	CB6		20.0		Tripped by Relay5 Phase - OC1 - 51
148	Relay1	12.808	148		Phase - OC1 - 51
168	CB2		20.0		Tripped by Relay1 Phase - OC1 - 51
178	CB1		30.0		Tripped by Relay1 Phase - OC1 - 51
408	Relay2	2.574	408		Phase - OC1 - 51
408	Relay3	2.574	408		Phase - OC1 - 51
428	CB3		20.0		Tripped by Relay2 Phase - OC1 - 51
428	CB4		20.0		Tripped by Relay3 Phase - OC1 - 51

Figure 4. Sequence of Operation of Protective Elements of 3-ph fault of fig.3

Fault Location	Actual Tripping		Correct Tripping	
	Primary Protection	Back up Protection	Primary Protection	Back up Protection
Relay2 Zone	Relay2	Relay6	Relay2	Relay1
Relay3 Zone	Relay3	Relay6	Relay3	Relay1
Relay4 Zone	Relay4	Relay6	Relay4	Relay1
Relay5 Zone	Relay5	Relay6	Relay5	Relay1
Relay6 Zone	Relay6	Relay1	Relay6	Relay1
Relay7 Zone	Relay7	Relay6	Relay7	Relay1
Relay8 Zone	Relay8	Relay6	Relay8	Relay1

Table 4. The Actual Tripping of the Network With DG Under the Old Relay Setting

2.4 New Coordination of the Network Relays with DG

To design new coordination between protective devices, S.C analysis is needed. The purpose of short circuit analysis is to adjust the delay time of the backup relay curve at S.C current of main protection relay curve to achieve correct back up protection. After adding DG, S.C level is increased and new setting for all network relays is shown in table5 and its TCC curves is shown in fig.5.

After Adding DG			
ID	Load Current	Pick up Current	Time Dial
Relay1	.....	150 A	7.4
Relay2	450 A	630 A	0.08
Relay3	450 A	630 A	0.08
Relay4	450 A	630 A	0.08
Relay5	490 A	686 A	0.11
Relay6	490 A	686 A	0.17
Relay7	475 A	665 A	0.1
Relay8	475 A	665 A	0.1

Table 5. Relay Setting of the Network With DG

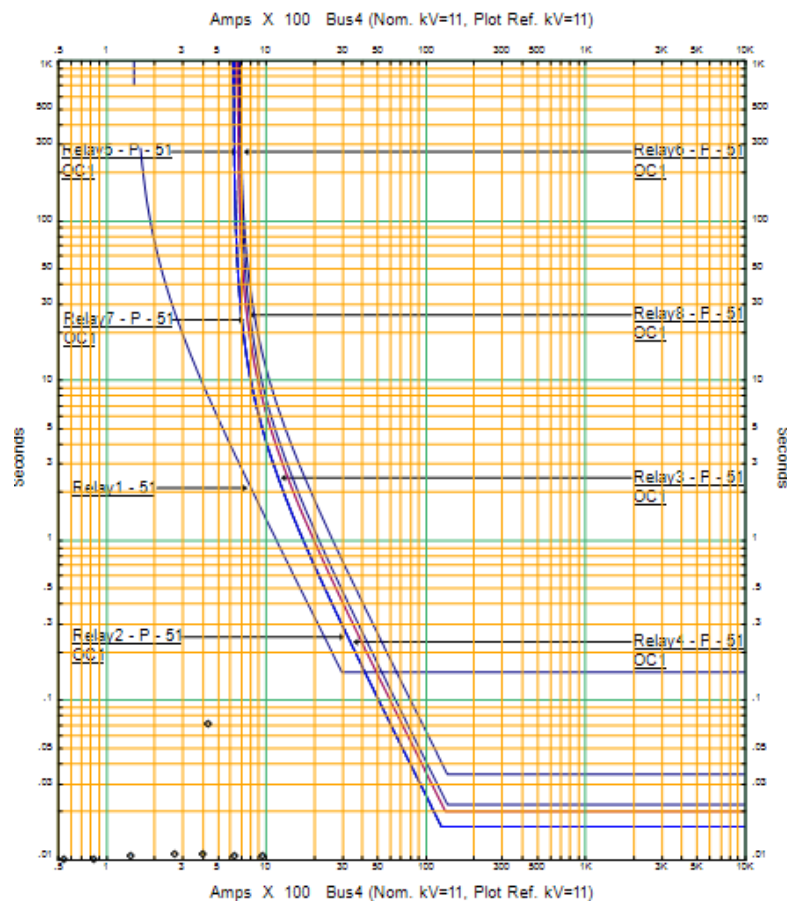


Figure 5. TCC Curves according to Setting of table5

3. Results and Discussions

3.1 Coordination Study of the Distribution Network without DG

Before inserting DGs to feeders 16 and 17, the actual tripping of all network relays is shown in table 6. Table 6 shows eight case studies due to three phase fault. Table 6 shows the main and back up protection relays with their trip times for each case study under the relay setting of table 3 and fig. 2.

Fault Location	Actual Tripping of all Relays at Full Load due to Three Phase Fault				
	Primary Protection	Fault Current	Trip Time of Primary Protection	Back up Protection	Trip Time of Buck up Protection
Transformer	Relay1	.....	50 ms	Relay1	146 ms
Relay2 Zone	Relay2	28.985 kA	16 ms	Relay1	50 ms
Relay3 Zone	Relay3	28.985 kA	16 ms	Relay1	50 ms
Relay4 Zone	Relay4	28.985 kA	16 ms	Relay1	50 ms
Relay5 Zone	Relay5	28.757 kA	22.1 ms	Relay1	50 ms
Relay6 Zone	Relay6	28.757 kA	22.1 ms	Relay1	50 ms
Relay7 Zone	Relay7	28.842 kA	18 ms	Relay1	50 ms
Relay8 Zone	Relay8	28.842 kA	18 ms	Relay1	50 ms

Table 6. Actual Tripping of the Network Relays without DG at Full Load due to Three Phase Fault

From table6, before adding the DGs to the network, the fault currents in between 28.757kA and 28.985kA. And the main protective relay of feeder make trip time in between 0.8 cycle and 1.1 cycles and the back up protective relay make trip at 2.5 cycles, hence, this means fast response from protective relays to fault.

3.2 Coordination Study of the Distribution Network with DG

After inserting DGs to feeders16 and 17, the actual tripping of all network relays is shown in table7. Table7 shows eight case studies due to three phase fault. Table7 shows the main and back up protection relays with their trip times for each case study under the relay setting of table5 and fig.5.

New Coordination After Adding DG					
Fault Location	Actual Tripping of all Relays at Full Load due to Three Phase Fault				
	Primary Protection	Fault Current	Trip Time of Primary Protection	Back up Protection	Trip Time of Buck up Protection
Transformer	Relay1	.....	50 ms	.....	.....
Relay2 Zone	Relay2	39.661 kA	16 ms	Relay1	50 ms
Relay3 Zone	Relay3	39.661 kA	16 ms	Relay1	50 ms
Relay4 Zone	Relay4	39.661 kA	16 ms	Relay1	50 ms
Relay5 Zone	Relay5	35.539 kA	22.1 ms	Relay1	50 ms
Relay6 Zone	Relay6	32.65 kA	34.1 ms	Relay1	50 ms
Relay7 Zone	Relay7	39.518 kA	20.1 ms	Relay1	50 ms
Relay8 Zone	Relay8	39.518 kA	20.1 ms	Relay1	50 ms

Table 7. Actual Tripping of the Network Relays with DG at Full Load due to Three Phase Fault

From table7, After adding the DGs to the network, the fault currents in between 32.65kA and 39.66kA, this means the short circuit level is increased due to DG insertion, hence, the coordination is changed due to increased short circuit amount. Also, from the results, the main protective relay of feeder make trip time in between 0.8 cycle and 1.7 cycles and the back up protective relay make trip at 2.5 cycles, hence, this means fast response from protective relays to fault.

3.3 The Adaptive Setting of the Network

From the two-above analysis before and after adding the DGs to the network, there are two setting of the network relays. The first setting of relays before connecting DG is shown in fig.2 and the second setting of relays after inserting DG is shown in fig.5. If the network is operated without DG, the first setting of relays should be adjusted. And if the network is operated with DG, the first setting of relays should be turned into the second setting of relays to achieve the correct coordination before and after adding DGs. From the mentioned results, this approach doesn't need any additional cost or additional equipment.

4. Conclusions

This paper presents a study for the effect of adding the distributed generators (DGs) on coordination of protective devices of a real radial system of 66kV utility substation. Also, this paper introduces an approach to overcome this effect. The proposed approach depends on updating the setting of all network relays after DG insertion to achieve correct coordination. Also, the proposed approach is tested using ETAP program and the results show a correct coordination between all protective devices before and after adding DG to the network.

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Home-Work Management and Social Behavior Development

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Abstract

Persons who work for firms together with their family members make up the society in which corporate entities operate. The traditional African society enjoyed relative peace and tranquility as well as a relatively low crime rate. However, the current apparently perturbing exhibition of undesirable behaviours in the Nigerian society calls for intervention by responsible corporate citizens to look into the social and emotional malaise and retool their internal policies and programmes to counteract any external threat such a menace may pose. This paper is a workplace approach to mitigating contemporary socio-behavioural ills through the management of Home-role and Work- role balance of employees for the socio-behavioural wellbeing of the society. It is an attempt at triggering new capacities in firms towards rethinking their Corporate Social Responsibility stance by embarking on viable workplace grown solutions to societal challenges and for the Nigeria to have a renewed hope for socio-cultural regeneration.

Keywords: behaviour, corporate, home, management, Nigeria, responsibility, social, work.

1. Introduction

Africa is a continent known for her rich cultural heritage. The closely knit nature of the communities makes it possible for one person to be related to everybody else even if there may be no known blood of family ties. The sense of brotherhood and hospitality were some of the cardinal values of an indigenous African man (Ezenweke&Nwadiolor, 2013; Olasupo, Oladeji, &Ijeoma, 2017). The traditional community settings were such that each person watched out for the other, adult's nurtured the young and economic and social activities were done for the benefit of all. Family and leadership roles were done with dexterity for the general peace, tranquility and betterment of the communities. Most individuals were involved in the traditional family occupations of farming, fishing, hunting, trading, cloth dying and weaving and so on (Bassey, Ojua, Archibong, & Bassey, 2012). Everyone at every age was expected to have a sense of responsibility to perform certain tasks and fulfill their moral obligations within the ambits of the social and cultural norms for the general good of all in the family and society. However, what is currently witnessed seems to be a *faux pas* of some sort.

The times are changing and will continue to do so bringing up new issues to deal with. These emergent social challenges which are impacting on the development of societies may also have implications for

Africa, the World's second largest and second most populous continent. Scholars have identified high dependency rate, low per capita income, unwanted pregnancy, general disorder, drug abuse, juvenile delinquency, youth violence and moral decadence among the contemporary Social Problems affecting National Development in Africa (George & Ukpong, 2013; Kufakurinani & Mwatwara, 2017). Modern corporate entities have come to stay and have changed the way people live their lives in societies. As more persons take up professional careers in the firms, the need for the balance of the home and work roles and responsibilities of individuals becomes more imperative. Men and women taking up employment in corporate firms come from homes and are part of societies. They expend considerable time and energies to maximize the productive capacities of their firms. The firms on their part are obliged to adequately remunerate the employees and make the workplace conducive for them work.

However, Nweze(2004) has noted that the family remains the most significant and enduring human group, providing social and emotional relationship and support to its members. Firms expect employees to tilt their allegiance to their work and apparently do not give adequate attention to the home-roles and responsibilities of the employees nor do they realize the societal implications of the management of home-roles. The bulk of research in the balance of home and work aspects of workers lives focused on how the balance or imbalance affects individual workers (Delecta, 2011). This paper is aimed at advocating that firms, as part of their corporate social responsibility, should add value to the society by meeting the social and emotional needs of family members and dependants of their employees through the management of their employee's lives within and, more especially, outside the workplace.

2. Literature Review

In the understanding and prediction of human behaviour, there is a need to look into the social and emotional demands of individuals. As a theory of socio-emotional development, this work draws heavily from the Attachment Theory (Bowlby 1988). The theory states that a strong emotional and physical attachment to at least one primary caregiver is critical to personal development. Four different attachment classifications have been identified: secure attachment which occurs when children feel they can rely on their caregivers to attend to their needs of proximity, emotional support and protection; Anxious-avoidant attachment occurs when the infant avoids their parents; Anxious-ambivalent attachment occurs when the infant feels separation anxiety when separated from the caregiver and does not feel reassured when the caregiver returns to the infant; Disorganized attachment occurs when there is a lack of attachment behaviour (Ainsworth & Bell, 1970; Main & Solomon, 1990). The Attachment Theory hypothesized that secure attachment is considered to be the most desirable state, the most prevalent and the most advantageous attachment style. Van IJzendoorn & Sagi-Schwartz (2008) believe that maternal sensitivity influences infant attachment patterns and that specific infant attachments predict later social and cognitive competence. The Principles of attachment theory have been used to explain adult social behaviours (Milanov, Rubin & Paolini, 2013) marital separation (Weiss, 1977) as well as in middle-aged siblings and their elderly parents (Volkman, 2006). The theory was also included in studies on neural development, behavior genetics, temperament as well as in understanding and treating child and family disorders

(Vaughn, Bost, & Van Ijzendoorn, 2008; Landers & Sullivan (2012). Parental attention and affection are therefore apparent in the prevention of maladapted and delinquent children as well as depressed spouses and other adult family members.

The theory of Bounded Emotionality (Mumby and Putnam, 1992) was another theory upon which this work hinged. Impersonality and restraints on emotional expression at work have been the order of day in many workplaces (Weber, 1981). However, The Bounded emotionality creates a strong sense of community among its members and help to deal with how employers and employees handle a range of emotions that emanate from the work itself, or are brought into work situations from an employee's home life (Martin, Knopoff & Beckman, 1998). Bounded Emotionality boosts the psychological well-being of organisational members and their families (Mumby and Putnam, 1992). Firms operating in Nigeria are likely to have employees with family members from diverse ethnicity, cultures, languages and the nature of the behavioural exhibitions of the persons are also likely to be many and varied and of all types of possibilities. , Without unwarranted intrusion in the private lives of employees, firms, by adopting the theory of bounded emotionality, may reduce the restraints on emotional expression at work, create avenues to seek help reduce stress occasioned by home roles and impact positively on the work roles.

2.1 Home-Role Management

Home –Role Management is a firms deliberate involvement in the lives of individual employees to ensure that individuals are enabled to fulfill their obligations to their families outside the workplace. Home-role management focuses the individual employee's life outside the workplace. The adopted management strategies and methodologies should be such that each employee plays his/her roles in the family. The traditional home- roles of men and women include specific responsibilities and obligations. Delecta (2011) highlighted house chores, child care, self-care, care for spouse and dependant elderly relatives as some of the family responsibilities of individuals. As a Home-Role Management strategy, a firm could adjust the work schedule of an employee to allow for time-off to care for a physically or mentally ill family member either to help in recuperation or preventing a relapse. An uncared-for pregnant wife, for example, who takes to alcoholism, apart from potential damage to her vital organs may likely be faced with the attendant risk of fetal alcohol spectrum disorders or any other fetal alcohol syndrome with the resultant mental retardation and adverse problems or any other neonatal, childhood, adolescent mental disorders (Mead & Sarkar, 2014). Nwigbo & Imoh-Ita (2016) has linked unemployment to high crime rates. Dismissing a good employee from an organisation because of his/her inability to handle home- role issues which may adversely affect work-roles, make the unemployed person take to crime or any other detrimental addictive behaviour which will be a further menace to the society.

The family unit is a microcosm of society. Nweze (2004) opined that the family is an important institution for the development of the individual, the society and Nation at large. The home issues of employees are rarely discussed, often neglected neither are there deliberate organisational policies to address the ever present issues.

This may not be unconnected with the belief that firms are not responsible for what happens to employees outside the workplace and that anybody coming to work should make their careers the focus of their lives (Mao, Chen, & Hsieh, 2009). Be that as it may, the African societal norms makes it obligatory for its members to be responsible for those around them and these employees come from families and are part of communities and societies. Thus, be it desirable or not, employees have the home-role to act responsibly in the eyes of the society and more so, to their family members.

2.2 Work-Role Management

Organisations desire that their employees continuously improve on their performance at work and use all available strategies and policies to ensure sustained competitive advantage. Katz and Kahn (1966) opined that every role, especially at the workplace is basically a set of behavioural expectations. Work-role Management is a firm's effort at ensuring that the specific workplace tasks, duties, obligations and other job responsibilities of employees, including those spelt out by the psychological contract, are adeptly carried out. Firms expect an employee to play the roles of a diligent and committed worker as well as a number of other intertwined and interrelated roles with blurred lines of demarcations that when played, makes the fortunes of the organisation better. Employee commitment, has been defined as the employee's identification with the values, goals and principles of the hiring organisation, a true desire to belong and remain within the organisation and to try and an endeavour on the organisation's behalf (Armstrong, 2007). Meyer & Allen (1997) proposed that organisational commitment is experienced by the employee as three thinking sets encompassing affective, normative, and continuance organisational commitment. Affective Commitment is an employee's feeling of loyalty to a firm. In this case the employee believes in the organisation and is highly involved in and is emotionally attached to the firm. Normative Commitment is a case where the employee feels the obligation to remain with the firm. There is a show of loyalty and duty as well as a feeling of indebtedness and reciprocity to a firm that 'took him/her in'. Continuance Commitment is a situation that occurs as a result of perceived economic and social cost associated with leaving. The employee feels that he/she has to stay with the company because of the enormous costs of leaving. Darolia, Darolia & Kumari, (2010) examined Employee Commitment with regards to career, union and profession. Meyer & Maltin (2010) concluded that affective, normative, and continuance employee commitment components have been negatively correlated to turnover, absenteeism and tardiness of employees within organisations. Employees who are engaged in their work and committed to their organisations give companies crucial competitive advantages - including higher productivity and lower employee turnover (Vance, 2006). Engagement, attachment, loyalty and belief in organisational values are all concepts that have increasingly gathered acceptance as a description of employee commitment (Mullins, 2010). Firms also expect an employee's punctuality, altruism, organisational citizenship behaviour. An employee with serious home and work role conflict which is more inclined to the home – role will not have time to show organisational citizenship behaviour and may not also fair well in interpersonal harmony and the employee's productivity in terms of product /service output. Employee involvement (EI) is another vital role firms expect of their workers. Employee involvement has been seen as the process concerned with participation and empowerment of employees so as to use their inputs in order to achieve higher

individual and organisational performance (Odero and Makori, 2017). Sofijanov&ZabijakinChatleska, (2013) opined that Involvement refers to the employee participation in decision making, problem solving and increased autonomy in work processes. There is increasing evidence indicating that employee Engagement and Organisational Commitment enhance corporate performance (Cheche,Muathe&Maina, 2017). It has been observed that employee involvement in decisions makes firms effective and efficient in the performance of their vital roles. (Kuye&Sulaimon(2011). However, workaholism is an employee's excessive work involvement, a very high drive to work, and a lack of work enjoyment (Aziz &Zickar, 2006). Being a workaholic is an addiction and workaholics have a psychological need to work that is detrimental to themselves and others. Apart from the health challenges that workaholics face, they tend to neglect their families, friends, relations and social responsibilities (Khan & Shah,2016 ; Molino, Cortese& Ghislieri,2018).Workaholics tend to have a poor work-life balance and low life-satisfaction as they tend to put their work before anything else in their lives (Matuska,2010).

2.3 SOCIAL BEHAVIOUR DEVELOPMENT

Behavioural development, being looked at here as the series of patterns behaviours follow, which may take a number of forms and could start at any stage in life depending on the causative factors. Gaik, Abdullah, Elias &Uli,2010) observed family relations, particularly, parent- child attach as a determinant in the development of antisocial behaviour among adolescents. Evolutionary psychologists believe that prosocial behavioural tendencies are passed from generation to generation (Barrett,2002) It is also believed that prosocial behaviour starts early in a child's life and continues in life a children gain a moral understanding of their world (Parke, Gauvain&Schmuckler, 2010)

Many working persons adopt the philosophy of either "working to live" or "living to work" (Delecta, 2011). Whatever be the case, people are expected to work and live with family members and with members of the community around them. Gaik, et al. (2010) has linked the development of antisocial behaviour among adolescents with poor family relations, especially poor parent –child attachment and insecure attachment which is associated with parental negativity and rejection. Antisocial behaviours which are openly expressed as aggression, disruptiveness, assault, vandalism, theft, robbery and other acts of violence are externalizing behaviours while the more subtle but equally negative behaviours such as depression, anxiety, isolation and social withdrawal are internalizing behaviours. (Bauminger, Solomon & Rogers,2010).

Antisocial behaviours in childhood and adolescence are seen as behavioural disorders. It is believed that delinquent behaviours in children have the potentials of causing failure in academics and impairing socio-emotional development that could lead to adult crimes(Moffitt, 2018).Antisocial behaviours like prosocial behaviours begin early in life and often continues into adolescence and adulthood(Toseeb, Pickles, Durkin, Botting, & Conti-Ramsden,2017; Park, Lee, Sun, Vazsonyi,& Bolland,2010). Many factors have been linked to the development of antisocial behaviours, Chief among them are the personal characteristics of the child, peers and family background (Javdani, Sadeh, & Verona, 2011).). The family background, which may also be called the home factor, plays a vital role in the socio-behavioural development in a person.

CoxJr, Criss, Harrist, & Zapata-Roblyer(2017) identified certain antisocial behaviour causal factors in a person's family background to include antisocial parents, parents who are drug addicts and alcoholics or suffering from depression; family poverty, marital problems, large family size, history of family violence, criminality of parents, psychiatric disorder of parents, employment changes, divorce, poor parental practices, urban residence, disorganized and high crime neighbourhood amongst others. Thus, making Family background and environment strongly associated with aggressive behaviours among children. Parental supervision and monitoring practices have been linked to adolescent delinquent behaviours and deviant peer associations (Hinnant, Erath, Tu, & El-Sheikh, 2016). Aguilar, Sroufe, & Carlson (2000) linked Socio-economic status of parents and antisocial and aggressive behaviour. The developments of prosocial and antisocial behaviours have their basic foundations in families with poor parenting predicting antisocial behaviours. A family background built on positive attachment could be to serve as a barrier to delinquency (Gaik et al.,2010).

2.4 The Need for Intervention through Corporate Social Responsibility

Extant Literature on corporate social responsibility (CSR) indicates that diverse schools of thought have emerged in the debate. One group believes that CSR should be mainly used as a social endeavour and the other thinks it should be linked to the corporate financial performance strategy (Medis, Yong, ,Khatibi & Ferdous -Azam, 2016).Windsor (2019) has proposed that an enterprise approach to corporate social responsibility (CSR) should be seen as voluntary. However, this work posits that firms may as a social endeavour , voluntarily compel themselves to contribute to society through deliberate firm grown policies and programmes. No organisation, private or public, however big or strong will be able to thrive in a society bedeviled with violence, crisis and criminality. The culture of respect, politeness, courtesy, hospitality, and good neighbourliness seem to be fast eroding and are being replaced by fear, insecurity, crisis, violence, drug addiction prevalence, criminality of all sorts, tactlessness and errors in etiquette. Firms should take a cue from the African socio-cultural tenets of brotherhood and good neighbourliness to be a good brother and neighbour to attenuate societal ordeals.

The working parents may be trying their best but apparently seem not to be doing enough to care for children, spouses and other dependants. High cases of sadness, depression, suicidal tendencies which have the potentials of making children and spouses to find solace in behaviours such a drug abuse ,alcoholism or in other addictive, risky and dangerous habits and behaviours all of which are detrimental to the social wellbeing of the society may be due to perceived children and spousal neglect as well as physical and emotional absence.

An employee whose home-work roles are not properly managed is susceptible to physical and mental health issues. (Maulik, 2017; Woo, &Postolache, 2008). The stress that comes from home-work roles overload could be enormous and overwhelming. An employee who does not prevent any of the addictive, risky and dangerous habits and behaviours of their family members by properly handling their home roles and responsibilities, such an employee will still have to take care of the addiction of the child or spouse while working. This situation could degenerate to the extent of causing distractions, anxiety, worry, accidents, or other behavioural misdemeanors at the workplace. Home-roles affect work-roles and vice

versa, thus, the need for the proper management of home-work roles. Should firms succeed in this bid to properly manage home-work roles, then they would have contributed to societal wellbeing.

3. Conclusion

Many organisations do not have policies and programmes on corporate social responsibility, in the direction of home-work management, which are society-centric. The organisations cannot live in isolation from their environment. Firm's dormant and docile stance in any aspect of home-work management is tantamount to waiting for a ticking time bomb waiting to explode on the faces of all onlookers. Firms cannot afford to stand and stare. The time has come for firms not only to take home- roles as important as the work- roles of their employees' health and wellbeing but also help to curb the menace which dysfunctional homes may have on society.

This work has significant implications for research and practice in that it contributes to closing the gap in the social behaviour development discourse as well as in advancing workplace grown interventions to societal issues using corporate social responsibility as a veritable tool.

4. Recommendations

Firms should see the balancing of home and work roles of employees as part of their responsibilities and draw from the recommendations of this work to enhance their Corporate Social Responsibility templates by enacting deliberate policies and programmes to help the society to come out of the current socio-behavioural quagmire. The recommendations are as follow:

4.1. Home –Role Overload Busters: Many employees, inadvertently or as a deliberate mistake, overload and overburden themselves with too many home roles, activities and responsibilities. As a home –role Management strategy, firms should bust the role overload by deliberately educating employees, and perhaps occasionally, family members, on certain seemingly private home issues like personal time management, thrift and savings, family planning, moral instructions covering honesty, transparency and civics.

4.2. Work –Role Load Regulation: -Firms design jobs and expect their employees to deliver on the job role expectations. However, in the scheduling of work and relocation of duties outside a given geographical location, family members of employees should be carefully considered. Also, the tasks, duties and work role expectations of employees should be such that there is no work-role overload and allow employees adequately perform their home roles and responsibilities.

4.3. Home Background Investigation. Firms should from time to time investigate and get information on employee's home life issues and the home backgrounds of persons with issues with their work roles should be investigated to find out and solve, where necessary, any underlying home-role issues.

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Ecological Family Agriculture Held in Remígio, PB, Brazil: A Case Study on Production of Knowledge and Innovation

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Abstract

This article describes, identify and analyze the social and technological, innovation and the production of knowledge among the family farmers syndicated in the municipality of Remígio, Paraíba's State, located in the Brazilian semi-arid and belonging to the so-called Polo da Borborema - a network of labour unions and rural workers. The said Polo has been practising innovation in ecological-based agriculture and with an emphasis on existing social relations, knowledge and local expertise. Thus, the case study and the qualitative approach were chosen. The collection of the data was carried out through a half-structured interview with farmers. The main results indicate that ecological agriculture practiced in the municipality of Remígio is an advanced process of local and private development. The local and particular aspect refers to the important feature that is the aspect of providing innovation from the experimentation and the necessity of each farmer, respecting their particularity and knowing. This process of producing knowledge and innovations is mainly based on the reflexive practice and the contextualization of knowledge through daily and informal processes of innovation. As important innovations that arise through these processes, there were several techniques and actions deployed, such as seed bank, solidarity rotary funds, among others, that take on innovative role, awareness and the growing change in Thought of the farmers. Some of these innovations are set up as "novelties", since they are based on external models. It is concluded by reaffirming the rich process of innovations and knowledge produced by these ecological farmers in communion with their old acquaintances allied to those brought by the Polo da Borborema, reaffirming and valuing the identities of these farmers.

Keywords: Innovation, production of knowledge, social inclusion.

1. INTRODUCTION

Nowadays, it becomes vital to understand that from the possession of the knowledges, innovations emerge, acquired, often, with the character of "novelties" in the constructive processes. This is because, innovation and knowledge production, can be associated, interconnected and indispensable in any system, be it scientific, dynamic, intercultural, experimental or technological, since the walk of innovation is completely dependent on the persistent search and application of new knowledge.

It is important to consider knowledge not only by the scientific character, but as the first case, the enjoyment and also the practice of rational and perceptual resources by the individual. These being, captivated by the "tracjo" and/or by formal learning.

The singular exercise of knowledge production and, due to the creation of new resources, can be called innovative activity (or innovation), this being an activity of which results, more or less susceptible, are comprehensible in the format of Inventions or innovations [1].

Innovation has been a design of dissimilar models of organizations, with this, in each reality, the aspects should be observed with the purpose of boosting it or extinguishing the barriers that can intrude it. It alluded to a complex construct, with different dimensions, conceptions and contexts of application that, consequently, is inferred from various theoretical approaches in several fields of knowledge, branches of activity and industrial sectors [2].

Innovations generally arise as a consequence of the antagonistic conditions of lack of work and opportunities, whether by the market or another factor, constituting a social insertion tool, which aims to construct new modalities of Development, related to a sustainable production technical basis.

Introduced in a modern conjuncture, the rationale for innovation in agriculture concludes two elementary and correlated aspects. Firstly, a view that the transformation, or modernization in agriculture, should be conditioned to modifications in the elements of production, that is, usual elements have been replaced by modern, such as inputs and machines. Secondly, a linear idealization where innovations and knowledge and innovations are elaborated extrinsically and pierced to productive spheres.

In many countries, the institutionalization of knowledge production and innovation has occurred in agriculture, in waiting for projects and policies to modernise the sector. Through a powerful integration and an interventional policy coordinated by the State, in the general at national level, from public research, teaching and extension bodies, agriculture has been modernized and integrated into developmental projects in developing countries economies [3].

Despite the public and private efforts to modernise the modernization in the rural world and agricultural production, it is possible to affirm the existence of enormous diversity in the ways of farming and producing knowledge and innovations in agriculture [4].

This diversity is configured as a result of the active role that farmers can take in the production processes, through the knowledge they accumulate and the decisions they make that are consistent with the capacity for peasant resistance. In this framework in various parts of the country and the world, farmers plan and conceive alternative pathways to those induced by modernizing policies [5].

Such pluralities give rise to the movements of contrariness to the agricultural developmentalist model introduced in Brazil (with greater strength between the 1970-1980 decades), where they direct their criticism to the social impacts of the agricultural model, contradicting some Dilemmas, such as the exorbitant concentration of land tenure and the riches conceived, the impetuous processes of displacement to large cities in industrialization process and the exacerbation of the dissimilarities between regions of the country.

It is in the nucleus of this movement of socio-environmental deniation that the first practices of alternative farming become rooted in Brazil-what later, in the years 90, would depart from the initial conceptual idea of alternative farming to be called Agroecology and agroecological transition.

In this sense, this study analyzes the experiences experienced by the family farmers of Paraíba, since, punctually in this expressive moment of resistance, it was built an identity of peasant farming, unions,

associations Community, pastoral services and support organizations for farmers, building a web that establishes support for new technical, organizational and political intervention standards for the strengthening of family farming. In view of this context, in the beginning of the years 1990, it was born through the action of three unions of rural workers with advice of "advisory and services to projects in alternative agriculture (AS-PTA)" With the challenge of connecting agendas to fight the reality and Concrete motivations of the large and diversified family farming of the territory. What would later provide the political conditions for the emergence of the Union Polo and the Borborema family farming organizations.

The creation of the Polo da Borborema is intertwining with the history of ecological farmers in the municipality of Remígio, this is due to the articulation of the rural workers ' unions of Remígio, Solânea and Lagoa Seca that begin the work creating political conditions and social services for the birth of the Borborema Union pole.

The Remígio's Syndicate, originated in 1962, was recognized in 1967 and dismembered in 1973, it was in its essence quite assistentialist, it worked more like a medical outpatient clinic than a union. In 1992, however, a new union model begins to be traced, young people from different denominations such as the MST, pastoral services, support organizations and others, interested in making a new union model, which was community as never had in Remígio and Motivated by the ideal of making a community union properly, using as an example/dream of Xapuri de Chico Mendes, began to engage in the struggle for the reform of the outdated union model that Remígio fit, establishing new molds Technical, organizational and political interference. The work was not easy, the communities did not understand the Union

Going to them and resisted this presence very much, was when the AS-PTA (advisory and services to projects in alternative agriculture) began to do a work in the region, at first in Remígio and Solânea, through a participatory rapid diagnosis (DRP) that Reflected agriculture within the property, seeking to better understand agriculture and the role of Union intervention in experiences, with dissemination, experimentation, even in generating public policies that could be charged.

It was the as-PTA that already advised and built a work together with Polo who aroused in Remígio the idea of agroecology. Little was understood of alternative technology, at the time, and even the family farming was quite "mixed", it was difficult this understanding between the ecological alternative and still understand that, for example, "had to have poison to ant, because nobody Fought the ant, it was not understood that the environmental imbalance that led the ants to have a larger population than the predator of it ", the understanding of alternative technology was that it would be more accessible to families, but it properly dictates, this because So far the idea of ecological farming that had been developed by the farmers themselves.

In 1996, Lagoa Seca also made the diagnosis supported by the union of Remígio, so it was also creating the idea of the articulation of the Semiarid Paraíba (ASA), headquartered in Campina Grande and in 1996, the Union Polo of Borborema, already with expressive visibility and Works with seeds, arborization within the swidging, planting techniques, animal silage and even with all these actions, there was a political crisis in the Union, between Presidentialism and community unionism, facing difficulties in the implementation

Of this community union idea. From 1995 onwards, the Union is now integrated by men and women, developing work with children and youth.

In 2006, thanks to the performance of the Polo, the Agroecological Fair of Remígio was initiated-it has the community character, gathering monthly (example in the region)-is a fair that makes seminars of management, production, exchange visit, among others.

Considering the initial resistance of the farmers, it is paramount to emphasize the intense social dynamics of experimentation of innovations and the production of knowledge that was spreading, by the Polo, through a process of collective learning coming from the Rescue and revaluation of the knowledge on the management of local agroecosystems, as well as the reconstruction of new measures aimed at resolving the problems and daily challenges of the agricultural families of the Polo da Borborema territory, in a way Especially those of the municipality of Remígio, Paraíba.

In this context, it is of the utmost relevance to redeem the history of Polo, to know and analyze the achievements achieved by these family farmers and to know how the acquisition and production of knowledge and technological innovation are being implemented, Through access or not to public policies, providing environmentally friendly farmers with innovations in the productive, economic and social sectors, as well as by introducing these farmers into a dynamic, organized, collective and sustainable farming, in addition To generate social, economic, productive, political inclusion, and knowledge of the field, produced by them in their production systems, in the exchange of experiences, in individual and collective experiences.

Structurally, the article is divided into five sections. One is this introduction, which situates the reader in the history of the region and in the context of the research. Following is a brief review of the literature on innovation and knowledge production. This part is followed by the section of the methodology where there are also some delineations of this research and presentation of the study area. The fourth section is the results and discussion. Lastly, in the last section, some final considerations are presented.

2. PRODUCTION OF KNOWLEDGE AND INNOVATION: LITERATURE REVIEW

The process of knowledge production considers formal, informal and everyday aspects, as elementary bases for the construction and reproduction of innovation, taking into account historical principles and the sum of this constant process. In this process, the subjects are constantly interacting, firming bonds and constantly altering what transforms them.

The process of composition of knowledge about the world is a collective process and not only individual this because, the concepts generated for its conception were and are elaborated throughout the whole history of mankind by the whole of the social subjects, meaning Thus, that knowledge is historical and social; History, since each new knowledge is an improvement of previous knowledge; and social, since no subject has an entirely new knowledge, so all knowledge is based on previous knowledge, elaborated by other individuals. Thus, "new" knowledge is also socially elaborated [6].

In the perception of Nonaka and Takeuchi [7], human knowledge can be categorized into two species: tacit knowledge and explicit knowledge, the tacit being the one who inhabits the minds of individuals, having a strong connection with practice and being strongly Personnel hardly shared and dependent on the individual personal life story, their mental models and their values; Already explicit knowledge is encrypted, formal, can be simply communicated and shared found in projects and documents, being substantiated in the item itself, the tacit and explicit knowledge are not disaggregated units, but rather paid.

On the other hand, in a particular way, the human condition varies according to the natural circumstances (physical condition, age, health, and sex), Psychic (absorbency, temperance, level of satisfaction) habitual and psychosociological of the subject. Entirely, these variants are able to help the subject operate relatively intensively in the way he intervening about social life, thereby influencing the generation of historical and cultural facts, which are generated, since it is necessary A rational and systematic interpretation of the one that takes on this particular charge in the construction of the educational universe, but especially of the social universe and its history.

According to Terra [8], tacit knowledge is interconnected to the innovation process, since it assumes the purposes of identifying and resolving problems, from the smallest to the greatest clash and finally precipitation and prediction.

In this set, knowledge is, therefore, a theoretical practical way of understanding the world, of men and of things, refers to a tool for understanding the relationships of the subjects between themselves and them with the environment in which they live in various, varied and detailed dimensions. Since knowledge is the central utensil of the consummation of human beings as humans, since it operationalizes them to think and act more consciously about the world, their social practice, research, is a complex task that takes place at all times of Human life, leading us to conclude that research is to generate knowledge for action [9].

Relating knowledge to a very dependent area and based on an evolutionary vision [10].

In recent decades, summarizing the expression "knowledge-based economy", committed to describing the tendency to increasing dependence on information, knowledge and skills, in most countries of advanced economies [11]. View of other spheres, in an empirical sphere, the production of knowledge, integrates several actions based on a systematic effort directly related to the generation, absorption, diffusion, progress and employment of knowledge and techniques, including several Activities interconnected in the process, such as research, systematization of experiences, production of techniques, both in the productive bias, as active, the development of processes and products and research.

The concept "innovation" has been applied in a wide variety of definitions, being often confused with "novelty". Concisely, some considerations are pertinent in this feeling, reflecting that innovation is the successful exploitation of new ideas, that is, a new fusion of knowledge to produce something "new" is an innovation, however a new knowledge Not only use value but also exchange. Santos [12], historically, divide innovation and its cycle into three phases: the first of them is the invention, existing since the beginning of mankind; the imitation or diffusion, common in the markets of which the economy was grounded by production; And the outsourcing of consumer and innovation products, used as a strategy for economic sustainability of organizations in the 21st century, coming after globalization of the economy

and the possibility to drive the speed of searching for new products, particularity of contemporary dynamics.

For Rogers [13], the path in which innovation develops results in all decisions, activities and their impacts, which happen through the recognition of an obstacle or a shortage, through the sequential adherence of innovation by users. Still completing, the step of "decision making" of the user about innovation is titled the process of Deliberation of innovation, thus being executed in stadiums or steps, such as knowledge, persuasion, decision, implementation and confirmation.

The idea of innovation is conceived as a creation or renewal of something that already exists, coming from observations, studies and persistence, seeking solutions that are simple and practical, to the extent that can be uncomplicatedly understood and accepted by Consumers [14].

Oliveira [15] emphasizes the paramount importance of the trivial difference between invention and innovation, considering that the invention is the technically viable "remedy" of a problem, while innovation is the technical and economically viable "remedy" of problem. Being technically and economically viable, innovation is the invention spontaneously sociabilized and dispersed in society.

Herrera and Ugarte [16] highlight that innovation "Innovation always refers to the set of actions necessary to transform a particular situation, which includes from the redesign of processes to the development of new capacities, since all innovation assumes a new competence. (...) A new way to do things, to organize to face the vulnerability".

Depending on the type of innovation, but because it does not say the context in which it is being employed, it is possible to classify different types of innovation succinctly, including three main flags, the problems, constraints and opportunities.

It may be formal or informal, the innovative activity assumes two different characters, being formal, in which the exercise of innovation is carried out in exclusive environments and in formal institutions, for example, in scientific laboratories and in Research and development departments. In the informal innovation, the problem-solving manager encourages finding a solution within the norms that it suits him, making use of his knowledge and fertilizing them with the issue.

The incumbencies based on innovation are indispensable for the maintenance of economic development in the capitalist system, inserting the modification of living standards and the creation of new technologies [17]. It is relevant to understand that, generally, innovations arise as a consequence of the antagonistic conditions of lack of work and opportunities, either by the market or by another factor, constituting a social insertion tool, which aims at the construction of new development modalities. Notoriously, they are based on innovations that derive from genius, vocation or aptitude, however, the preponderance of innovations, are given as a result of a rational, intelligent and premeditated search for opportunities to innovate.

Triumphing in the construction of a new paradigm capable of overcoming the difficulty and accepting the plurality of the scientific and technological field is an "always innovative and constructive challenge" for scientific and technological competences, this is because one must recognize the role of the companies/actors in creating the opportunities and activities of research and development, as well as on the role and personal commitment of each member, so that a new impetus for innovation can be printed and

facilitate the adaptation of the sector productive to the challenges imposed by globalization through the diffusion, adequacy and use of new processes, forms of organization, services and products.

In view of this brief theoretical framework, we have to describe how innovation and knowledge production are given in the field of study. Before, however, it is necessary to present the methodology and procedures adopted.

3. METHODOLOGY AND PROCEDURES

Methodologically, we opted for the case study, in order to gather detailed and systematic information on the subject: Production of knowledge and innovation and qualitative approach in data analysis.

For the collection of secondary data, we accessed government databases and the unions in question, trade union leaflets, booklets, among others.

For the collection of primary data, the instrument used was a semi-structured interview script and participant observation-with the use of a field diary. In advance, through the pre-test of the interview, the interviewees were chosen, identifying the subjects of research analysis according to the objectives that guide this dissertation, we chose to work with different family units, which were in different locations in the design of the territorial area, taking into account the particular characteristics of occupation and fixation in that environment, included here the historical context, as well as its trajectory in agriculture.

Thus, interviews and participant observation were conducted with representatives of families of ecological unionized farmers. A total of 20 interviews were conducted. The interviews were recorded and subsequently transcribed. In addition to the interviews, technical materials (leaflets and bulletins) produced from the ecological agriculture of Remígio were collected.

The municipality of Remígio is located in the mesoregion of semi-arid and in the western Curimataú microregion, it has a territorial area of 178.1 km² with a demographic density of 98.77 inhabitants/km².

4. RESULTS AND DISCUSSION

The use of the expression agroecological agriculture in this work referred to the realities studied, which compose a set of productive practices and social relations that in an interrelated way construct the design of an agriculture that prioritizes the values Environmental impacts in agricultural production. For better understanding and visibility the agriculture of Remígio/PB is not only based on the elimination of pesticides, high solubility chemical fertilizers and genetically modified organisms, but, it is a progress and a change of posture that goes much, in addition Of this, because the political, cultural, social and economic aspects that subsist agroecological practices are valued.

This frequent use of expression roots a specific and local character of the path of construction of agroecological agriculture in this reality. The result of the capacity of the "spreading seeds", of the pioneers in acting and hitting the front with the strong trends and concepts given to the development, especially by the modernizing bias of agriculture, thus emerging a new sociotechnical proposal.

This considering that this new socio-technical proposal encompasses among many things, the synthesis of the dialogue between ideas and ideals added and constructed in the most varied spaces by the technicians

and also by the farmers who share the same ideal, the search unceasingly of strategies, knowledge through practice with agricultural families and the sum with partners involved in the construction of new socio-technical and productive alternatives which allow them the identity of agroecological farmers/ That is manifested locally through their discourses.

Organized in different thematic areas (water resources, agro-biodiversity, animal husbandry, health and food, ecological crops and commercialization), the Polo da Borborema builds the work in the form of agroecological innovation networks that articulate More than 8000 agricultural families from the Borborema territory.

Historically, the Polo occupies the territory of Borborema, a prominent presence as it resumes and updates a long tradition of social resistances that have been structured as active responses to adverse political and economic conjuncture of agriculture Peasant.

Recognizing the agrarian history of the Territory of action of the Borborema is to reaffirm a completely extreme "before and after" in the lives of so many farmers and in the life of the organizers of this process, since it is possible to identify the evolution of Processes of innovations within the accelerated progressive process of agricultural change, characterized by the multiplication of innovations.

It is valid first of all, to consider that the term knowledge is being treated in this work, such as the admission and performance of the intellectual and sensory capacities by the human being, and may be it, both conquered by experience and learning Formal, as for both. Besides that, as already mentioned in this dissertation, knowledge can both be stacked in the human mind (tacit knowledge), and can be factual, generating a complex of courses and accumulations (coded knowledge).

Learning encompasses the multiple methodologies by which the knowledge and ability to do something are arranged in a process of mastery by individuals and social groups. As explained by Rosenberg [18], learning can be by informal practice (learning in daily work), as well as a formal learning (through schools, internships, trainings, among others).

In this field that integrates the association between the production of knowledge and consequently the generation of new solutions is conceived the activity of innovation or "innovative activity", an activity that results in perceptible solutions in the form of inventions or innovations. Considering more than one innovation is a new aggregation of knowledge in order to manufacture a new one, adding to this new knowledge the value not only of use, but also of exchange.

In a specific way, ecological/agroecological agriculture or the different practices of alternative agricultures are part of a differentiated group for this type of contemplation, because it is coherent to affirm that the degree of institutionalization of the production of knowledge, innovation activity and consequently learning is low, or in some situations, almost unreal. But why does that happen? Most of the time, and in the theoretical/scientific/political debate of the agrarian issue, this category is most often considered as a disadvantaged margin of the technical productive standards and the technological trajectories instituted by the modernization of Agriculture.

This considering how the institutionalization of innovation and the established technological roadmaps were based on parameters that consider the annexation of industrial elements (modern inputs) as substantial the expansion of productivity and Profitability of agriculture.

Nevertheless, even with this historical propensity for standardization and decharacterization of innovative activity, the habitual and informal activity still remains and, in many circumstances, is so or more important than formal activities. Two determinant points of the type of innovative activity that stand out in a given sector or activity can be listed, one point is the level of institutionalization of the innovative activity and the other, the method with which the work is organized in that sector or activity [19].

Based on the theoretical references proposed above, the main innovations and knowledge produced in the ecological agriculture of Remígio/Paraíba are presented here, considering that this process is continuous, which have much added to the Over the years and that this is nothing more than the result of the growing work developed in the form of creative practices and processes of contextualization of exogenous knowledge and practices to agroecological conditions and local knowledge, triggered by the organization of the farmers themselves, in addition to the reorganization proposed by the Borborema Polo in the region. Technical and capable innovations of families reproduce when questioned, both farmers and the diffusers of this new ecological/agroecological based agriculture on how the past was addressing how the participation in the Union and the Polo to develop a more sustainable agriculture, these were consonants to appoint participation in courses, exchange visits, experimentations and other training activities as fundamental in the training process.

According to reports from the interviewees, the junction of the strands that support the work developed in the region is based, above all, on sustainable practices and experimentations that consider sufficient technical elements to think and propose interventions More ecological in the production units of farmers ' families, providing a collective learning process, motivated in the recognition and enhancement of knowledge about local agroecosystems by the farmers themselves. This, taking into account the Polo da Borborema as a political-organizational sphere Consolidator of the set of local development and stimulus of agroecology and not only as a claimant of public policies such as emphasize [20]. Among the various agricultural innovations of agroecological basis are highlighted the practices cited in addition to techniques used, as follow below:

- Community seed Banks

Cultivated and historically saved, the seeds of passion (as are called the Creole Seeds in Paraíba) represent true jewels for the farmer families. With a rich genetic load, these seeds bring in themselves the resistance, adaptation and cultural heritage of several generations that means, among many wonders, the independence of the purchase of seeds every year. Articulated in a network form, the banks of community seeds of Remígio are articulated with more than 70 banks in the territory of the Polo, mobilizing peasant families for the use and conservation of local varieties cultivated in intercropping systems.

Seed banks are forms of community organizations that aspire to the self-sufficiency of a collective in the supply of seeds of certain species, also referring to a fundamental strategy for climate instabilities, the semiarid, Post that guarantees the diversity and quantity of varieties and species chosen for the appropriate planting moment [21].

I consider in this work the community seed banks as innovation due to the fact that some farmers already had the practice of storing seeds in their own homes before the community banks were formed (it was a kind of bank person/ Individual) with the proposal for the improvement of the Polo in the awareness of

farmers making this genetic reserve thinking not only about themselves, but in their neighbor, in their association, in their community, the values of agroecology are born, the principles Work together by the common goal in the pursuit of good for all.

Farmers and agriculturists are the managers themselves, as a lending system, they guarantee farmers a good quality seed for planting at the right time, besides being seeds adapted to local conditions, valuing the tastes and Preferences for each region. The families take a quantity of seeds and assume the commitment to return in the same quantity with a small percentage increase at the time of harvest, so that the banks can always prosper [22]. It is also a commitment of the farmer families to return to the banks a seed in good condition so that there is a guarantee of commitment to work.

- Infrastructures for water harvesting and storage

The dynamics for constructions of thousands of infrastructures focused on the capture and storage of water is also an innovation recognized by both the diffusers of this agroecological agriculture in the municipality of Remígio, and by the farmers, since in Most rural households can find different types of water reservoirs, such as plate cisterns; Pedestrian cisterns, which has ensured a representative water grid that generates as a consequence a personal safety for use and consumption, as well as in productivity;

The semi-arid joint (ASA) has already put into practice several social technologies, whether for family supply or production, however, some have already become governmental programs, as is the case of the plate cisterns to capture water from Rain for human supply, which aroused in the project cisterns of plate, cisterns boardwalk, cisterns of Flurry, Barreiro Trincheioa.

- 1 million cisterns program (P1MC): In a process of deconcentration and popularization of the water, through the storage of rainwater that falls from the roof, in cisterns built with cement plates next to each house, farmers start to have water Drinking for consumption, rather than walking kilometers looking for water mainly to drink in reservoirs (dams, Barreiros) Most of the time of private properties, the cisterns occupy a significant volume of water for family use in a Representative time course, with this autonomy and quality of life, families are managing their own water, in addition to the decreasing incidence of diseases due to the consumption of contaminated water and the decrease in the burden of work of women in Domestic activities.

- Sidewalk cisterns and Flood cisterns: with the objective of expanding the water supply of agricultural families, the program encourages the productive potential of family units, the minimum space near the house should be used for planting and breeding, land and water integrate a system of "Earth and water to grow and maintain the life of plants and animals". In this space, having water means hydric safety and also food and nutritional security, because the stored rainwater also serves to produce food and seeds.

They are the social technologies that provide quality of life for the family, besides the generation of income in the use of this water for consumption and creations, flowerbeds, making for the families an instrument of liberation and self-affirmation.

In some cases are novelties (such as the sidewalk cisterns), these social technologies, in others are considered innovations in the aspect of their improvements or adaptations, however the most important has been its democratization, these social technologies are also In the range of actions made possible by the implementation of solidarity revolving funds.

- Network of nurseries

The Borborema Polo has supported municipal, community and family nurseries that collaborate to the practices of reforestation and restoration of the native landscape of properties, increasing the functions of trees in the environmental production systems and of the trees in production systems.

The seedlings vary between fruit, forage, and forest, medicinal and arboreal that adds even more diversity in the environment. With them the ideas of living surrounds and landscape-swived integration are possible, guaranteeing the environment a greater environmental equilibrium. The seedlings of these nurseries have helped family farmers understand the principles of agroforestry within their crops in their localities.

It is a work that has strengthened with the strong contribution of youth, with the campaign of Childhood and youth, developing activities of seed collection, production and distribution of seedlings, learned and experienced in workshops and moments of formation.

- Solidarity revolving Funds are nothing more than instruments of popular sovereignty of agroecological innovations of agricultural families. In the municipality of Remígio there are several types of FRS, with or without currency circulation, we can include the BSC, screen fences (produced by the farmers themselves), wire fences, palm fields, ecological stoves, acquisitions of small animal's reform and Improvement of kitchens, purchase of ovens and machines (for pulp production and processing of other products such as cassava) that has greatly assisted the production and commercialization of products in agroecological fairs. The funds, which bring together resources such as labor and money, rotatives, in which resources circulate, revolve among all members, solidarity, who receives the resource, assumes the responsibility to contribute further, in which you do not think only in your need, but Also in the other, is another action of the Polo, with articulation in the unions focused on the diversification and the productive restructuring of the surroundings of the houses providing access by farmers to a set of tools that opportune the transition Agroecological and the economic sustainability of communities in the protagonism of their realities, generating autonomy.

The Solidarity-based revolving fund functions as a community savings, with its management directed towards strengthening family farming, can be formed by both the donation of voluntary resources by each participant/member as can be assembled from External resources and actions aimed at the community, according to the synthesis of the interviewees' statements.

House surroundings (productive yards)

There are many actions supported by FRS, the productive backyards are an example of revitalization, because they are in the tiny spaces in the case, which most often women, cultivate food, medicinal plants, create small animals, which Ensures a better quality of life for the family. The Polo has held in Remígio, as well as in other municipalities through the Health and Food Commission an accentuated work in the regeneration of these backyards providing that the family complex can innovate its productive systems diversifying, generating Food security and income. What was previously seen as "worthless" now integrates, the productive system contributing directly to the economy, besides that, in it are demonstrated several knowledge and practices passed from generation to generation.

Thus, the backyards develop the important role in the sovereignty and food security of families, affirming the ecological, cultural, social and economic principles of agroecology. Agroecology extrapolates the one-

dimensional view of agroecosystems (genetics, edaphology among others) to encompass an understanding of the ecological and social levels of coevolution, structure and functioning. Instead of focusing its attention on some particular component of the Agroecosystem, Agroecology emphasizes the interrelations between its components and the complex dynamics of ecological processes [23].

- Working with women

It is notorious and quite striking the work with women, for innovation and knowledge production, this because the actions of the Polo focused on them allow to trace a new history in the construction and diffusion of agroecology throughout the territory and in a special way in Remígio. Assisted by AS-PTA, Polo has rooted a network of experimenters who have provided profound changes in the lives of hundreds of women and building a development project on an agroecological basis for the region.

Agglutinated in the invisibility of female work in productive and reproductive activities, as well as in the open possibilities for women with the growing rise of non-agricultural activities as income generators, the debate on gender and agriculture Family has advanced considerably in recent years. While, some questions remain open, and they deserve a reflection when we ask the place of women in the agroecological proposals and the perspectives of emancipation linked to these activities [24].

The women's confrontation is not only because of their place in production, besides this, their struggle is also for their spaces as social subjects and protagonists of the advanced process of construction and development of agroecological agriculture in the territory of Borborema. It was from the creation of the Commission health and food that work with women became intense.

- The partnerships are also considered an innovation from the viewpoint of the leaderships, the various researches and collaborations that have mutually established themselves in the course of this progress in the territory, the flourishing trajectory of so many actions performed influences directly these interactions with different public and private institutions that work in the rural development field.

Other entities and partner NGOs join the Polo in this progressive path, the articulation of the semiarid Paraibano (ASA Paraíba), the PATAC (application program for appropriate technologies), the Centrac (Center for Cultural Action), the Cepes (Center for Studies Political and social), the CPT (Pastoral commission of the Earth), ASA Brasil (articulation of the Brazilian semiarid), INSA (National Institute of the Semiarid), the MST (Movement of landless rural workers), the program of Rural identity Territories (a Territorial development policy of the Secretariat for Territorial Development (until recently) Ministry of Agrarian Development (SDT/MDA)) implemented in 2003 that also acted as a partner and claimer of public policies adapted to the region, formally constituting the Borborema territory and the AS-PTA itself, which besides advising also works as a partner, among others.

Besides these mentioned above, actions in the management and conservation of the various production systems are also considered innovations, the "Awakening" of the valuation of the land is an extremely positive aspect if we think about the disruption of many thoughts that before They did not look at their property with the same look that one has today it is common for you to hear both from the farmers and by the disseminators who did not "see their sustainable environment", do not imagine the diversity of actions that could develop there.

The various spaces of formation, production, construction and experimentation are also considered innovative, in them, many experiences are exchanged, summed and disseminated so that the farmer is the starting engine for the transformations in his life, in his family and on the property;

- Exchange visits: Farmers know other experiences not only in Paraíba but also in other states, discover many experiences developed by other families of experimenters farmers and returning their homes they have the will to also experience those innovations or novelties and depend on the results, they socialize the knowledge acquired with the neighbours, arousing in the others the desire to mobilize to experience also.
- Training workshops: These are moments when families receive information about a particular innovation, also included in the moments of exchange, the workshops develop several innovative activities in both farmers and exhibitors, this because the project of experimentation is supported and also strengthened with the partners of the Polo in this construction of local development, for example, we have cited silos, production of biofertilizers and others;
- The storage of forage in the silos guarantees the herds greater availability of food in good quality especially in the periods of drought. The raw material for silage comes from the swiddens, most of the time the "remains" that would be wasted, such as the Cambão and the straw of maize associated with other crops such as grass, palm, gliricidia, crushed and stocked guarantee the animals a high nutrition Due to the diversity of incorporated cultures.
- The production of biofertilizers is also seen as an innovation, it was through the very knowledge added that the farmers found alternatives for the control of pests and diseases, which was of scientific nature became replaced by the empirical nature, Through experimentation and dissemination of the methodologies used. The agroecological fairs also comprise an innovative strategy proposed by the Polo, since they do not happen only the commercialization of products, farmers exchange knowledge and practices and money is not the essential, there is a whole construction, training and Respect to agro-ecological principles. In the Polo region today there is a network of 12 agroecological fairs, coordinated by the Association Ecoborborema. The guidelines to be followed seek above all to establish this relationship of trust between the producer, the Environment and the consumer, preening to ethics and trust. The Agroecological Fair of Remígio, as already cited in the previous chapter, develops a series of activities of training and deepening of some themes of reflective interest, such as the study of the free Fair of the municipality and the exchange of farmers of Remígio for Know the fair of Lagoa Seca-PB, the diagnosis on the use of pesticides carried out in 2002 by the Polo, which resulted in a video assisted by more than 800 people in the city, the planning and evaluation meetings, the evaluation and management seminars already performed. A strong characteristic of this fair is its organization, with the participation of the fairers in the assemblages of Ecoborborema, the realization of monthly assemblies, and articulation of the sale to the PAA (food acquisition program), today not so strong of the Federal government. The articulation of this network of fairs is generating new opportunities and access to the markets for the region's family farming. The autonomy of the farmers and the distribution of power horizontally and non-vertical, is an innovative process proposed by the Polo, this starting from the new union format, "The Four Walls" of the headquarters no longer behave their role as director, Secretary, leader Union.

The network of experimenters and agricultural experimentation farmers (monitors, multimers) is growing increasingly and strengthening as a methodological innovation introduced in the actions of the Polo. This model builds the decentralization of power and "name" to technicians with new and greater knowledge, with the disruption of this monopoly it is possible to attribute to them the highlight two essential functions, the first of appreciation or redemption of knowledge Development process and social transformation.

The work with youth has greatly advanced in the proposal to provoke them to awaken their knowledge and skills in the contribution of the productive system and the family. Through the supportive revolving funds and the partner projects to encourage work with young people, they build a path with the execution of practical activities managing the funds and arousing individual and collective potentials and expectations of the group (now has young beekeepers, animal breeders, suppliers of agroecological fair products, political mobilizers among others).

5. CONCLUSIONS

In addition to all the innovations recognized by the farmers, as well as by the technicians/leaders/members of the Polo da Borborema, in Remígio, and throughout the region that serves, was unanimous the perception of the new consciousness and of the whole systematic that today mobilizes and Transforms the lives of so many people. Change and adaptation in techniques of use and conservation of resources also add to these innovative actions. The reading of the local reality encompasses an immense accumulation of knowledge added to the search for new knowledge and experiences, renewing each day the mechanisms of innovation led to overcoming the economic, technical, and organizational socio-environmental adversities experienced By the region's family farming.

In agriculture, innovation affirms the theory of the two strands that it can happen, whether it is a formal activity, produced in research and development institutions and laboratories, or as an informal activity during productive practice.

In addition to all those described from the perspective of the feasibility of all these actions, other characters are read as innovators, according to the interviewees ' statements.

The breeding of manure from the Sterers (which was previously wasted), the seed picker, the transgenic test performed in the region's corn and still in the test phase, the machine to make the "couscous of passion" with the local seeds were also cited as innovations.

The life and trajectory of ecological/agroecological farmers in Remígio and throughout the Polo's work radius clearly describes two completely different stories, the past rooted in a "suffering", heterogeneous agriculture, without expectations of Improvements and return and the today's current, which is a cry of "liberation" of signature and emancipation of its history and its positive advances. Promoting and disseminating so many experiences with family farming is not an easy task, not everything happens as it is desired, because the policies in the region most often do not take up with the Polo the flag of struggle and appreciation of this agriculture that Resists so long, it has already shown concretely where it can and manages to arrive, an agriculture that has historically been leaving its mark throughout its territory. The diffuser design based on the idea of passage and appropriation of the many technologies proposed in the

experimentation network has revitalized the local innovative processes as social tools of socialization of knowledge in a collective way where no one is submits or disappears.

The enormous organizational capacity of farmers in their communities and environments leads to innovative experiences in the management of community seed banks, agroecological fairs, work with women and youth, supportive revolving funds and others.

The various networks and actions provided by the Polo da Borborema confirm the existence of production activities and exchange of knowledge between producers, mutual observation and political, technical and social dialogue with some variants of a region to another.

Based on the relationship of reciprocity recognizing the production of knowledge as a result of the practice we are further enhancing the role of innovations produced and distributed horizontally, which does not neglect the technologies produced Externally, and their respective applications, this when the reality is contextualized and the local necessity allows the construction and association of new knowledge produced from the practices.

The common relationships and collectively expressed in the communities, although already described are generating innovation, active partner of the Polo, the partnerships, but above all of the farmers, prescribe the most diverse connections in mutual aid networks where life and Development of agroecological agriculture are community. As active subjects and forerunners of this whole process, using as an initial source the popular knowledge and power of exchange of knowledges (socialization), the learning in ecological/agroecological agriculture is allowed much stronger by the knowledge Accumulated throughout this historical journey.

The process of local development is continuous, the struggles are daily the production of knowledge, innovation and learning of family farming is a process that refreshes day by day, the Polo has contributed to the autonomy and reaffirmation of the identity of Farmers who have always been on the sidelines of society. Within this model of family farming it is extremely important to promote social organization as a basis for the construction of a sustainable development process, so as to include the small producer in the globalized and competitive world. This cooperation divides responsibilities, surpasses fears, insecurities and weaknesses while empowering the workforce, virtues and abilities.

A new cycle of recampesization in terms of land achievements and social sovereignty expresses the reality of the construction of peasant farming in the territory of Borborema providing a search for the construction of increasing levels of economic autonomy, Technical, political and cultural.

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COLLECTIVE INTELLIGENCE (CROWDSOURCING) ON THE INTERNET: A collaborative approach in information and knowledge management

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Abstract

The present work proposes to investigate the practice of collective intelligence (crowdsourcing) on the Internet by scientific institutions that develop or not sustainable actions, in order to characterize their use of the virtual environment in the process of knowledge generation for their own benefit. This is an empirical analysis based on a survey of data on the Internet, aiming to identify websites whose hosting organizations adopt collective intelligence practices to achieve their objectives in the generation of knowledge, necessarily of a scientific nature and / or related to sustainable development. As a result, it was possible to identify the adoption of this practice by several organizations, in which their level of dependence on the virtual environment as well as the virtual environment's contribution to the accomplishment of their projects are observed.

Keywords: crowdsourcing; knowledge; information; collective intelligence; Internet; collaborative work.

1. Introduction

Information and knowledge are notoriously recognized in their importance for the development of our society. Information, as part of the process of communication between individuals, is the input of knowledge that constitutes the main pillar of support for progress (CASTELLS, 2002, JANNUZZI, FALSARELLA, SUGAHARA, 2016).

The role of knowledge in society has changed over time, but significant modifications have taken place

with greater emphasis in the twentieth century. Scientific and technological propositions and discoveries, generated in extraordinary volume, give society opportunities for meaningful social, political and economic changes (CASTELLS, 2002).

One of the crucial achievements of this evolution was the lowering of costs and facilitation of the transference of information, since information and communication technologies release emitters and receivers from sharing the same physical space for their communication (CASTELLS, 2002). In this context, the advantageous conquest of new ways of acquiring knowledge through networks and information systems is unquestionable.

This accelerated pace of progress and changes in society, while stimulating the production of knowledge, also contributes to the emergence of new forms of human behavior and new forms of human institutions, through networks and information systems that allow the reduction of barriers of communication in time and space. This environment gains a significant dimension in face of exponential growth in Internet use.

It is from this perspective that a form of relationship that is called collective intelligence configures itself, mentioned in several studies as crowdsourcing, and is practiced in different situations and in different environments of society, its essence being the collaborative work (ESTELLÉS-AROLAS; DE-GUEVARA, 2012). Crowdsourcing can be understood as the act of an organization "[...] the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" (HOWE, 2008, p.1).

This expansion of frontiers, which enables a more participative collective knowledge, arouses the interest of several organizations that begin to adopt collective intelligence to incite actions, to search for solutions or to expand contents in a collaborative way (SCHENK; GUITTARD, 2011) such as actions for the sake of sustainability as well as in scientific research. Considering that organizations increasingly seek to treat knowledge as a manageable resource, working it through what is known as knowledge management, characterized as the "[...] deliberate and systematic coordination of people, technology, processes and the structure of an organization [...] achieved through the creation, sharing and application of knowledge [...]" (DALKIR, 2017, translation by the authors), it can be deduced that the adoption of collective intelligence (crowdsourcing) becomes also part of this management.

If an organization seeks to make knowledge manageable and, from among different sources, also seeks collaborative knowledge and making use of collective intelligence in its actions, then all the actions of this organization that respond to this situation can be contextualized in the knowledge management practiced by it. Thus, it is in this context that it becomes relevant to investigate the conjuncture in which this collective knowledge is being developed - collected, identified, managed, and stimulated in its adoption of the use of the Internet as mediating environment to obtain information.

When navigating the virtual environment, it is possible to observe that many organizations are practicing the concept of collective intelligence through Internet sites as a way of collecting information for generation of knowledge. Among these organizations, there is the presence of institutions and researchers that adopt collective intelligence practices to search for scientific knowledge and / or for sustainable development actions. Therefore, it is in this context that the following question is elaborated: How are organizations of scientific interests related or not to sustainable actions making use of collective intelligence on the Internet

for generation of knowledge?

From this question, the present research aims to investigate the practice of collective intelligence (crowdsourcing) on the Internet by scientific institutions that develop or not sustainable actions, in order to characterize their use of the virtual environment in the knowledge generation process.

2. Information Knowledge

Knowledge is an element of fundamental importance for the evolution of human society in its different forms of organization (family, educational, governmental, commercial, research, etc.). These organizations, characterized as human systems, foster knowledge from information assimilated by individuals of a system, who also become sources of new information, contributing to the survival and evolution of this system with generation of new knowledge. This fact can be identified in the words of Cintra et al. (2002) when they say that "[...] all knowledge begins with some kind of information and constitutes information[...]" (CINTRA et al, 2002, p.10, translation by the authors). From their words, it can be affirmed that it is information that is responsible for generating knowledge.

The information-knowledge relationship is based on the information management process. Information management is closely linked to the use of information, since it is its use that guides the entire process, i.e. each of the procedures performed in management is based on the use of information. Using information implies receiving this information from some emitter, and for it to be assimilated - possibly used – thus exercising its power of action, it must meet the informational needs manifested by the receiver (JANNUZZI; TALAMO, 2004).

In spite of the notorious relevance attributed to information management, it is possible to observe in the literature that discusses it that the concept attributed to the term usually takes on descriptive characteristics of the procedures, not emphasizing its main role in human information systems. In other words, the role of information management is to obtain, based on the supply of information, pertinent answers to the informational need in order to create conditions for effective use of information in generation of knowledge (JANNUZZI; TALAMO, 2004).

As aforementioned, knowledge is recognized as a resource of fundamental importance for the evolutionary process of society in general, even favoring it to occur in a sustainable way (JANNUZZI; FALSARELLA; SUGAHARA, 2016). It is in this context that discussion about knowledge management gains a significant dimension in the scientific field, producing studies about management procedures of this intangible and subjective resource that is characterized by involving cognitive processes in assimilation of information.

Knowledge management models observed in the literature usually present, in common or similar, in their totality or not, stages such as creation, acquisition, organization, internalization, sharing, implementation and revision of knowledge, with specific distinctions according to particularities of each proposal: those that favor acquisition of knowledge already stored and those that focus on its creation from primary information - information that has not yet been scientifically analyzed (MISHRA; BHASKAR, 2011; JANNUZZI; FALSARELLA; SUGAHARA, 2016; MARCONI; LAKATOS, 2017).

The search for information to generate knowledge can occur informally, from unstructured information such as the exchange of information between individuals in social gatherings, or in a formal way, based on

structured information, available in sources that are organized in stocks such as databases, libraries, statistical data institutions, etc. (JANNUZZI; TALAMO, 2004). In this context, it is possible to observe that society has been confiding in the use of increasingly sophisticated information and communication technologies (ICTs) to search for knowledge, since within a new dimension of time and space they facilitate access to information (CASTELLS, 2002).

The use of information and communication technologies to search for information in order to generate knowledge has become more and more present. It is observed that different organizations have sought to generate primary data from different individuals, who constitute source of information within a collaborative practice, characterizing the use of collective intelligence (crowdsourcing).

By observing the process of knowledge management, it is possible to affirm that the use of information and communication technologies can favor the practice of collective intelligence in stages such as creation, acquisition and organization. The purposes of these stages are in harmony with the principles of collective intelligence, since it is used, in the case of creation, as a concept in the search for information in order to generate knowledge, in the case of acquisition, as the search for knowledge already consolidated and, in the case of organization, as filtering agent of the extensive informational volume in cyberspace. Thus, collective intelligence, as a collaborative practice in the construction and management of knowledge, associated to the use of information and communication technologies, is clearly a valuable resource that adds greater dynamism and differentiated dimensions to organizations that make use of it.

3. Technology, interactive society and collective intelligence

In the twentieth century, computers, as media technologies, revolutionized the means of communication hitherto known and used in society. The communication process, in turn, has absorbed and adapted to the introduction of new technologies that have emerged and expanded over the years. Since then, computers have connected to each other in the form of a colossal and multiple network - of global proportions - that is supported by the Internet as the channel that enables this interconnection. It is observed the integration of several communication modalities - oral, written and audiovisual - in a single interactive electronic system with global reach (CASTELLS, 2016).

Computer-mediated communication (CMC) via Internet enables a mass-proportion audience to be reached, but with receivers with a higher degree of segmentation and that receive content at different times, depending on the individual's interest in that content and on personal choice of when accessing the message. In relation to the communication process, the CMC allows users to interact actively: those who until then were configured as receivers can also send messages, which makes computer-mediated communication a two-way system (CASTELLS, 2016). From this configuration it is understood the concept of an interactive society, in which individuals can establish speeches through means that traditionally only emitted messages. There is, therefore, an open channel of communication between emitter and receiver, which enables the roles to become inverted in the message response period. Thus, the Internet shows itself as a vehicle of interactive communication, which enables a massive connection through it (CASTELLS, 2016).

The space where this communication and other social interactions occur - with information flows and generation of knowledge, supported by the Internet and all the social networks and links that are constituted

through it - is named cyberspace (LÉVY, 2015). It is observed that, today, society is increasingly interconnected in cyberspace, impacting how social relations are built and shaped, since it allows the shortening of physical and geographical distances among its users. According to Lévy apud Szabó and Alves da Silva (2007: 45, translation by the authors), "the growth of cyberspace is associated with three factors: interconnection, the construction of virtual communities and collective intelligence."

Given the new configurations of sociability made possible by electronic communication and the emergence of new modalities of social ties, different authors around this theme question the real impact of the Internet on the level of social interaction among its users, debating about the possibility of the Internet decreasing levels of social interaction in the "real" world in favor of virtual communities and thus leading to an even greater isolation of people from society. Castells (2016) refutes this proposal inasmuch as he asserts that virtual communities do not contradict those that happen in the physical environment: they simply work concomitantly on another plane of "reality". Computer-mediated communication is useful in many different contexts, and is also favorable for the formation of weak and multiple social ties, including those between individuals previously unknown to each other and that would have difficulties to meet on the physical plane, but who can choose to do so on the virtual plane (CASTELLS, 2016).

In cyberspace, this ability to interact and build networks between individuals allows a large amount of information available on the worldwide computer network to be filtered based on specific needs, where virtual communities would not only work towards attending them, but also contribute collectively to the production of knowledge as a whole (COSTA, 2009).

Individuals unite in cyberspace around common interests, constituting virtual communities or social networks, as suggested by Costa (2009). Virtual communities differ from content portals in that these have a published content already defined by an editorial, while communities are self-organized: everyone can contribute, publish, and interact with one another. Collective intelligence is then the result of these informational processes in cyberspace that proceed and are intended for multiple purposes. (SZABÓ and GONÇALVES DA SILVA, 2007)

Thus, with a broader collective of people who begin to produce and share knowledge as well as filter the large amount of information available in cyberspace according to specific needs, it is observed that the cognizance that contributes to the generation of collective knowledge in the virtual environment is lead towards a place called by Lévy (2015) as a space of knowledge. The collective intelligence produced in this space is characterized, therefore, by the diffusion of access to contribution, since the knowledge can come from all that make use of the cyberspace - which is no longer territorialized – as a place of interaction and sharing of subjective competences, in constant process of shared learning and knowledge generation.

4. Methodological aspects

This is an exploratory research, an advised method when one aims at "providing an approximate overview of a certain fact" (GIL, 2008, p. 43), which, in this case, it is the use of collective intelligence for research through the Internet. With regard to qualitative data, the research is characterized as a documentary survey, because the collection of data is based on its publication on the Internet, and as such, it constitutes the primary source of the research input, since it has not yet received an analytical treatment, that is, it does

not originate from publications already analyzed scientifically (GIL, 2008; MARCONI; LAKATOS, 2017).

The selection of research sources met the following criteria / procedures:

- 1) The use of Google as an Internet search tool. This decision was made by the fact that the institutions make use of this channel in its most traditional and comprehensive way aiming to contact a great number of people available to meet their objectives;
- 2) Use of keywords crowdsourcing research; crowdsourcing project; crowdsourcing science;
- 3) Assessment if the website was in continuous operation;
- 4) Assessment if the website that makes use of collective intelligence represents scientific research and is related or not to sustainable actions.

The research sample is characterized as intentional, since "... the elements that form the sample are intentionally related according to certain characteristics established in the plan ..." (RICHARDSON, 2017, p. 160, translation by the authors), which, in this case, the plan is the use of collective intelligence to obtain data in order to generate knowledge for the institution. The most popular examples as well as others less accessed and of different fields were selected at the time of search (April / 2018). At the beginning of this study, it was established that a volume of 13 sites could already provide important elements for this research. The reading and treating of the data obtained was defined by content analysis, method which proposes to work with the "information contained in the messages" (BARDIN, 2016, p.41, translation by the authors) which was considered adequate under the following aspects:

- Contextualization of the selected websites, according to their field of action and themes;
- Characterization of the dependency level of the organizations on virtual environment and its contribution to the accomplishment of their objectives;
- Categorization of websites, according to their proposition – scientific, either related or not to sustainable development - and stages of knowledge management.

5. Data results and analysis

The survey on the use of the Internet as a means for the practice of collective intelligence in generation of knowledge by scientific institutions obtained the following results:

Table 1 - Institutions that make use of collective intelligence as source of information

Institution	Category	Online adress/URL
Catalyst for Collaborative Solutions – Stanford University	Scientific Institution	https://catalyst.stanford.edu
Climate CoLab – MIT	Scientific Institution / Sustainable Development	https://www.climatecolab.org/
Caribbean Storms 2017	Scientific Institution	https://www.scientificamerican.com/citizen-science/caribbean-storms-

		2017/
Connecticut Turtle Atlas	Scientific Institution	https://www.scientificamerican.com/citizen-science/connecticut-turtle-atlas/
The Plastic Tide	Scientific Institution / Sustainable Development	https://www.scientificamerican.com/citizen-science/the-plastic-tide/
Small World of Words	Scientific Institution	https://www.scientificamerican.com/citizen-science/small-world-of-words/
Globe at Night - National Optical Astronomy Observatory	Scientific Institution	https://scistarter.com/project/169-Globe-at-Night
Gender and Tech Magazines - Bard College	Scientific Institution	https://crowdcrafting.org/project/genderandtechmagazines/
Floating Forests	Scientific Institution	https://www.zooniverse.org/projects/zooniverse/floating-forests
EMammal	Scientific Institution	http://emammal.si.edu/
Snapshots at Sea	Scientific Institution	https://www.zooniverse.org/projects/tedcheese/snapshots-at-sea
African American Civil War Soldiers	Scientific Institution	https://www.zooniverse.org/projects/usct/african-american-civil-war-soldiers
Brain Match	Scientific Institution	https://www.zooniverse.org/projects/simexp/brain-match

SOURCE: the authors.

The institutions selected for this research presented different propositions in the use of collective intelligence. They use their website to provide a collaboration channel to network users for data collection and / or knowledge sharing. Namely:

Table 2 - Proposals for users' collaboration by the institutions

INSTITUTION	Proposal for use of collective intelligence
Catalyst for Collaborative Solutions – Stanford University	Collaboration for scientific research. The proposal is to explore unusual interdisciplinary solutions to the world's most pressing problems and become an internationally recognized model of a high impact interdisciplinary research ecosystem.

Climate CoLab – MIT	Collaboration action for sustainable development. The proposal is to be an open platform for solving complex social problems, beginning with global climate change.
Caribbean Storms 2017	Collaboration for scientific research. The proposal is to analyze satellite images of areas hit by Hurricane Irma and Hurricane Jose in order to help rescue workers in finding locations that need assistance.
Connecticut Turtle Atlas	Collaboration for scientific research. The proposal is to help scientists track turtles in the US state of Connecticut to better understand threats to their habitat. From receiving data through the web and a smartphone application, participating volunteers can identify important habitats for turtles, locate areas of nest abundance, detect roads with high traffic-related mortality, and assist with various aspects of research and development in the field work related to turtles.
The Plastic Tide	Collaborative action for sustainable development. The proposal is to help scientists find out where the millions of tons of plastic that are dumped every year in the oceans go, from the analysis of database images and identification of residues such as fragments, fishing lines, beverage bottles or other plastic waste.
Small World of Words	Collaboration for scientific research. The proposal is to help researchers to discover through the completion of a questionnaire how the meaning of words is stored in memory.
Globe at Night - National Optical Astronomy Observatory	Collaboration for scientific research. The proposal is to raise awareness about light pollution by observing and measuring the night sky.
Gender and Tech Magazines - Bard College	Collaboration for scientific research. The proposal is to find out how gender inequality in technology can be reflected in technology journals, which is done by examining the frequency with which women are represented in technology journals and how they are represented.
Floating Forests	Collaboration for scientific research. The proposal is for volunteers to use photos of the space given to them to understand how algae forests grow and change over time.
EMammal	Collaboration for scientific research. The institution spreads cameras at strategic locations for wildlife registration and volunteers can collaborate using the software available to view photos, identify animals and send them to the institution for review and storage.
Snapshots at Sea	Collaboration for scientific research. The proposal is that volunteers use photos that will be given to them to identify and account for marine mammals.

African American Civil War Soldiers	Collaboration for scientific research. They are building a comprehensive database of the 200,000 soldiers who formed the United States Colored Troops (USCT), where images of soldiers' military service records obtained by photography and scanning are transcribed. From them, individual detailed information such as name, age, height, place of birth and enlistment, as well as evidence of battles fought, injuries and casualties suffered, honors received, and promotions conquered are collected. The idea is that the interface offered allows users to collaborate by highlighting such evidence, drawing the attention of scholars and the public.
Brain Match	Collaboration for scientific research. Images of brains are used to study brain disorders, where researchers align and analyze them, comparing images of different brains to conclude whether there is matching anatomy or to detect subtle differences between brains. This process is called a registry and is a complex, error-prone task. While a researcher usually visually checks for a brain match after doing the registry, there are no established guidelines for judging the quality of the record done. Therefore, the proposal is for volunteers to collaborate to assess the quality of the brain record (how well the brain images correspond), with the intention of generating consistent assessments among users, improving the quality of brain registries.

SOURCE: the authors.

The data analysis seeks to indicate the level of contribution fostered by the virtual environment based on three characteristics: comprehensiveness; knowledge acquisition, and virtual environment dependency. The Comprehensiveness feature is intended to identify whether collaboration has unrestricted participation or is specific to its knowledge; the Knowledge Acquisition feature seeks to point out the purpose of the required collaboration, i.e. whether this collaboration refers to identification of content or problem solution; finally, Virtual Environment Dependency tries to characterize whether the level of reach of the research developed is greater by virtual means or the same as in a physical environment.

Table 3 - Characteristics of the Collaborative Process

CHARACTERISTICS	Comprehensiveness	Knowledge Acquisition	Virtual Environment Dependency

INSTITUIÇÃO	<u>Unrestricted</u>	<u>Restricted</u>	<u>Identification of</u>	<u>Problem</u> <u>Solution</u>	<u>High level</u>	<u>Medium level</u>	<u>Low level</u>
Catalyst for Collaborative Solutions							
Climate CoLab – MIT							
Caribbean Storms 2017							
Connecticut Turtle Atlas							
The Plastic Tide							
Small World of Words							
Globe at Night - NOAA							
Gender and Tech Magazines - Bard College							
Floating Forests							
EMammal							
Snapshots at Sea							
African American Civil War Soldiers							
Brain Match							

SOURCE: the authors.

Based on the proposals and projects of selected scientific institutions, this analysis points out the contribution of the electronic environment to the feasibility of using crowdsourcing, since this was made possible by the evolution in media technologies, the multimedia system and the advancement in the field of communication brought by computers and the use of the Internet, as explained by Castells (2016). The two-way communication between network users and traditional media means of emitting information - contextualized in the form of the so-called interactive society - laid the groundwork for today's collective intelligence to operate as a channel of speech that is purposely open between institutions and individuals so that they can contribute collectively with tacit information that will build a knowledge that would be in the future explicitly explained and used by the institutions.

Based on the concepts of Jannuzzi, Falsarella and Sugahara (2016) and Castells (2016) it is possible to relate information as a message sent in the field of tension between emitter - that would be the institutions and organizations - and receiver - that would be the individuals. The message will be decoded, assimilated and recoded from users' individual cognitive filters, which were receivers and become emitters by forwarding the recoded and re-signified information to institutions - analogically, now emitters. In this perspective, this communicative process is related to the gathering of information and construction of knowledge itself that analogically would be the message that had been captured and suffered interference and modification.

As pointed out by L vy (2015), this informational flow and generation of knowledge occur in cyberspace and, associated to the evolution in social configurations, bring an interconnection between individuals with

the shortening of physical and geographical distances (SZABÓ, GONÇALVES DA SILVA, 2007), as observed in the current relationships and in the projects listed above that allow the contribution of users regardless of their locations, beliefs or relation between themselves and the institution.

In this perspective, the conception of social capital that has the potential to filter the gigantic supply of information in the computer network according to specific needs is perceivable (COSTA, 2009) and is complementary to the proposal of collective intelligence as a collaborative approach in information and knowledge management. This is what is observed in the analysis of the projects of the thirteen selected scientific institutions, of which eleven use unrestricted collective intelligence, allowing more democratic access to contribution since individuals with Internet access from any location could collaborate with the project development and filtering of information for submission to institutions. Given that the channel used for crowdsourcing is the Internet, as explained by Levy (2015), it is feasible to use the border expansion of the space that it offers along with access to a greater diversity of knowledge to favor this collaborative form of search.

Only two of the institutions have restricted comprehensiveness projects. In Catalyst for Collaborative Solutions, the attendance restriction is for those who are not students from Stanford University, to which the project belongs. In Connecticut Turtle Atlas, participation extends to those who are interested in it, but the availability of travel to Connecticut is required - as some of the steps involved require in-person participation in proposed fieldwork.

The high dependence on virtual environment for the use of collective intelligence in research projects is almost unanimous, with one exception: Catalyst for Collaborative Solutions presents an average level of dependence, since, by restricting participation to students of the university that hosts the project, it ends up centralizing geographically the participating users, who could come to know the project and contribute to it through channels other than the Internet, such as meetings and face-to-face interviews. Nevertheless, the dependence on the virtual environment on this project is marked as a medium because of the facilitation, speed of access, and organization of the information that this environment provides, favoring the qualitative development of the research.

In relation to the knowledge management models that the selected institutions use, all aim to achieve new cognizance through the collaborative construction of knowledge, thus favoring the step of searching for knowledge to the detriment of the practice of acquisition. According to the concept of Rubenstein-Montano et al. (2001, p.7 apud Jannuzzi, Falsarella and Sugahara, 2016, p.102), the selected institutions have a descriptive structure of knowledge management, as they determine the steps to be taken to build the cognizance that will aid in specific solutions to what they are looking for, and as they characterize how knowledge management is and will be done in their projects.

Thus, in order to achieve new knowledge that they aim for, the institutions make use of collective intelligence in their search phase for collaborative construction of knowledge, based on tacit information that ordinary individuals can offer and which will then be transformed into explicit knowledge in the organization, which - according to Jannuzzi, Falsarella and Sugahara (2016) - configures the creation of knowledge itself: the information of collaborators going through the field of tension and being decoded and assimilated by scientific institutions in the form of knowledge.

In this way, most institutions use collective intelligence to identify content to the detriment of solving a specific problem, since in this way it is possible to consider a greater multiplicity of individual cognizance and to contemplate knowledge in diverse forms and areas of comprehension, such as proposed by Levy (2015). Thus, the research extends to a larger number of participants and it is possible for the institution to have greater control over it, since the organization specifies the point at which it wants the collaborative action and, from this contribution, will continue or finish the research with its own resources.

The projects presented by the institutions mentioned in this research cover different areas of knowledge, but an emphasis is given to the greater propensity of those related to biological sciences and nature to use collective intelligence, since in these areas there is also a greater propensity to the overture to collective intelligence in the steps of knowledge management in which it can act: creation, acquisition and organization of knowledge. (JANNUZZI, FALSARELLA, SUGAHARA, 2016)

The access of users who contribute to the institutions is done via a web page, with global reach, most of which are in English. It is assumed that this is the most widely spoken language in the world so the users' approach to collaboration in the projects is facilitated.

6. Conclusions

The elaboration of the present study focused on the analysis of projects related to scientific research collaborating or not on sustainable actions. It was considered the impact that virtual environment brings to the development of these projects, mainly focusing on the use of collective intelligence as a collaborative tool for generation of knowledge.

It was observed from the collected data that the scientific institutions that make use of crowdsourcing are, in great majority, highly dependent on the virtual environment; do not restrict participation through specific criteria; and have predilection for knowledge acquisition in the form of identification of diverse contents, which is in line with the initial proposal of crowdsourcing: to mobilize participation of the collectivity, regardless of physical, scientific, cultural or socioeconomic frontiers, for the construction of a collective knowledge. Therefore, such a practice is in accord with the view that individuals carry knowledge of different forms and areas, that can be shaped in order to meet diverse demands, and it must be valued.

The use of collective intelligence is an encouragement to the sharing of knowledge housed in an individual cognitive for an explicit plan, in which an infinitely greater number of people will be able to access it, complement it and build a knowledge that belongs to many. Thus, by embracing people from different perspectives, the possibility of building more diverse and rich knowledge is increased exponentially, which facilitates the achievement of objectives proposed by projects and brings dynamism to the institutions that make use of collective intelligence.

In this sense, crowdsourcing optimizes knowledge management by supporting the functions of creating and acquiring knowledge, and by enabling the organization of the information flow, since it can be used as a sensitive intelligence to the specific particularities that must be selected from the gigantic content available in cyberspace, considering the information that is useful and can contribute to the development of the projects in question. Crowdsourcing shows itself as an immensely useful tool that enriches the knowledge process and brings benefits to both parties: individuals and institutions.

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A Conceptual Understanding and Significance of *Takaful* (Islamic Insurance): History, Concept, Models and Products

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Abstract

Human beings are naturally inclined towards safeguarding and protecting themselves from future misfortunes. This natural tendency of risk mitigation has given rise to the concept of insurance which existed thousands of years ago and was fervently practiced by many ancient tribes. Over time, the concept of insurance has changed since it is now being commercialized and have been transformed into a profit-oriented business. To revive the legacy of the real concept of insurance, the takāful (Islamic insurance) scheme was introduced in the second half of the 20th century differentiating itself from conventional insurance practices. The takāful scheme is strictly based on Islamic law known as Shari'ah. This paper thus expounds on the concept of takāful assimilating a holistic overview of this emerging industry while sorting the differences between the takāful scheme and the conventional insurance mechanisms. It concludes that the takāful (Islamic insurance) scheme is a robustly viable and sustainable alternative to conventional insurance.

Keywords: *Takaful*; Islamic insurance; conventional insurance; *mudarabah*; *waqf*; *wakalah*

1. Introduction

The modern forms of insurance are relatively new, but the concept is not. Thousands of years ago, transferring the risks and losses were practiced among individuals and groups. For example, in many societies, when a house burned down, the entire community contributed to rebuilding it. These benevolent

practices still exist among some primitive tribes (Raynes, 1948). Around 3000 B.C., marine insurance was used by Chinese merchants where the concept of protection and insurance was practiced against trade losses. They distributed their cargoes in several boats, and if one of the boats sank, the merchant lost only a part of his cargo (Abdul Rahman & Redzuan, 2009). A different kind of insurance was developed by the Indians and Greeks against sinking ships. Ship-owners financed their commercial voyages by borrowing money from creditors with placing their ships as collateral. If profit were gained, they would repay their debts with high rates of interest. In the event, if the loss was incurred or the ship sank, they were free from repaying the debts (Al-Hanis, 1979). Ancient Romans had benevolent societies with developed life and health insurance where aged and sick individuals were helped financially, and funeral insurance was provided. Also, their soldiers were subscribed to health and disability plans (Khorshid, 2004).

2. Pre-Islamic Practices

Before the advent of Islam, ancient Arab tribes had practiced the concept of “*kafālah*”, where they were loyal to their tribes and had developed a strong tribal system to protect their members against any hazards. For instance, if any of the tribal members committed a crime such as murder, a war would break out amongst them which at times even lead to more deaths and tragedies. These grievances were mitigated by paying what is known as blood money in order to avoid further revenge and tribal bloodsheds. All of the members of the tribe contributed in the form of a donation to meet the compensation funds for the victim's family. Such donations were collected to settle compensation for any tribal disputes. This kind of cooperation and practices were known as “*Aqilah*”, where the members of the tribe shared burdens of each other. The entire community guaranteed each other against any losses or hazards that could occur to them which is identical to the concept of contemporary mutual insurance (Alhabshi & Shaikh Abdul Razak, 2009).

Ibn Khaldun had written in *The Preface (Al-Muqaddimah)* that the Arabs have practiced some methods to compensate and indemnify the voyage members of the group against any losses in their business ventures, which were known as winter and summer voyages. They paid a percentage of their profit or capital to compensate for any losses or damages faced by any of the voyage members (Khorshid, 2004). The same practices of “*Aqilah*” continued even after the advent of Islam due to its obvious benefits which are clearly emphasized and supported in the Holy Qur'an.

The Prophet (pbuh) reinforced “*Diyah*”, compensation paid to the victim's heirs in the case of murder. The value and quantum of compensation were agreed upon between the families. One who committed the murder/crime was individually liable for the payment or compensation, but the common practice was that “*Aqilah*” (close kin of the murderer) or the tribe was supposed to pay the compensation as well (Alhabshi & Shaikh Abdul Razak, 2009). The second caliph of Islam, Umar ibn al-Khattab (May Allah be pleased with him), had formed a similar scheme known as “*Qasamah*” to pay the compensation to the victims of the one who was murdered, in the event the murderer could not be identified (Abdul Rahman & Redzuan, 2009). At the end of the eighth century, Muslims had built a powerful naval force and developed marine navigation and science. Merchants realized the necessity of insurance to cover the losses from the hazards of the sea. Based on the ethical norm of helping one another, they contributed to the fund to compensate

one who suffered any losses (Alhabshi & Shaikh Abdul Razak, 2009). Commercial insurance contracts are relatively new in the Islamic world. It was initially examined by Hanafi jurist (*Ibn Abidin 1783-1836 A.D.*), that some Muslim merchants have sought his opinion about marine insurance under the principles of *Shari'ah*. He opined about marine insurance that, "I see that it is not permitted to any merchant to get indemnity for his damaged property against the payment of a certain sum of money known as insurance premium; because this is a commitment for what should not be committed to". The discussion continued after *Ibn Abidin* for a century regarding the legitimacy of commercial insurance based on the Islamic standpoint, where it was subjected to deep revisions among the Islamic jurists (Ahmad, 2007; Anwar, 1994; Khan, 2005).

In 1965, The Congress of Islamic Research in Cairo discussed the validity of conventional insurance in the Islamic world. In 1976, after 11 years, the first International Conference on Islamic Economics was held in Makkah, Saudi Arabia. More than 200 Islamic jurists and economists attended this big event where they reached a consensus announcing all types of conventional insurance as unlawful since it was in contradiction with the principles of the *Shari'ah*. This decision was approved by the Organization of Islamic Cooperation (OIC) in 1985 in Jeddah in which it was stated that "The contract of commercial insurance with periodical fixed premium provided by the present-day insurance companies is a contract which is void and therefore *harām* in accordance with the requirements of the *Shari'ah*". Mutual insurance or *Takāful* scheme was approved by OIC to replace the system of insurance as it is moral and structured on mutual help and cooperation for the sake of the society (ISRA, 2016).

The first *takāful* insurance was introduced in Sudan in 1979. The industry was stimulated by the growth of Muslim's need for Shariah-compliant insurance. The Shari'ah board of the Faisal Islamic Bank in Sudan issued a fatwa with regards to the Takāful scheme, and the first Takāful Company was founded by the bank under the Company's Act 1925 to become a public company. Thus, the concept of Takāful has spread to other parts of the Islamic world as well. In Malaysia, the first Act of Takāful was enacted in 1984, where the company was launched as a private limited company. Nowadays, there are many Takāful operators around the globe in Muslim and non-Muslim countries (Obaidullah, 2005; Ochieng, 2013; Sharifuddin, Kasmoen, Taha, Talaat, & Talaat, 2016; Solomon, 2014).

3. Methodology

This research delves into the conceptual understanding of the *takaful* industry in Malaysia since its awareness, outside of Malaysia, is not as comprehensive as it ought to be. The researchers believe that for a robust fathoming of the subject matter, the qualitative research analysis tends to be the best approach. To carve out a comprehensive structure which not only provides a detailed understanding of the concept of *takaful* to its audience but advertently, it also draws a baseline for the differences between the conventional and the Islamic insurance practices. This distinction is crucial for a broader audience to clarify many of the pre-existing misconceptions about *takaful*. The research primarily contains data from the available literature, library research, case studies, and document analysis.

4. Findings and Discussion

The term *takāful* is an Arabic word derived from the word “*Kafala*”, which means “warrant”, “bail”, or “guarantee” (Engku & Odierno, 2008; Ismail, 2011). *Takāful* refers to an arrangement for mutual solidarity and indemnity that protects members who face defined risks and dangers. The *takāful* scheme needs to be in line with Islamic ethics and norms in order to be acceptable among the Muslims where the existence of principles such as cooperation (*Ta’āwun*) and donation (*Tabarru’*) is necessary (Redzuan, Abdul Rahman, & Aidid, 2009).

The AAOIFI's *Shari’ah* Standard No. 26 of November 2017 defined the *Takāful* scheme as "Islamic Insurance (which) is a process of agreement among a group of persons to handle the injuries resulting from specific risks to which all of them are vulnerable. A process, thus initiated, involves payment of contributions as donations, and leads to the establishment of an insurance fund that enjoys the status of a legal entity and has independent financial liability. The resources of this fund are used to indemnify any participant who encounters an injury, subject to a specific set of rules and a given process of documentation. The fund is managed by either a selected group of policyholders or a joint stock company that manages the insurance operations and invests the assets of the fund, against a specific fee." The International Association of Insurance Supervisors (IAIS) and Islamic Financial Services Board (IFSB) defined the *Takāful* scheme as “*Takāful* is the Islamic counterpart of conventional insurance and exists in life, family and general forms. It is based on concepts of mutual solidarity, and a typical *Takāful* undertaking will consist of a two-tier structure that is a hybrid of a mutual and a commercial form of company”.

4.1 Concept and Significance

The essence and idea of *takāful* revolve around mutual assistance, protection, indemnity, solidarity, and sharing liabilities among the participants (Engku & Odierno, 2008). Facing risks or dangers as a group and working collectively makes the burden of loss much lighter and affordable. If any of the members are afflicted with harm, the entire group feels responsible for assisting the afflicted member. It is significant since it creates harmony and brotherhood among the participants. As mentioned above, similar features were perceived under the Arab’s tribal customs and practices in the form of ‘*Aqilah*’ regarding the fulfilment of blood money, which was approved and adopted by Prophet Muhammad (PBUH).

Basically, in the *Takāful* scheme, groups of people facing the same peril and harm will be willing to make contributions in the form of a certain sum of money to a common fund, which can be used for the compensation to those members who suffer from a defined loss. For instance, in the case of modern motor policy, a vehicle driver faces many risks daily while driving. These motor-cycle drivers may form a group and make contributions to a particular sum of money to compensate any participant that may suffer an accident. A similar concept of insurance can also be applied to marine and fire. Islamic teachings highly emphasize such fervent arrangements of indemnity and solidarity emphasized by Islamic teachings while similar injunctions are also found in many Holy Qur’anic verses and the sayings of the Prophet Muhammad (PBUH).

Profit maximization is not the primary objective of the *Takāful* scheme. If any of the customers decide to exit from the fund, they receive a full refund of the premium they have paid after deducting the operations

costs; this is however not the case in the conventional insurance (Solomon, 2014). In conventional insurance, the nature of the relationship between the insurance company and the policyholders is of a vendor and vendee, which is undoubtedly different from the *Takāful* scheme. *Takāful* promotes sharing responsibilities to protect policyholders against misfortunes and risks according to the policy (Alhabshi & Shaikh Abdul Razak, 2009).

4.2 *Shari'ah Basis*

The basis of *Takāful* can be deduced from the *Shari'ah* teachings and the injunctions of the Holy Qur'an, the Sunnah and the legal maxims. Allah (SWT) commands Muslims to be involved and contribute to good deeds as it is mentioned in Surat Al-Maidah:

"Help ye one another in righteousness and piety, but help ye not one another in sin and rancour, fear Allah, for Allah is strict in punishment" (Qur'an, 5:2).

The above Qur'anic verse refers to the form of mutual help, spreading good deeds, and practicing virtue. The essence of *Takāful* is to help each other in difficult circumstances wherein removing the perils and hazards from the participants is an excellent form of cooperation which is in line with the commands of Allah (SWT). There are several Ahadith where the Prophet (PBUH) encourages believers to help each other and overcome hazards:

- (i) "Allah (SWT) will always help His servant for as long as he helps his brother [in need]" (Narrated by Imam Ahmad and Imam Abu Daud).
- (ii) "The believers are like the body; when one of its parts is afflicted with pain, the rest of the body will also be affected" (Narrated by Imam Bukhari and Imam Muslim).
- (iii) "One true believer and another true believer are like a building, whereby every part in it strengthens the other part" (Narrated by Imam Bukhari and Imam Muslim).
- (iv) "By my life, which is in Allah's power, nobody will enter Paradise if he does not protect his neighbour who is in distress" (Narrated by Imam Ahmad).
- (v) "Whosoever removes a worldly hardship from a believer, Allah will remove from him one of the hardships of the hereafter. Whosoever alleviates the needy person, Allah will alleviate from him in this world and the next" (Narrated by Imam Muslim).

Preceding *Ahadith* inspires and urges Muslims to take care of each other, work collectively, and think about the needy. With *Takāful* strategy and risk mitigation, hazards and unpleasant events can be alleviated and disbursed over all participants rather than leaving the heirs and the properties to the chance. If the hazard was to be borne individually, it may damage the person and cause him/her severe harm. Hence, it can be perceived that the concept of *Takāful* is highly encouraged in *Shari'ah*. Muslims are responsible for one another and their community. True believers never harm or leave the needy (Alhabshi & Shaikh Abdul Razak, 2009; Engku & Odierno, 2008).

4.3 *Objectives*

Essentially, the objective and the purpose of the *Takāful* scheme is not only about gaining profits but also to support and bear the loss of other participants. The basic concept of *Takāful* revolves around sharing

risks among participants, providing protection, solidarity, cooperation, and mutual help to all participating members in order to overcome unpleasant events and inflictions (Abdullah, 2015). Participants jointly agree to guarantee proper help and monetary compensation to the members of the group for any catastrophe or disaster that may potentially put them in a worse-off situation (Yousof, 1990). As such, the dilemma becomes lighter, and the financial burden of the needy alleviates while preventing them from falling into the debt pit.

The concept of *Takāful* reflects the goals of *Shari'ah* as perceived from the Holy Qur'an and the Sunnah (Abdullah, 2015). Initially, the idea of insurance was altogether neglected by the Islamic jurists since it contained prohibited elements such as uncertainty, gambling, and usury. Notwithstanding, with the introduction of *Takāful* however, these elements were abolished hence revitalizing the concept insurance by implementing the *Takāful* scheme (Khorshid, 2004).

4.4 Risk Management

Some Muslims have a common misunderstanding about the concept of *Takāful*. They assume that by subscribing to *Takāful* one involves into risk mitigation –which in Arabic is known as “*Qada' val Qadar*” (predestination) –and that it is against Allah's (SWT) will; however, it is not. Neither *Takāful* scheme denies predestination nor does it attempt to prevent it. The role of *Takāful* is to merely reduce the impact of the event of hardship after its occurrence.

Preparing to protect oneself from the future catastrophes is evident from the following *Ahadith* and occasions described below.

- (i) It is evident from the Holy Qur'an that Prophet Ya'qub (PBUH), father of Prophet Yusuf (PBUH), resorted to risk management method when he ordered his sons to enter Egypt from different gates (Yasin & Ramly, 2011). The Holy Qur'an states that "And he said, "O my sons, do not enter from one gate but enter from different gates; and I cannot avail you against [the decree of] Allah at all. The decision is only for Allah; upon Him I have relied, and upon Him let those who would rely [indeed] rely" (*Surat Al-Yusuf, Verse 67*).
- (ii) When Prophet Muhammad (PBUH) saw a *Bedouin* leaving his camel untied, he questioned the *Bedouin* saying, "Why don't you tie down your camel?" The *Bedouin* replied, "I put my trust in Allah". The Prophet (PBUH) said, "Tie your camel first, then put your trust in Allah" (Narrated by Imam Tirmizi & Ibn Majah).
- (iii) Saa'd ibn Abi Waqqās (May Allah be pleased with him), one of the companions of the Prophet (PBUH), before his dying had enquired from the Prophet (PBUH) about donating two-thirds of his wealth to charity, the Prophet (PBUH) replied to him that, "it will be better to leave your heirs wealthy rather than leaving them in poverty begging from others".
- (iv) In the era of the second caliph, Umar ibn al-Khattab (May Allah be pleased with him), similar occasions had occurred for instance when a cholera epidemic had wide-spread in some territories, he withheld from entering those areas and justified saying that, "We run from one divine destiny to another".

According to the preceding Qur'anic verse and the Prophetic narrations, Muslims are obliged to safeguard themselves, preserve their properties, and undertake necessary precautions to mitigate risks or losses instead of waiting to be saved miraculously. It is essential to manage *Takāful*'s risks properly according to the principles of the *Shari'ah* and provide a solution when conducting business.

4.5 Prohibited Elements and Proposed Solution

From an Islamic standpoint, none of the aspects of the contract should violate the *Shari'ah* principles. Investments and activities based on *riba* (interest) and gaining profit without bearing risk are prohibited in *Shari'ah* due to its oppressive nature and unfair distribution of risk and return. In order to make it valid, *Shari'ah* requires that all transactions must be free from prohibited elements such as *riba* (interest), *gharar* (uncertainty), and *maysir* (gambling).

4.5.1 Usury (*riba*)

The term *riba* means expansion, growth, increase, usury, interest, or any predetermined excess on loan based on time value of money or for deferred payments when the debtor is unable to settle his debt after a fixed period (BISC Group, 2008; Engku & Odierno, 2008). The reason why *Shari'ah* condemns conventional insurance products is that they are involved in interest-bearing transactions. In the modern financial system, conventional insurance companies rarely keep their collected premiums in cash; usually, it is invested in interest-bearing fixed income instruments. Based on Islamic laws, charging or paying interest is not allowed, regardless of the interest amount or the purpose of the contract (Hachemi et al., 2014). Dealings based on *riba* is a form of injustice leading to manipulation and exploitation where the rich get richer, and the poor becomes poorer. Allah (SWT) prohibits *riba* in the Holy Qur'an gradually in four stages.

In the first stage, Allah (SWT) compares *riba* (interest) with *zakat* (obligatory financial contribution) and *sadaqa* (voluntary charity). Not only that, Allah (SWT) in fact praises *zakat* and *sadaqa* to remind people to think about the repercussions of *riba*.

“And whatever you give for interest to increase within the wealth of people will not increase with Allah. However, what you give in zakah, desiring the countenance of Allah – those are the multipliers” (*Surat Ar-Rum, Verse 39*).

In the second stage, Allah (SWT) condemns Jews' practices of *riba* considering it as *dhulm* (injustice/oppression) since it wrongfully devours people's rights and properties.

"For wrongdoing on the part of the Jews, We made unlawful for them [certain] good foods which had been lawful to them, and for their averting from the way of Allah many [people]. And [for] their taking of usury while they had been forbidden from it, and their consuming of the people's wealth unjustly. And we have prepared for the disbelievers among them a painful punishment” (*Surat An-Nisa, Verses 160-161*).

In the third stage, Allah (SWT) prohibits the method of usury, charging double and multiple.

“O you who have believed, do not consume usury, doubled and multiplied, but fear Allah that you may be successful” (*Surat Ale-Imran, Verse 130*).

In the fourth stage, Allah (SWT) finally prohibits all kinds of *riba*, forbidding charging or gaining any excess over the capital.

“Those who consume interest cannot stand [on the Day of Resurrection] except as one stands who is being beaten by Satan into insanity. That is because they say, "Trade is [just] like interest." But Allah has permitted trade and has forbidden interest. So whoever has received an admonition from his Lord and desists may have what is past, and his affair rests with Allah. But whoever returns to [dealing in interest or usury] - those are the companions of the Fire; they will abide eternally therein” (*Surat Al-Baqarah, Verse 275*).

Immediately in the succeeding Verse, Allah (SWT) says,

“Allah destroys interest and gives increase for charities. And Allah does not like every sinning disbeliever” (*Surat Al-Baqarah, Verse 276*).

Generally, a conventional insurance company deposits and invests its funds in conventional banks and investment instruments or portfolios in which their income is based on interest (*riba*). Additionally, imposing interest against late payment towards premium of the policyholders. Interest-based activity is prevalent in conventional insurance companies. Thus, in order to be compliant with the rulings of *Shari'ah*, *riba* must be excluded from all operations and transactions in *Takāful* business (Billah, 2013).

4.5.2 Uncertainty (*gharar*)

The term *gharar* means ‘deficit in clarity’, ‘deceit’, ‘ignorance’, or ‘uncertainty’ in a business transaction over the terms, substance or attributes of the contract (Abdul Rahman & Redzuan, 2009). Transactions must be devoid of *gharar* since it is a crucial requirement for a contract to be valid in Islam. Prohibition of *gharar* can be deduced from the verse in *Surat-An Nisa* in the Holy Qur'an:

“O you who have believed, do not consume one another's wealth unjustly but only [in lawful] business by mutual consent. And do not kill yourselves [or one another]. Indeed, Allah is to you ever Merciful” (*Surat An-Nisa, Verse 29*).

According to a *hadith* reported by Said ibn al-Musayyib (May Allah be pleased with him), the Prophet (pbuh) “Forbade from an uncertain transaction” (Narrated by Imam Malik). Hence, from the above verse and the narration, uncertainty is prohibited in transactions. In order to protect rights and obligations, to ensure equal power in dealing and provide full consent for involved parties in the contract, it is necessary to eliminate all factors that lead to *gharar*. Contracts will be rendered void due to the existence of extreme uncertainty (*gharar faahish*) which affects the validity of the contract. Minor uncertainty (*gharar yasir*) is generally tolerated and does not affect the validity of the contract. In charitable and unilateral contracts, the existence of *gharar* does not have any adverse effect on the validity, and it is generally tolerated since in the charitable and unilateral contracts nothing is expected in return (Engku & Odierno, 2008).

Furthermore, all terms and conditions must be clearly stated and defined for the parties involved in the business venture. In conventional insurance, policyholders are unaware as to how the profit is generated, realized, distributed and how the funds are invested, which renders the entire agreement as *Shari'ah* non-

compliant. If losses occur, policyholders are compensated; however, if there are no losses, policyholders' premiums are not reimbursed. Additionally, conventional insurance does not practice profit and loss sharing between the participants and the company. However, in a *takāful* scheme, rules and conditions are pre-defined, and the income distribution is transparent in the agreement. *The takāful* scheme is not meant for maximizing profit; instead, it is built based on mutual cooperation, indemnity, and solidarity providing financial assistance as well as moral support against losses and hazards to the participants or their properties.

4.5.3 Gambling (*maysir*)

The term *maysir* means 'betting', 'gambling' or 'wagering'. It may exist in the form of *gharar* since they are intertwined. *Maysir* occurs in the conventional insurance contracts where policyholders give a lesser amount of premium to the insurance company in a hope to get more substantial sum if hazards were to occur. The policyholder may lose all contributed premium if a defined event does not happen, there is always one party that wins, and another loss, which is contrary to the *takāful* scheme (Abdul Rahman & Redzuan, 2009; Hachemi et al., 2014).

Transactions between policyholders and conventional insurance company resemble a game of chance since at the end of the contract there is always one party that loses. To further clarify, if the customer makes a claim, the insurance company loses; and if there is no claim, the customer loses the premium he/she has paid. Majority Islamic jurists consider conventional insurance products to be *Shari'ah* non-compliant as it involves gambling. In *takāful* however, all terms and conditions are precisely defined. Those who suffer from any hazard will be compensated for their contributed premium plus from other participants' donations. Game of chance and gambling are condemned by *Allah* (SWT) in the following verses:

- (i) "...They ask you concerning wine and gambling. In them is a great sin and some profit for man, but the sin is greater than the profit" (*Surat Al-Baqarah, Verse 219*).
- (ii) "O you who believe! Intoxicants and gambling, (dedication of) stones, and (divination by) arrows are an abomination of Satan's handwork: eschew such (abomination), that you may prosper" (*Surat Al-Ma'idah, Verse 90*).

In the above verses, *Allah* (SWT) advised and warned against gambling while prohibiting it in the Holy Qur'an. Islam prohibits all activities that involve uncertainty, and excessive risks where gaining or losing money is based on chances and speculations.

5. The Solution

Generally, the idea of insurance does not contradict the *Shari'ah* laws because the essence is noble, which is to help members to overcome troubles and provide protection against potential losses. It is impossible to reject the idea of insurance in modern life due to people's need for financial support from perils or hazards. In order to make it *Shari'ah* compliant, there was a need to "Islamize" the idea of insurance by modifying and removing prohibited elements that harm policyholders and the society at large. Albeit, the idea of insurance in Islam is as follows:

"Islam is not against the concept of insurance itself but against some of the means and methods that are currently used in conventional insurance. The concept of mitigation of risks by adopting the law of large numbers was widely used in Islam and especially in the practice of "Al-Aqilah" (the practice from ancient Arab tribal custom). However, to be acceptable in Islam, any form of insurance should avoid the elements of riba, maysir and gharar, although elements of gharar may be forgivable depending on the circumstances" (IFSB & IAIS, 2006).

If *takāful* companies avoid depositing collected funds in conventional banks and interest-based investments, *riba* and other prohibited elements will be wiped out automatically. Since the essence of *takāful* is indemnity, solidarity, sharing responsibility, and mutual cooperation, the element of gambling (*maysir*) does not exist. There is no winner or loser; in fact, all members may benefit from the *takāful* scheme. Islamic jurists have suggested avoiding the elements of *gharar* by bringing the conventional insurance scheme closer to the *Shari'ah* principles. It is mandatory to modify conventional insurance to donation (*tabarru'*) and mutual cooperation (*ta'āwun*) contract with a condition of compensation. Experts acknowledge that the elements of *gharar* remain (to a certain extent) in *takāful* because the occurrence of hazard is unpredictable. Due to the benevolent and charitable essence of *takāful*, such uncertainty is acceptable and tolerated (Engku & Odierno, 2008).

The essential difference between Islamic and conventional insurance is the feature of donation. The relation between the conventional insurance company and its clients is a relation of vendor and purchaser of an insurance policy. On the contrary, in the *takāful* scheme, there is no purchasing or selling of the policy, only contributing money based the spirit of donation which is then to be used for compensation to the participant, in the event of a claim.

6. Operational Models

The primary requirement for *takāful* products is to adhere to the *Shari'ah* laws. A *takāful* scheme comprises of two parties, the participants and the operator. The scheme is not profit-oriented, and the nature of contract among members is based on donation whereby all participants agree to donate a sum of money to the fund. The donation is utilized to compensate members in case they face defined perils or hazards. A few commonly used models are listed below.

6.1 Mudārabah Model

The structure of this model is designed based on the principles of *mudārabah*. It is essentially a profit-sharing contract between the capital provider (*rabb-ul-maal*) and the entrepreneur (*mudarib*). *Takāful* operators offer their skills and experiences in managing collected funds and act as a fund manager (*mudārib*). Participants provide the required capital and act as a capital provider *rabb-ul-maal*. Derived profits are shared between parties based on the pre-agreed profit-sharing ratio. However, in case of financial loss, participants are to bear all the losses while the *mudārib*, in this case, does not get compensated (Archer, Karim, & Nienhaus, 2009; Serap, 2013).

There is no salary or periodic payments for the operator except the pre-agreed shares of profit. In the *mudārabah* model of the *takāful* scheme, the capital is owned by the participants (*rabb-ul-maal*); whereas

in the conventional insurance, the capital is owned by the company and the insurer is the sole beneficiary of realized profits (Al-Salih, 2004; Attar, 1983). Figure 1 below illustrates the flow of basic *mudārabah* operational model of the *takāful* scheme.

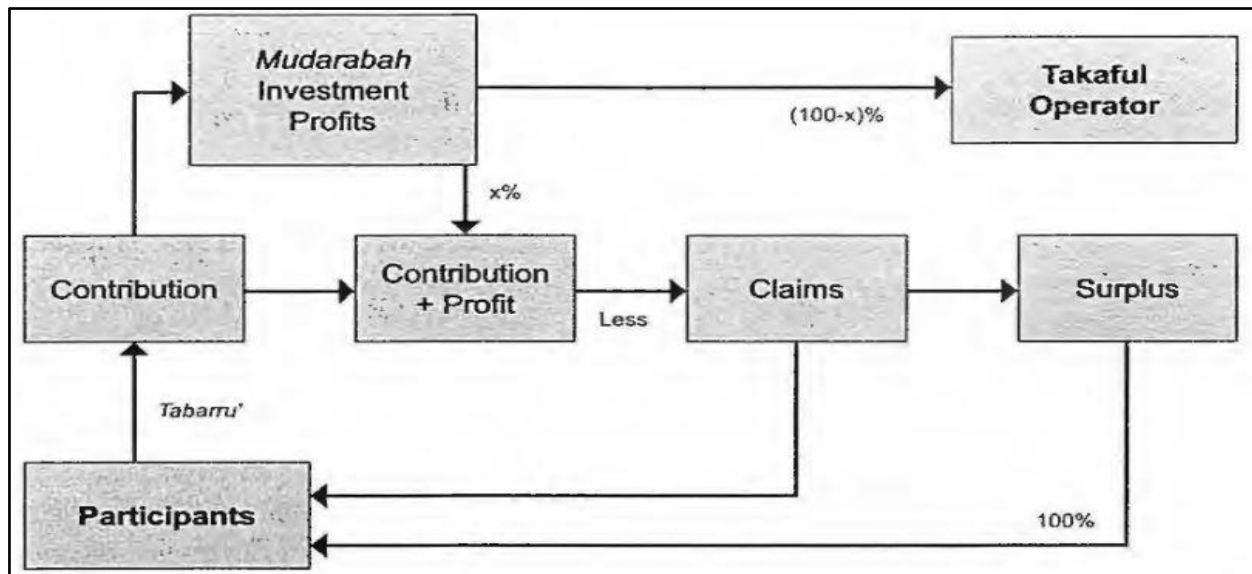


Figure 1: *Mudārabah* operational model in a *takāful* scheme (Engku & Odierno, 2008).

6.2 Wakālah Model

The structure of this model is designed based on an agency contract (*wakālah*). This contract entails an authorization from the participants by the operator to represent and execute permissible dealings. The *takāful* operator acts as an agent of the participants to manage and invest collected funds (Hassan, Abbas, & Zainab, n.d.; Tolefat & Asutay, 2013). The realized profits and losses from investments and *takāful* operation solely belong to the participants. The *takāful* operator, as an agent of the members, is responsible for distributing shares of profits to the participants as per their contribution to the fund and is compensated based on a pre-agreed service fee which is deducted from the collected funds (Andrew, 2007). Figure 2 below illustrates the flow of basic *wakālah* operational model in a *takāful* scheme.

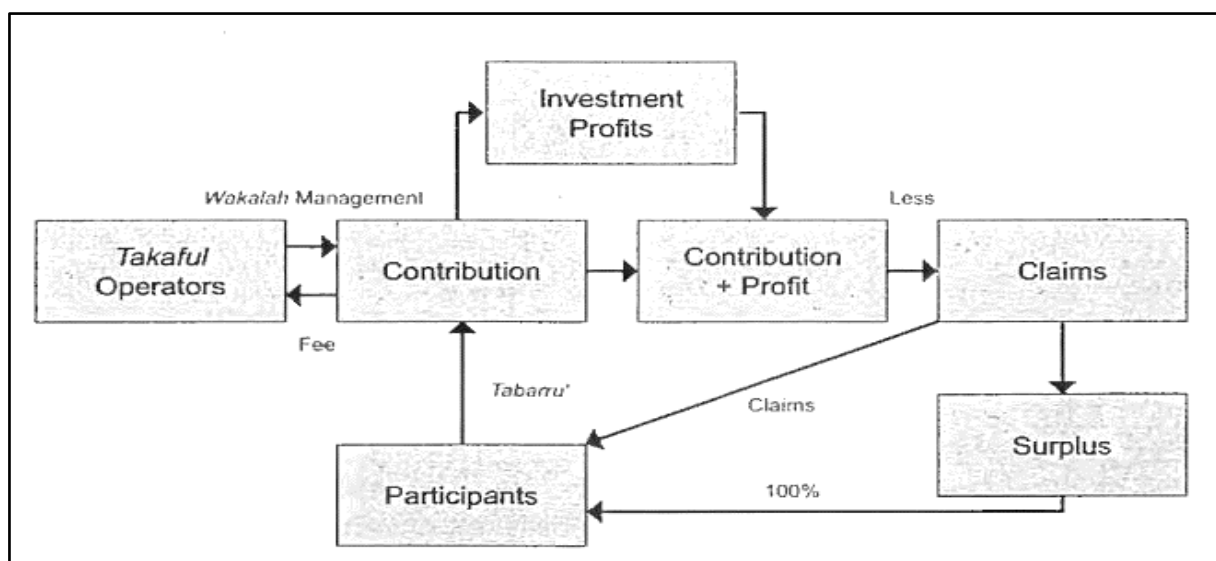


Figure 2: *Wakālah* operational model in a *takāful* scheme (Engku & Odierno, 2008).

6.3 Waqf Model

The structure of this model is designed based on the concept of charity (waqf). It means a "religious endowment" bestowed for the sake of Allah (SWT), which is done by donating permanent assets such as buildings, books, agricultural machinery, livestock, shares stocks and even cash. It is acceptable based on the condition that the physical asset itself is not depleted with the flow of the benefits from such assets (Kahf, 2003). Therefore, the participants of *the takāful* fund have no right to it since the ownership of *the waqf* fund solely belongs to Allah (SWT). They are not entitled to receive any profit or surplus from the fund but are permitted to only claim for compensation in case of occurrence of a misfortune (Tolefat & Asutay, 2013). Figure 3 below illustrates the flow of basic *waqf* operational model in *the takāful* scheme.

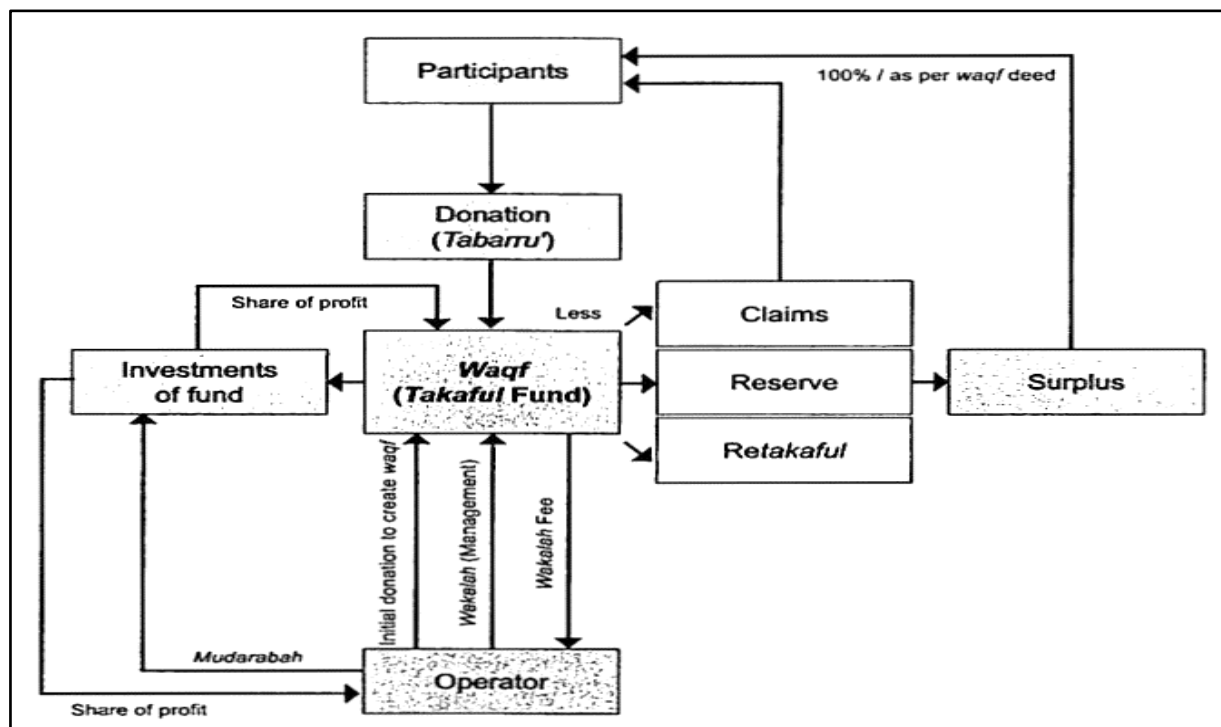


Figure 3: *Waqf* operational model in a *takāful* scheme (Engku & Odierno, 2008).

6.4 Hybrid Model

The structure of this model is designed by combining *mudārabah* and *wakālah* contracts. *Takāful* fund operator and participants sign two contracts simultaneously; *mudārabah* for investment and *wakālah* for underwriting (Tolefat & Asutay, 2013). Enables the operator to act as an agent as well as an entrepreneur at the same time. It receives a fee on *wakālah* basis plus a share from the derived profit based on a pre-agreed *mudārabah* contract. The operator has no right to reserved amounts that remain after redeeming all claims. All losses are entirely borne by the *takāful* participants provided that the *takāful* operator did not act negligently. If proven otherwise, the *takāful* operator bears the losses. Figure 4 below illustrates the flow of transactions in the hybrid (*mudārabah* –*wakālah*) operational model in *the takāful* scheme.

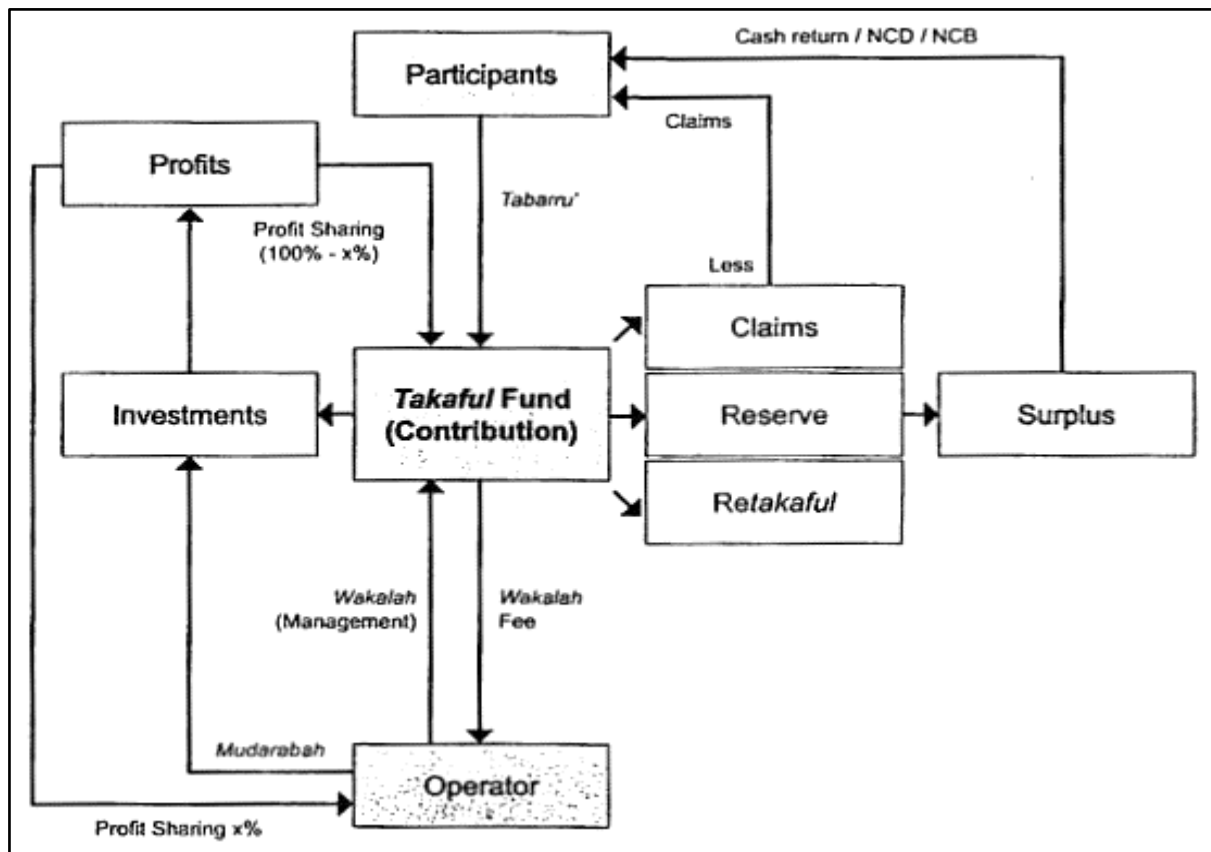


Figure 4: Hybrid (*mudārabah–wakālah*) operational model in a *takāful* scheme (Engku & Odierno, 2008).

In all of the above discussed *takāful* models, the operator allocates the contributed funds in two separate accounts: 1) Participants' Account (PA) where funds are invested in a *Shari'ah*-compliant business. 2) Participants' Special Account (PSA) where members are compensated if there are any losses. After realizing the profit, the surplus is then distributed between members based on their contribution except in the case of *waqf* model, where the realized profit from investments remains in the *takāful* fund without any distribution among the participants (Marifa Academy Team, 2014).

7. Products of *Takāful*

7.1 General *Takāful*

General *takāful* products are typically designed to provide a form of *Shariah*-compliant risk-sharing and risk management mechanisms on an annual renewal basis. In this scheme, the relationship among the participants is based on *ta'awun* and *tabarru'*; whereas the relationship between *takāful* operator and participants, it is based on *mudārabah*, *wakālah*, or *waqf* (Yasin & Ramly, 2011). Several general *takāful* products are designed, and a few of them are as mentioned below.

- (a) Motor *takāful*: This type of policy protects the participant against any losses or damages to the insured vehicle due to theft, accident, fire or third-party property damage or bodily injury.

- (b) Fire *takāful*: This type of policy protects the participant against any losses or damages caused by fire, lightning, or explosion to their properties. It includes but not limited to buildings, machinery, plant, furniture, and accessories. The fire takaful scheme usually excludes damages caused by earthquake, volcanic eruption, or typhoonscheme.
- (c) Engineering *takāful*: This type of policy protects the contractor's interest against any losses, damages, or liability due to different causes to the construction of bridges, buildings, dams, and towers.
- (d) Marine *takāful*: This type of policy protects the participant against any perils or damages to the property while it is in transit. It includes sea peril, collision, stranding, fire, and severe weather. Such coverage may be provided to marine transport or road and aviation. Moreover., it can also be a combination of all (Marifa Academy Team, 2014; Yasin & Ramly, 2011).

7.2 Family Takāful

Family *takāful* products are typically designed to offer protection against the risks of death or permanent disability. Under this scheme, the participant may benefit from long-term savings and investment returns according to a pre-agreed ratio based on *mudarabah*. Also, the participants in a family *takāful* scheme entrust their money to the *takāful* operator and conduct a *wakālah* contract which enables the operator to act as their agent.

The participants' contribution in the form of a donation to the *takāful* fund is deposited in PSA. The funds are used to compensate claimant's family in case of the claimant's demise or permanent disability. The contribution in the form of savings is deposited in PA for investment in *Shariah*-compliant businesses. The *takāful* operator is responsible for distributing the surplus based on participants' contribution to the fund. There are several types of family *takāful* products offered by various operators which are primarily divided into two categories; 1) Individual family *Takāful*: In this type of product, the member of the fund has policy protection against any defined risks, including mortgage, education, or health. 2) Group family *Takāful*: In this type of product, the members have policy protection for themselves and their families against any defined risks, including mortgage, group health, and education. Their families are entitled to receive financial benefits in case of illness, death or permanent disability (Marifa Academy Team, 2014; Yasin & Ramly, 2011).

8. Differences between Takāful Scheme and Conventional Insurance

The common objective of all insurance schemes is the alleviation of the financial burden when peril, hazard or catastrophe occurs to the participants. Nevertheless, there are some differences between the *takāful* scheme and conventional insurance. The *takāful* scheme is designed on mutual cooperation, solidarity, and indemnity while guaranteeing one another against any future losses or catastrophe. Participants jointly agree to share the financial burden and support members of the group in overcoming the defined incident. Collectively donated money to the fund is managed and invested by the *takāful* operator while being utilized to compensate the participants (Maysami, Golriz, & Hedayati, 1997; Muhammad, 2013).

In conventional insurance, the risk and hazards are transferred from the insured party to the insurer company (Pfeffer, 1956). Conventional insurance scheme comprises prohibited elements, which

contradicts the basic principles of Islamic laws (Siddiqi, 1985). The *takāful* company does not act as an insurer; instead its role revolves around managing and investing the contributed funds. The operator is neither selling the risk coverage nor are the participants purchasing it. Additionally, it must be emphasized at this juncture that unlike the conventional insurance, the risk (of having to compensate participants for claims), for the *takāful* operator, is not an exchange for the contributed amount to the fund; instead, the risk is shared among the members (Yousof, 1990). Nevertheless, conventional insurance company acts as an insurer, and its framework is structured based on "risk assumption", while it may pay less (or more) than the actual value of the insured property (Ali, 1989).

In *Takāful* scheme, the sources of funds are from the policyholders wherein the *takāful* operator manages the business activities through *mudārabah*, *wakālah* or *waqf* models. Meanwhile, in conventional insurance, the sources of funds are from the shareholders, and the business activities are solely managed by the insurer (the company) without any participation of the policyholders. In *Takāful* scheme, collected funds are invested in *Shari'ah*-compliant businesses. *Takāful* increases the moral values of the society and offers suitable approaches for abolishing the dilemmas being faced due to the unique risks (Hachemi et al., 2014). When a conventional insurance company sells the policy to the clients, the company agrees to undertake and compensate the clients if they suffer from a defined loss. The inclusions and exclusions of the type of coverage in policy is determined. When an insured event occurs, the company compensates the client; whereas if the defined event does not occur during the period, the company possesses all of the paid premiums and the insured receives nothing.

Although the objectives of an insurance scheme are good, such practices are not compliant with Islamic laws. The existence of the elements of chance and uncertainty creates an ambiguity in the contract, which is not acceptable according to the *Shari'ah* rulings. There is always a winner, and a loser in such a contract where gaining more than the premium paid based on a chance is akin to gambling. The other prohibited instrument in a conventional insurance company is investments in interest-based activities (Alhabshi & Shaikh Abdul Razak, 2009).

Table -1 Comparison between *Takāful* and Conventional Insurance

	<i>Takāful</i>	Conventional Insurance
Contract type	A combination of <i>tabarru'</i> contract and an agency and/or profit-sharing contract.	Contract of exchange (sale and purchase) between insurer and insured.
The obligation of participants/policy holders	Participants are duty-bound to contribute to the scheme and are expected to share the surplus mutually.	Policyholders are duty-bound to pay the premium to the insurer.
The obligation of the operator/insurer	The <i>takāful</i> operator acts as the administrator of the <i>takāful</i> fund and is thus benefited from it. If there is any deficiency in the fund, the <i>takāful</i>	The insurer is liable to pay benefits as promised from the insurance fund and/or shareholder's fund.

	operator must provide interest-free loans (<i>qard al-hasan</i>).	
Returns of the operator/insurer	The <i>takāful</i> operator earns a return for rendering services for managing the <i>takāful</i> funds from <i>mudārabah</i> profit-sharing scheme as <i>mudārib</i> and as an agency fee from <i>wakālah</i> contract.	The insurance company makes a profit when there is an underwriting surplus.
Counter value	Counter-value (<i>'iwad</i>) is the effort and/or undertaking of risk.	No explicit or valid counter-value. Source of profit is anticipating (hoping) that the uncertain future will be in their favour.
Indemnification component	The indemnifications component is based on mutual contribution (<i>ta'awun</i>) reciprocal donation (<i>tabarru'</i>).	The indemnification component is a commercial relationship between the insurance company and the insured.
Insurer-insured relationship	There is no insurer-insured relationship between <i>takāful</i> operator and participants. Participants act as both the insured and the insurer simultaneously.	There is a clear insurer-insured relationship.
Investment fund	<i>Takāful</i> funds must be invested in <i>Shari'ah</i> -compliant instruments.	There is no restriction in investing the funds.

(ISRA, 2016)

As the Prophet (pbuh) said, "There shall come upon the people a time in which the one who is patient upon his religion will be like the one holding onto a burning ember." (Narrated by Imam Al-Tirmizi, No. 2260). In another narration, he stated: "A time will come upon people when they will consume usury". The companions asked him "Is that all of the people?" The Prophet (PBUH) said, "Whoever does not take from it will be [at least] afflicted by its dust" (Narrated by Imam Ahmad, No. 10191).

9. Conclusion

In so far, it is apparent that conventional insurance is designed to be profit-driven rather than being a rescuing tool for its subscribers. Although the subscribers are compensated in the event of the occurrence of the damage in the current insurance practices, they are however deprived of retrieving any of their contribution (paid premium) in the event of the absence of hazard occurrence. Moreover, the insurance company fully benefits financially from the chance of not having to pay its subscribers. In a *takāful* scheme, however, the participants are reimbursed a pro-rated amount of their paid premium in the event if the misfortune does not occur. Thus, the *takāful* scheme is based on an ethical and a just mechanism; the central concept is seen by many as a sustainable alternative to the existing insurance practices.

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Abbreviations

SWT = “*Subhanau Wa Ta’ala*”. An acronym used for praising the one true God the Almighty.

pbuh = *Peace be upon him*. An acronym used in the praise for Prophet Muhammad, the last and final messenger

of God the Almighty.

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Study on China's Investment in Central Asia

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Abstract

The article is devoted to the current topic of today - politics and the economy of China with the countries of Central Asia. The paper poses the problems of China's interests in Central Asia, as well as the prospects for cooperation between these countries. China's role in development of the modern economy is steadily increasing, and therefore the vector investment cooperation with this country is one of fundamental for the countries of Central Asia, which, in addition, are neighbors of China. For China, which has a very limited stock of natural resources, countries rich in oil, gas, and other resources become of strategic importance. The purpose of the study is to identify the results of a comparative analysis of the main interests of the PRC in the Central Asian region, namely in Kazakhstan and to determine the effect of three economic data on Chinese direct investment. To achieve this goal, the "Kao Residual Cointegration Test" and the "Pooled Least Squares" method were used. The research work is using the EViews software and the Pool Least Squares method. The main results were identified and shown in schematic form. The interests and volume of investments of the People's Republic of China in Central Asia were identified in this area. The article has practical value and can be offered for reading to a different target audience.

Key words: China, Central Asia countries, investment, EViews, Cointegration test, Pooled Least Squares.

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1. INTRODUCTION

The People's Republic of China (PRC) is today one of most important countries of the world in the political and economic arena. China like known to be the most populous state in the world, according to an estimate at the end of 2018, China's population was 1.401295 billion people. Over the year, China's population increased by approximately 7193567 people, given that China's population at the beginning of the year was estimated at 1.394102 billion people, an annual increase of 0.52%¹². China has become a leader in the global economy. By 2007, the country became the largest exporter of finished products: the volume of Chinese merchandise exports in 2014 was almost 60% more than in the United States, and 75% in Germany, ranking second and third in the list of countries - world exporters. In terms of imports, China is the second largest world importer after the US. Since China is the first industrial producer in the world, the level of

industrial goods production by this country is 19.8%. In addition, the country is firmly in first place in terms of gold and foreign exchange reserves as of September 2018 (US \$ 3,361 billion)¹³. For comparison, it should be noted that Japan ranks second (1313 billion dollars) by a large margin from China, Russia is in 7th place (459 billion dollars), and the United States is on the 19th line (123 billion dollars).

Despite the above achievements of the country, it has a limited supply of resources. In turn, the neighboring countries of Central Asia, which include Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan, Tajikistan, are rich in resources and useful in connection with which the Beijing authorities are pursuing an active investment policy in the region.

Meanwhile, China's growth factor is also important for Central Asia. China is ready to invest in these countries, since 1992 a huge number of various contracts have been concluded, so, during the SCO summit in Astana on June 8-9, 2017, the parties signed 22 commercial agreements totaling \$ 7 billion[1]. Earlier, in mid-May, Beijing signed a package of economic agreements with Uzbekistan in the amount of \$ 20 billion⁵. Also, as a result of Xi Jinping's visit to the countries of Central Asia, many new investment projects were launched in the fall of 2013. China invests in the development of these countries, thereby supporting and boosting their economies.

In this paper, we analyze investment in China's trade with the countries of Central Asia, identify their volumes and, on the basis of this, identify prospects for China's further investment policy in Central Asia and precisely in Kazakhstan. This topic attracted the interest of many economists, analysts and scientists, for example, Doctor of Economics and Professor of the University MGIMO Zakharova A., Turaeva M.O. being members of the Russian Academy of Sciences.

2. RESEARCH DESIGN AND INVESTMENT

China and Central Asian countries

The independence of Central Asian countries in 1991 meant a fundamental change for China's own geopolitical environment: small sovereign countries, internal and external course, and prospects whose development has not yet been clear. The Chinese government was confident that this region would play an important role for the PRC. Five countries of Central Asia (CA) - Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, with independence, expanded the space for mutual cooperation with China. Since 1992, many intergovernmental agreements on investment and trade cooperation have been signed. China, as is known, being the most populous state in the world, has extremely limited reserves of resources. In turn, the Central Asian countries are rich in resources and minerals. The use of these resources will help China to compensate for the internal deficit and achieve economic benefits. In this connection, China's investments in this region have geopolitical and economic factors. Therefore, China, developing trade and economic cooperation, accelerates the implementation of the government strategy of "going abroad" and increases the scale of direct investment. With the creation of the Shanghai Cooperation Organization (SCO), favorable conditions have been created in the field of investment, and Central Asia has become a "hot" region for Chinese investment.[2]

It should be noted that the idea of forming "One Belt, One Road", put forward by the President of the PRC Xi Jinping and sounded for the first time during his speech in Astana, is also closely connected with China's

investments in this region in the framework of the state visit to Kazakhstan in September 2013. As Xi Jinping noted, China and the countries of the Central Asian region have a common strategic goal consisting in the stable development of the economy, prosperity and the power of states. The Chinese leader stressed the need to “comprehensively strengthen practical interaction” and “convert the benefits of political dialogue, geographic proximity and economic complementarity into cooperation, sustainable growth, creation of community of interests on the basis of mutual benefit and common gain.” The “One Belt, One Road” policy is directed to improve existing and create new trade, transport routes, as well as economic corridors connecting more than 60 countries of Central Asia, Europe and Africa. Creating this path is the main goal of China’s foreign economic strategy, and Central Asia plays a key role in it due to its convenient geographical location.

Today, China mainly purchases oil in the Middle East. Saudi Arabia is the largest oil exporter to China, supplying 370 million barrels per year (15% in China’s oil imports). It is followed by Iraq - 235 million barrels (10%), Oman - 235 million barrels (10%), Iran - 198 million barrels (8%), Kuwait - 106 million barrels (4%) and the United Arab Emirates - 92 million barrels (4 %)[3]. But instability in the Middle East has a direct impact on Beijing’s policies in the region. Due to the fact that the US Navy controls the transportation routes for oil from the Persian Gulf, including in the direction of the South China Sea, China does not feel comfortable, because blockade, China may lose supplies Middle Eastern oil and gas. In this regard, China seeks to find alternative sources of oil imports, which are the countries of Central Asia.

In implementing its regional projects, Beijing uses a wide range of instruments, channels and financing schemes. Most of the funds are allocated on a bilateral basis (direct investment, loans, concessional loans, grants), and other financial resources are allocated through international financial institutions and organizations (ADB, SCO, ABII).

Another priority for China is energy security. That is why Kazakhstan and Turkmenistan, rich in energy resources, are of great importance for the state. China is pouring large sums into the energy sector, which includes minerals, oil, gas, oil exploration and prospecting, pipelines, roads, routes, etc. For Beijing, which seeks to diversify its sources of resources, Central Asia is growing in importance as one of its reserves of raw materials [4].

As can be seen from the above, Central Asia is extremely important for China in strategic and economic terms. Consider the economic transactions and the volume of Chinese investment in these countries.

3. RESEARCH MAIN FINDINGS

Industries and volumes of China’s investment in the Central Asia Countries

China’s economic presence in the countries of Central Asia is becoming increasingly complex. The situation in the countries of Central Asia is directly related to the interests of the PRC. China borders with three Central Asian countries - Kazakhstan, Kyrgyzstan and Tajikistan, the total length of the border with which exceeds 3000 km.

The countries of Central Asia are China’s closest neighbors, so the development of cooperation with them is extremely important for this country. Central Asia can become a new market for Chinese goods and services, at the same time it is an important source of raw materials, which can bring real economic benefits

to the country, accelerate the economic development of Western China and solve the problem of internal inter-regional disparities. Rich in oil and gas resources, Central Asia is recognized as one of the main suppliers of non-renewable resources. Energy cooperation is beneficial for both partners. Central Asia is able to meet China's growing energy demand. The Chinese market allows the countries of Central Asia to increase the volume of exports of oil and gas resources, solve the problem of regional export diversification and gain greater economic benefits.

China's investment activity in Central Asia is multifaceted and dynamic. Beijing uses a wide range of instruments, channels and financing schemes for regional projects. The main part of the funds is allocated on a bilateral basis, these include direct investments, loans, soft loans, grants, and the rest - through the international financial institutions and organizations (SCO).

In the late 1990s, PRC's direct investments in the region did not exceed \$ 1 billion and were limited to the oil and gas sector. After 10 years, their volume increased by more than 20 times, turning Beijing into the main financial donor of the Central Asian countries.¹⁴ The influence of China became especially noticeable after the 2008 crisis, when the traditional sponsors of the region (Russia, USA, Europe) faced their own budget problems. In the second decade of the XXI century. Cooperation more widely spread not only to the fuel and energy complex, but also to other sectors of the economy: infrastructure, construction, assembly plants, and agriculture.

It is worth noting that, within the framework of the Shanghai Cooperation Organization (SCO), China has managed not only to gain trust from the countries of Central Asia, but also to establish truly friendly relations with them.

Over the past few years, China has become the main importer in three of the five Central Asian countries: Kyrgyzstan, Tajikistan and Uzbekistan. So, in 2015, 56% of all imports to Kyrgyzstan came from China. A similar situation exists in Tajikistan, in which the PRC imports accounted for 41%¹⁵. China is also the leader in imports to Uzbekistan - about 20%. As a result, by the end of 2015, accumulated Chinese direct investments in Kazakhstan, Uzbekistan and Turkmenistan exceeded Russian 11 times. The main direction of investment is the mineral resource complex. It is here that 95–98% of Chinese foreign direct investment in the region of Central Asia is concentrated. Consider the investment structure and economic policy of China in each of the countries of Central Asia.

Kazakhstan

Kazakhstan for China is a kind of gateway to Central Asia, as the main energy and transport corridors pass through this country, with which the Silk Road Economic Belt will be connected. The country is interesting as a rich source of natural resources, a profitable market for Chinese goods. Kazakhstan is the leader among XUAR 10 trading partners, which, of course, makes it very attractive for China. According to the EDB (The Eurasian Development Bank) Center for Integration Research, by 2015 out of \$ 27 billion in Chinese direct investment accumulated by major CIS economies, Kazakhstan accounted for 23.6 billion dollars[5].

Table 1

Chinese direct investment and trade turnover of Kazakhstan and China for 2015 – 2018

Kazakhstan and China. US\$ million				
	Chinese direct investment	Trade turnover	Export	Import
2015	838,4	10 567	5 480	5 087
2016	974,7	7 896	4 228	3 668
2017	1 082	10 469	5 777	4 692
2018	1 153	11 657	6 272	5 384

As can be seen from table 1, from 2015 to 2018, the volume of foreign direct investment of China in Kazakhstan almost constantly grew, China is not the main investor of Kazakhstan. The trade turnover between the countries is the largest among the countries of Central Asia, in 2016 there is a decrease in this indicator. Foreign trade turnover between Kazakhstan and China for 2016 amounted to \$ 7,896 million, a decrease of 26% for the same period in 2015. Experts, the main reasons, apart from the devaluation of the tenge, which reduced the solvency of the currency, see a decline in prices for exported raw materials and a downturn in the economy, which caused a decrease in demand.

The most attractive for Chinese investments are the oil and gas and transport and logistics sectors of Kazakhstan's economy. Oil reserves in Kazakhstan are estimated at 5.5 billion tons, and natural gas - at 1.8–2.4 trillion cubic meters. In 1997, between the Ministry of Energy and Mineral Resources of Kazakhstan and the largest Chinese the state oil and gas company China National Petroleum Corporation (CNPC) signed an agreement on cooperation in the field of oil and gas, as well as agreement on the construction of an oil pipeline from Kazakhstan to China. In the total amount of Chinese FDI accumulated by Kazakhstan, the development of the fuel and energy complex and pipeline transportation account for \$ 21.2 billion. In addition, in mining and processing 81% of investments were directed to energy resources, 19% - to transportation of oil and gas. According to the information of the National Company KazMunai Gas JSC, at present China controls up to 30% of all oil production in Kazakhstan. CNPC - China's largest oil company, ranked 4th in the ranking of the best Fortune Global 500 13 companies - is the main foreign player in the oil market in Kazakhstan. The company bought out LUKOIL's stake in Kazakhoil - Aktobe, and in 2013 acquired \$ 8.33% of shares in the Kashagan field for \$ 5 billion.¹⁹

An important area of cooperation between countries is the implementation of a number of joint transport and logistics projects that significantly expand opportunities for economic cooperation between countries. For Kazakhstan and China, a very important event was the commissioning in 2013 of the Zhetygen – Korgas railway line (293 km) with the Khorgos junction and Altynkol station serving it. The launch of the new railway line made it possible to reduce the distance from China to the southern regions of Kazakhstan and the Central Asian countries by about 550 km. By According to expert estimates, by 2020, two thirds of all trade flows from China to Europe will pass through “Khorgos” - Eastern Gate, with an increase in

their volume in 2010–2020. by 45%, which again brings us back to the idea of “One Belt - One Road” and allows us to the conclusion is that Kazakhstan will truly become the gateway to this path.

Kyrgyzstan

China's investment plays a huge role in the economic development of Kyrgyzstan, which makes it one of the main trade and economic partners of the CIS republic. In Kyrgyzstan, Chinese investments include such areas as light and food industry, processing of agricultural products, planting and planting of agricultural crops, development of mineral resources and metallurgy, construction contracts, communication and transportation services, real estate development, food industry.

Table 2

Chinese direct investment and trade turnover of Kyrgyzstan and China for 2015 – 2018

Kyrgyzstan and China/ US\$ million				
	Chinese direct investment	Trade turnover	Export	Import
2015	474,4	1 095	60	1 035
2016	301,3	1 563	80	1 483
2017	303,0	1 591	97,5	1 493
2018	123,2	1 812	13	1 799

As follows from the table above, Chinese direct investment in 2018 declined by almost 56% to \$ 123 million. This is due to the fact that, firstly, the Kyrgyz population does not engage in dialogue with foreign investors. Secondly, the monitoring policy in China's financial market has intensified. Trade turnover between the countries slightly but increases. Almost 95%, a huge volume of trade is import of goods in Kyrgyzstan.

Kyrgyzstan exports most of its products to the markets of the EEU (Eurasian Economic Union), mainly to Russia and Kazakhstan. China is the second largest trading partner Kyrgyzstan after Russia. Chinese investors are active in Kyrgyzstan. Major investment projects are the repair of the road plot located on the Kyrgyz-Chinese border area, oil exploration and production in the Alai Kyrgyzstan, exploration and mining of minerals (iron ore, tin, gold deposits), etc.

According to official data from the Ministry of Industry and Trade of Kyrgyzstan, the interest of Chinese companies is primarily focused on chemical industry, as well as enterprises engaged in the extraction and processing of rare earth metals. The main investors are large state companies and investment funds that buy real estate available on the market, and also invest in the creation of joint Chinese-Kyrgyz enterprises. “If earlier China was not very active in the region, and expansion was observed in the form of a stream of Chinese goods, now we see a vigorous activity Chinese companies in Kyrgyzstan. They show interest in all spheres, and the projects are already of a state scale,” political scientist Azamat Temirkulov notes. “As a result, China will gain access to many fields.”

Over the past few years, the Chinese side has allocated a number of grants to Kyrgyzstan for the

development of infrastructure and the social sphere. In 2008, the PRC government allocated a grant of 50 million yuan for the development of transport and maintenance economic stability in Kyrgyzstan. In 2011, the Kyrgyz and Chinese governments signed an agreement on technical and economic cooperation, in under which Beijing has pledged to grant Bishkek a grant of 30 million yuan for the development of innovation and the strengthening of the country's economy.

Uzbekistan

The rapidly growing economy of Uzbekistan, its favorable geographical location in the center of the region, modern transport communications, a reliable strategy to attract investment increase interest in cooperation among representatives of the Chinese business community. Over the past years, China has become one of the key economic partners of Uzbekistan, a major investor and an interested participant of the programs on structural transformation and modernization of the economy being implemented in Uzbekistan.

Table 3

Chinese direct investment and trade turnover of Uzbekistan and China for 2015 – 2018

Uzbekistan and China. US\$ million				
	Chinese direct investment	Trade turnover	Export	Import
2015	480,8	3 495	1 267	2 228
2016	529,5	3 614	1 607	2 007
2017	502,2	4 120	1 400	2 720
2018	240,1	6 428	2 869	3 559

Looking at table 3, it can be said that Chinese direct investment in Uzbekistan is approximately 500 million each year, the volume of investment for 2018 is presented only in 3 quarters, the trade turnover between the countries increases from year to year, this suggests that China is becoming a strong partner of Uzbekistan. During the visit to the PRC 11- On May 15, 2017, President of Uzbekistan Shavkat Mirziyoyev held talks with the leadership of Beijing. During the state visit the country signed 105 cooperation documents totaling about \$ 23 billion.¹⁶

In particular, the parties will develop cooperation in the field of transport, technology, hydropower, oil and gas industry and in the humanitarian sphere. As Shavkat Mirziyoyev noted at these negotiations, "at present, China is one of the leading states making major investments in the economy of Uzbekistan. The country has more than 700 companies and enterprises with the participation of Chinese capital. Over the past years, Chinese investors invested in the economy of Uzbekistan about 7.8 billion dollar investment." At the end of 2016, the volume of mutual trade turnover between the countries amounted to 4.25 billion dollars. China's demand for goods produced in Uzbekistan increases textile, agricultural products, plastic products. The Chinese side praised the dynamics of the economic development of Uzbekistan and large-scale structural changes and expressed interest in the development of cooperation in the field of high technologies, in particular, through the creation of industrial and technological parks.

At the expense of Uzbekistan, China seeks to strengthen its geopolitical influence in Central Asia. Chinese companies are showing interest here in the oil and gas, electric power, chemical industries, developing fields in the Fergana Valley and at the bottom of the Aral Sea, are building gas processing plants. According to CNPC management, “by the end of 2019, the Chinese company plans to mine in Uzbekistan up to 1 billion cubic meters gas per year. In the period 2014-2019 \$ 277 million will be additionally invested in gas production”

Tajikistan

China has become the leader in terms of direct investment in the economy of Tajikistan, as reported by Xinhua. For the first quarter of 2017, the total size Chinese accumulated direct investment amounted to \$ 76.6 million, representing 58.2% of the total foreign investment in the country. According to the head of the State Committee on Investments and State Property Management of Tajikistan, Faiziddin Kakhhorzoda, “in just the first 3 months in 2017, \$ 131.5 million has been transferred to the economy of Tajikistan”. Cash went to support the activities of 339 Tajik enterprises.

Table 4

Chinese direct investment and trade turnover of Tajikistan and China for 2015 – 2018

Tajikistan and China. US\$ million				
	Chinese direct investment	Trade turnover	Export	Import
2015	272,6	792,9	29,1	763,9
2016	312,5	885,1	44	841,1
2017	303,2	591,6	35,4	556,2
2018	321,2	655,3	32,7	622,6

As can be seen from table 4, Chinese direct investment from 2015 began to grow. The trade turnover between the countries varies within 800 million and most of them are Chinese exports to Tajikistan.

Investment in Tajikistan covers telecommunications, textile industry, agriculture, construction of power lines and electrical substations, the development of road transport and others. Basic Chinese investment projects include the construction and reconstruction of the Dushanbe highway Kettle-Khujand, the construction of high-voltage power line 500 kV transit South-North and Lolazol-Khatlon, construction of the Shar-Shar tunnel on the Dushanbe-Kulyab road, reconstruction of the highway in the border areas of Tajikistan and Kyrgyzstan. Since the establishment of diplomatic relations, the government of China allocated to Tajikistan financial assistance in the amount of more than 404 million yuan (not including concessional loans from the Chinese government to the SCO partner countries [4, p. 39].

In general, Tajikistan, which does not possess significant reserves in demand PRC resources difficult to offer anything to Beijing: exporting its own products to China does not play a significant role for the country, and the balance of foreign trade with China sharply negative.

“China will not refuse to give countries such as Tajikistan a loan or a grant, and may even sacrifice the interests of their investors in order to keep small countries on a leash. In China, they are well aware that, having received the requested support, these countries automatically become obliged to him and, in turn, will no longer refuse to provide any services will be required,” said political scientist Sobir Khamidov.

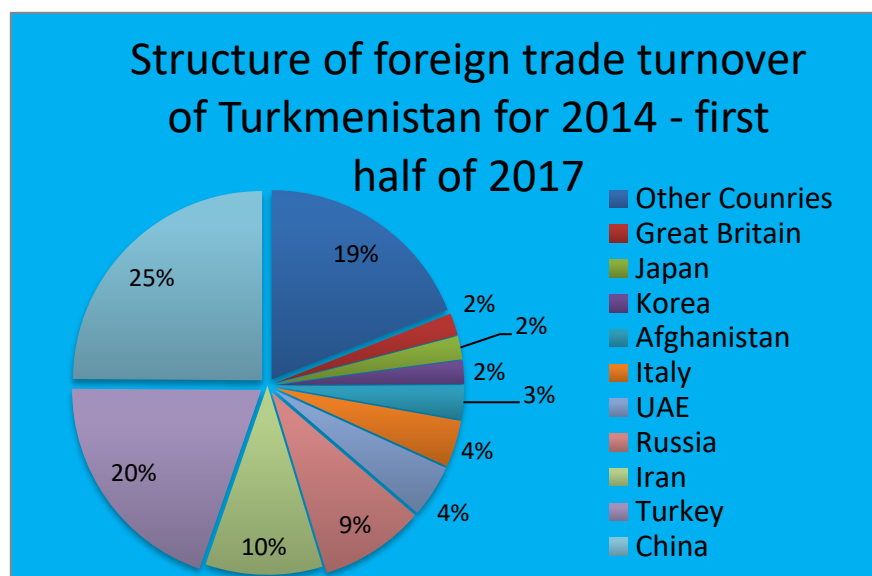
On the example of Tajikistan, a political scientist pointed out that practically all the rich The republic’s gold deposits are being developed by Chinese companies. Chinese farmers receive land for agricultural purposes. Chinese companies are allowed to place enterprises in the territory of the republic that cause environmental damage (cement plants), which the PRC due to a sharp deterioration ecological condition in the country plans to fully withdraw for its repartition.

Turkmenistan

China pays special attention to increasing the import of natural gas from Turkmenistan. This Central Asian country reportedly possesses fourth-largest gas reserves in the world, and in 2016, Turkmenistan supplied about 30 billion cubic meters of “blue fuel” to China. (Given the closed nature of the political system of Turkmenistan, there are no accurate data in the public domain). In Turkmenistan, China exported from the country in 2014 to China. This was largely due to the opening of the Central Asia-China gas pipeline in 2009, built mainly for Chinese loans; now its fourth branch is passing, which is supposed to pass from Turkmenistan through the territory of Uzbekistan, Tajikistan and Kyrgyzstan.

Figure 5.

Structure of foreign trade turnover of Turkmenistan for 2014 - first half of 2017



Based on figure 5, it can be said that China is one of Turkmenistan’s major partners, for 4 years China has taken the first place in the state’s foreign trade, in percentage terms it is 25%.

According to the forecasts of the International Energy Agency, the demand for gas in China will grow by 8.7 percent per year until 2022. China’s own energy reserves are insignificant, so it needs to expand access to international sources. In addition, Beijing pays special attention to the buildup of land supply routes to

reduce reliance on maritime shipments through the Strait of Malacca, which can easily be blocked in case of potential conflict.

As noted by Sun Weidong in the first 9 months of 2018, the volume of trade between the countries reached 6.85 billion US dollars and grew by 16.2% over the same period last year. China has been Turkmenistan's largest trading partner for 8 years in a row. The China-Turkmenistan main pipeline is a symbolic bridge of traditional friendship between the two nations.

In 2009, the China Development Bank provided Turkmenistan with the initial \$ 3 billion loan to develop the Galkynysh gas field (also known as South Yolotan-Osman), and two years later, Ashgabat received an additional tranche of \$ 4.1 billion.

In addition, a consortium led by the China National Petroleum Corporation (CNPC) concluded in 2009 a production sharing agreement (PSA) at the field Galkynysh worth \$ 10 billion. By that time, the CNPC portfolio already had a similar agreement on the Baghtyrylyk oil and gas project covering several fields, including Saman-Depe and Altyn Asr. According to the Galkynysh agreement, Turkmenistan has pledged to annually supply 30 billion cubic meters of gas to China for 30 years. But Beijing and Ashgabat intend to increase annual exports to China to 65 billion cubic meters - 30 billion from Galkynysh, and the rest should be covered by Baghtyrylyk and other deposits. [5]

The main obstacle to the realization of this goal is the lack of sufficient capacity to export products. The existing network of pipelines in China is working at the limit of its capabilities, and the expansion of the network suspended. At the same time, the economy of Turkmenistan faced the problem of a sharp declining export earnings caused by low energy prices.

4. STATISTIC METHODS AND ANALYSIS

Above, we have considered the investments and economic activities of China in Central Asian countries. And as can be seen from the above, Kazakhstan is one of China's major partners in the field of investment and in money transfers. Using the example of Kazakhstan, we will consider direct Chinese investments and the three main indicators of the state, gross domestic product, commodity turnover between the two countries and the National budget deficit of Kazakhstan. To achieve this goal, the Eviews software was used. Detailed information is provided below in table 6.

Table 6.

Economic data of Kazakhstan for 2009 - 2018.

Year	Chinese direct investment US\$ billion Y	GDP US\$ billion x1	Trade turnover between Kazakhstan and China US\$ billion X2	National budget deficit US\$ billion X3
2009	0,936	115,30	9,458	1,349
2010	1,717	148,00	14,080	1,465
2011	1,693	192,60	19,700	1,520
2012	2,414	208,00	21,670	2,349
2013	2,246	236,60	22,730	1,895
2014	1,861	221,40	17,150	2,854
2015	0,838	184,40	10,560	2,407
2016	0,974	137,30	7,896	2,384
2017	1,082	159,40	10,490	1,526
2018	1,153	184,20	11,650	1,425

First, the study examines whether the gross domestic product, turnover, and the state budget deficit affect foreign investment in a given country. For this, Chinese direct investment was taken as “Y”, GDP as “X1”, Trade turnover as “X2” and National budget deficit respectively. We do cointegration test by using the “pool” method so as to find the relationship between explanatory variables and Chinese direct investment. Panel (data) analysis is a statistical method, widely used in social science, epidemiology, and econometrics to analyze two-dimensional (typically cross sectional and longitudinal) panel data. The data was collected over time and for the same persons, and then regression is performed on these two dimensions.

Table 7

Kao Residual Cointegration test with pool method

	t-Statistic	Prob.
ADF	-6.554779	0.0000
Residual variance	5.77E+16	
HAC variance	1.79E+16	

The Kao test specifies cross-section specific intercepts and homogeneous coefficients on the first-stage regressors. In the bivariate case described in Kao (1999), we have $y_{it} = a_i + bx_{it} + \varepsilon_{it}$ for

$y_{it} = y_{it-1} + u_{i,t}$, $x_{it} = x_{it-1} + \epsilon_{i,t}$ for $t = 1, \dots, T; i = 1, \dots, N$. More generally, we may consider running the first stage regression $y_{it} = a_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \dots + \beta_{Mi} x_{Mi,t} + \varepsilon_{i,t}$ requiring the a_i to be heterogeneous, β_1 to be homogeneous across cross-sections, and setting all of the trend coefficients γ_1 , to zero. Kao then runs either the pooled auxiliary regression, $\varepsilon_{it} = \rho \varepsilon_{it-1} + v_{it}$ or the augmented version of the pooled specification, $\varepsilon_{it} = \tilde{\rho} \varepsilon_{it-1} + \sum_{j=1}^p \psi \Delta \varepsilon_{it-j} + v_{it}$. Under the null of no cointegration, Kao shows that following the statistics,

$$DF_p = \frac{T \sqrt{N}(\hat{p}-1)+3\sqrt{N}}{\sqrt{10.2}},$$

$$DF_t = \sqrt{1.25}t_p + \sqrt{1.875N},$$

$$DF_p^* = \frac{\sqrt{NT}(\hat{p}-1)+3\sqrt{N}\hat{\sigma}_v^2/\hat{\sigma}_{0v}^2}{\sqrt{3+36\hat{\sigma}_v^4/(5\hat{\sigma}_v^4)}},$$

$$DF_p^* = \frac{t_p + \sqrt{6N}\hat{\sigma}_v/(2\hat{\sigma}_{0v})}{\sqrt{\frac{\hat{\sigma}_{0v}^2}{(2\hat{\sigma}_{0v}^2)} + 3\hat{\sigma}_v^2/(10\hat{\sigma}_{0v}^2)}}$$

Table 8

Method: Panel Least Squares.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID?(-1)	-2.035734	0.248934	-8.177801	0.0000
D(RESID?(-1))	0.298400	0.134809	2.213503	0.0329
R-squared	0.855085	Mean dependent var		-17248963
Adjusted R-squared	0.851271	S.D. dependent var		2.73E+08
S.E. of regression	1.05E+08	Akaike info criterion		39.83035
Sum squared resid	4.21E+17	Schwarz criterion		39.91480
Log likelihood	-794.6071	Hannan-Quinn criter.		39.86089
Durbin-Watson stat	1.381490			

A common panel data regression model looks like $y_{it} = a_i + bx_{it} + \varepsilon_{it}$ where y is the dependent variable, x is the independent variable, a and b are coefficients, i and t are indices for individuals and time. The error ε_{it} is very important in this analysis. Assumptions about the error term determine whether we speak of fixed effects or random effects. In a fixed effects model, ε_{it} is assumed to vary non-stochastically over i or t making the fixed effects model analogous to a dummy variable model in one dimension. In a random effects model, ε_{it} is assumed to vary stochastically over i or t requiring special treatment of the error variance matrix. Clearly shows that t-Statistics are more than 1.95 and the probability is equal to 0.0329 which is lower than 0.05. Considering the above, as well as based on the results, we accept no

cointegration. Since there is no cointegration we use pooled Least Squares to compare the influence of X1, X2 and X3 respectively.

Then estimate a pool specification using the common regressor list: X1, X2 and X3 where the latter pool series expression refers to a set of 10 implicit series containing dummy variables for group membership. The implicit series associated with the identifiers “X1”, “X2”, and “X3” will contain the value 1, and the remaining seven series will contain the value 0.

The results from this estimation are given by:

Table 9

Pooled Least Squares.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.003600	0.001069	-3.367873	0.0015
X2	0.120412	0.008123	14.82325	0.0000
X3	0.197374	0.054085	3.649307	0.0007
R-squared	0.913765	Mean dependent var		1.49E+09
Adjusted R-squared	0.910095	S.D. dependent var		5.47E+08
S.E. of regression	1.64E+08	Akaike info criterion		40.72690
Sum squared resid	1.26E+18	Schwarz criterion		40.84162
Log likelihood	-1015.172	Hannan-Quinn criter.		40.77058
Durbin-Watson stat	3.118263			

It is crystal clear that all the parameters are correct, but it is worth noting that X2 (trade between the two countries) gives the smallest probability that means the effect of this parameter on Y more than others. The difference is statistically significant at conventional levels.

The basic class of models that can be estimated using a pool object may be written as:

$$Y_{it} = \alpha + X_{it}'\beta_{it} + \delta_i + \gamma_t + \epsilon_{it}$$

where Y_{it} is the dependent variable, and X_{it} is a k -vector of regressors, and ϵ_{it} are the error terms for $i = 1, 2, \dots, M$ cross-sectional units observed for dated periods $t = 1, 2, \dots, T$. The α parameter represents the overall constant in the model, while the δ_i and γ_t represent cross-section or period specific effects (random or fixed). Identification obviously requires that the β coefficients have restrictions placed upon them. They may be divided into sets of common (across cross-section and periods), cross-section specific, and period specific regressor parameters.

$$Y_{it} = -0,003600 * X1 + 0,120412 * X2 + 0,197374 * X3$$

Estimation command can be clearly described in the form of the following model.

Estimation Command:

=====

LS Y X1 X2 X3

Estimation Equations:

=====

$$Y = C(1)*X1 + C(2)*X2 + C(3)*X3$$

$$Y = C(1)*X1 + C(2)*X2 + C(3)*X3$$

$$Y = C(1)*X1 + C(2)*X2 + C(3)*X3$$

$$Y = C(1)*X1 + C(2)*X2 + C(3)*X3$$

$$Y = C(1)*X1 + C(2)*X2 + C(3)*X3$$

Substituted Coefficients:

=====

$$Y = -0.00360025850883*X1 + 0.120411780486*X2 + 0.197373622896*X3$$

$$Y = -0.00360025850883*X1 + 0.120411780486*X2 + 0.197373622896*X3$$

$$Y = -0.00360025850883*X1 + 0.120411780486*X2 + 0.197373622896*X3$$

$$Y = -0.00360025850883*X1 + 0.120411780486*X2 + 0.197373622896*X3$$

$$Y = -0.00360025850883*X1 + 0.120411780486*X2 + 0.197373622896*X3$$

5. CONCLUSION

This article has demonstrated that the economic activities of China in the countries of Central Asia play an important role for both China and the Central Asian region. Thus, we have traced that China's investments in Central Asian countries are growing and play a large role in the economy of both parties. As for the future prospects of the development of the Chinese economy, Xi Jinping in September 2016 in the city Hangzhou during the G2016 summit declared China's intention to play a key role in global governance and called on the world community to create a new political and economic architecture of the planet - a community with a single fate, where the role of leader China will be allocated with its economic power and resources. By 2020 the country must turn from a regional power into a global one. Similar bold the statement could not be made without justification: according to calculations based on the forecast of China 2030 China's expected economic dynamics will be as follows: by 2020, China's share in world GDP will increase to 22.3%, and by 2030 - to 26.1%.¹⁷ Similar growth It is planned to be implemented using such mechanisms as the transition from the model of priority development of industry to the growth of the economy through the strengthening of services, that is, to make the final transition to the post-industrial stage development. China's investment in Central Asian countries, which are an important source of energy and a sales market for China, will also play a primary role in this. In addition, in accordance with the pooled least squares, the study showed that trade has an important role in direct investment. In order to increase the amount of investment in the countries with the least data, our proposal is the following, need to rationalize the geopolitical situation between the countries and consider questions about trade turnover.

6. ACKNOWLEDGMENTS

This article is original and has not been published previously. The value of the article is in comparing the economic and geopolitical relations of China with the countries of Central Asia as well as in considering the impact of the three economic parameters on China's investment policy. Since the topic of this article is relevant for today, the validity period is unlimited, this article can be updated. The originality of the article is to consider the economic and political situation of all 6 countries and to use EViews software. Special thanks to my supervisor and everyone who helped me in the implementation of my goal. It was not easy work that helped me gain more experience and increase knowledge, but this experience is very valuable to me. I hope this is not my last article and I will try to publish more articles with more on various topics.

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A review of urbanisation and transport challenges in developing countries

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Abstract

This paper provides a review of the challenge of urbanisation and urban transport from a planner's perspective. Following the establishment of the relationship between urban structure and transportation, it goes ahead to describe urbanisation and how its rate varies from developed countries to developing one. It also presents urbanisation as a challenge planner are having difficulty with combating. It then identifies transport planning as an important component of urban planning, points out some of the challenges of transport planning, and describes why some approaches were unsuccessful. Finally, some promising planning options are described. It concludes that while the uptake of these promising options is slow, they have the potential to resolve development problems in cities facing urbanisation challenge.

1.0 Introduction

There exists a close relationship between the nature of the urban transportation and the urban structure (Pacione, 2009; Ogunsanya, 2002; Muller, 1986). This is more so as transport plays a significant role in the origin and continual survival of any settlement. The movement of people, goods and services within the urban area has been a vital aspect of the city life. Urban form was compact and walkable prior to the invention of modes of transport that enhances long distance travel and as transport technology improves, various urban forms emerges (Pacione, 2009; Ogunsanya, 2002; Muller, 1986). The invention of the motor vehicle ushered in the most dramatic innovation in transportation by radically overhauling the transport system (Glaser and Kahn, 2004). It facilitated the public transport which made dispersal of jobs, shopping and residential locations possible (Muller, 1995; Ogunsanya, 2002; Glaeser and Kahn, 2004). What this process leaves behind is urbanisation.

Urbanisation is a global phenomenon that is occurring mainly in the developing countries of the world. The world's urban population was estimated to be 220 million in 1900. By the year 1950, this figure has risen to 730 million and 2.3 billion by 1990 (Devas and Rakodi, 1993). It reached an alarming 3.2 billion in 2005 and is still growing (Akunnaya and Adedapo, 2014). At city level, the situation is similar: In 1950, there were two megacities in the whole world - New York city with a population of 12 million and; Tokyo with 11 million inhabitants (UNPFA, 2011). By 1975, the number has increased to three and by the year 2004, there were already about 20 megacities and the number is expected to have greatly increased by year 2020. These cities now account for about a tenth of the world's urban population with most of the megacities in the developing countries of the world. Most developed countries are now experiencing

counter urbanisation process (Grimsrud, 2011) whereas rapid growth is being experienced in the developing countries especially in Asia and Africa where there is acute shortage of basic infrastructure (Akunnaya and Adedapo, 2014). Specifically, it is estimated that by 2020, Mumbai, Delhi, Mexico City, Dhaka, Jakarta, Sao Paulo and Lagos will be having over 20 million inhabitants thereby making the cities extremely difficult to manage (UNPFA, 2007).

Moreover, while the rate of urbanisation in Europe and other countries of the West was a gradual process initially influenced by increase in agricultural productivity and industrialisation that translated into economic growth, that of developing world, especially those of the global south has been more rapid, dramatic, challenging and resulting majorly from rural-urban migration (Devas and Rakodi, 1992; Njoh, 2003; Kessides, 2007). The case of Africa is particularly intense. The current rate of urbanisation is put at 40%, far exceeding those of Europe, America and Australia (Parnell and Pieterse, 2014) and is expected to reach 50% by the year 2030 (UN DESA, 2011). For most of these countries, this urbanisation is unplanned for. The rapid unplanned urbanisation is therefore leading to increased pressure on available urban infrastructures and services, and resulting in degeneration of such infrastructures and their inability to meet the need of the ever-increasing population.

Urban transportation and mobility have therefore come to be one of the planning and development issues with which urban planners and city managers in developing countries in general. This paper explores the challenges of transport development in urban planning with emphasis on developing countries of the world. It begins by describing how transport development facilitated the growth of urban centres and the subsequent increase in the rate of urbanisation. It goes on to show how this situation ultimately led to increased geographical separation between areas of activities in urban areas requiring efficient transport facilities. Specifically, section two provides a description of the advent of urbanisation and how planners are having challenges with combating it. Section three identifies transport planning as an important component of urban planning and points out some of the challenges of transport planning. In section four, transport development approaches and the reasons why they were unsuccessful is the subject of discussion while the last section, section five, is dedicated to options that might work for transport development in challenging cities. The paper ends with a short summary.

2.0 Urbanisation and planning challenge

Urbanisation is described as “the increase in the urban share of the total population” (UNPFA, 2007: 1). Urbanisation was not important before 19th century. Urban growth witnessed in the nineteenth and early twentieth century was brought about by the invention of mass transportation modes such as the horse drawn and electric tramways, railway and motor cars (Tolley and Turton, 1995; Ogunsanya, 2002; Pacione, 2009). Before then, cities were principally compact because people had no choice than walking to places of their daily activities. They lived at or close to their work places thereby creating high density living environments that were of relative sizes and functionally integrated (Tolley and Turton, 1995; Hanson, 1986). The industrial revolution that saw the invention of modes of transportation other than walking which allowed for greater distance to be covered and larger goods to be transported led to geographical extension of human settlements and as technology advanced, so did the extent covered by the urban built-up areas (Hanson,

1986; Tolley and Turton, 1995; Glaeser and Kahn, 2004). As transport improved from walking, through the use of horse bus and tramway to the invention of the railway system, there came some level of dispersal as a result of the fact that much distance could be covered within a relatively short period of time (Ogunsanya, 2002). This dispersal, coupled with increasing population growth led to what is known as urbanisation and its attendant problems.

The goal of the planners is to ensure that urban development is taking place in a planned and sustainable manner (Garba, 2004). This is however not being achieved in most countries, particularly those of the developing world. Thus, while urbanisation is being experienced, particularly, in the developing countries across the world, it is often regarded as highly undesirable as majority of the countries are not adequately prepared for it (Cohen, 2006; Pacione, 2009; Pierterse and Parnell, 2014). This is more so as the process of urbanisation exhibits some of the characteristics which include, among others, low level of industrialisation, high incidence of rural-urban migration resulting in higher level of younger population, high rate of unemployment and high crime rate (Barredo et al., 2004). These problems which always require the attention of planners are difficult to tackle. Thus, they are central political issue in most developing countries as they create some undesirable consequences some of which include “leapfrog development, proliferation of scattered settlements, unregulated population growth, shortage of affordable housing, insufficiently funded public services, increasing social difference, overly long commuting times, traffic congestion, and severe ecological problems” (Mandeli, 2008: 513). These problems have also been cited by other researchers and called different names some of which include increased rate of urban sprawl (Glaeser and Kahn, 2004), uncontrolled land-use, housing shortages, high unemployment rate, increased urban crime rate, environmental pollution as well as unhealthy urban economy (NITP, Undated; Stren, 1991; Gandy, 2006). In reflecting on these issues, Kessides (2005: 61) observed that many of the problems with urbanised African cities “should be recognized as a signal of serious neglect”. She went further to state that “Much better-managed urban development could therefore play a significant role in launching the (African) economies onto a stronger, more sustained path of economic growth” Kessides (2005: 61).

3.0 Relationship between transport and urban planning

Transport planning and development is an important aspect of urban planning. This is demonstrated in the land use - transport relationship. For example, improved transport infrastructure and services helps in bridging the gap created by the spatial separation between different land uses in the city. But also improved transportation enables people to travel farther and thus facilitates the increased separation of places of activities in the city as well as promotes increased suburbanisation. It is therefore worthy of note that the transport-land use relationship is symbiotic and complex (Mitchell and Rapkin, 1954; Hanson, 1986). The characteristics of the transport system are determined by the level accessibility, which in turn affect the location of activities (Land use). The location of activities in space affects the pattern of daily activity, which informs the need to travel (Huang, 2003). According to Oduwaye, Alade and Adekunle (2011), land use pattern generates interaction needs (trip generation) which, in efficient urban planning, should be directed (with definite goals in mind) to specific transportation facilities (trip distribution and modal split).

Thus, urban transportation and mobility is one of the planning and development issues urban planners and city managers have to grapple with. This is so due to the significant role of transport to the origin and continual survival of any settlement. The concepts of mobility and accessibility are very vital to the understanding of urban transportation. “‘Mobility’ is the ability to move between different activity sites due to the geographical separation existing between them while ‘accessibility’ refers to the number of opportunities or activity sites within a certain distance or travel time” (Pacione, 2009: 266). The movement of people, goods and services within the urban area is therefore a vital aspect of the city life.

The role of transport in the spatial and economic development of cities and regions are enormous. Cities develop around their transport network and as the city develops its transport needs also increases. Various places of activities within the urban area are geographically separated and so transportation is required to overcome the spatial barriers and for cities to function efficiently. Hanson (1986), in underscoring the importance of mobility and accessibility, stress the fact that the location of goods and services, employment locations, as well as location of public facilities are often (though inappropriately) widely spread geographically and so require efficient transport system for these places to be connected. Thus, cities consist of different land uses to which transport help connect. Nevertheless, cities of the world and those of the developing countries are continuing to grow in size, complexity and importance with economic improvements and increased population. These have serious implications for managing future growth as well as maintaining city mobility and liveability.

As earlier noted, many cities in the developing countries of the world have experienced significant level of urbanisation which has resulted in increased need for mobility of human population and goods. But this mobility need is grossly unmet (Pirie, 2014). With particular reference the transport planning in many African cities; many cities are defined by inadequate planning and deteriorating transport infrastructure and services (Pirie, 2014; Sietchiping et al., 2012). This failure in transport does have its feedback effect. Particularly, the transport options available in these places are limited and mode use is dependent on individual’s income level. Kessides (2005: xviii) noted that the failure in urban transport policy seriously compromise movement and shutters the urban marketplace. Sietchiping et al., (2012) noted that these problems are mostly borne by the poor with the consequence of reduced capacity of citizens to participate in work opportunity as well as satisfy daily domestic transport requirements. Carruthers (2004 in Kessides, 2005: 46) reiterated Sietchiping et al.’s finding when he showed that “a transport and poverty impact assessment for Lagos found that the average bus fare for normal use would require over 50 percent of household income of the poor, although drivers may charge less or more than posted fares. These figures compare to an affordability benchmark of 15 percent” – an indication people’s level of accessibility. Furthermore, Kessides (2005: ii) shows that these shortcomings in urban transport system results in the premature experience of the “downside of urban concentration”. She further claims that policy neglect is responsible for a situation where the upper middle class use motorised vehicles unrestrained with attendant effects such as congestion and less efficient public transport, and then more cars and more congestion (Kessides, 2005: 47). Moreover, she went further to state that “the virtual absence of public transport services and lack of traffic management should be blamed first for serious congestion, not the size of the city itself” and that “neglect of urban transport” explains in part the pollution problem some cities are facing

(Kessides 2005: 54-55). From economic dimension, attempts to create regional trading arrangement have been found to be slowed down by the lack of policies that promote city-regional corridors and inter-city transport linkages (Kessides: xxi). These planning failures do have wider impact than are usually imagined.

4.0 Transport planning policies: Why they fail

According to Greed (2000: 5) “Towns and cities are not God-given or natural. They are the result of centuries of decision-making by individual owners and developers, and of government intervention”. Hence, to achieve orderly towns and cities, there is the need to carefully work out how it is to be achieved over a long period of time. To achieve this, Stren (1991) suggests the need to re-evaluate approaches to the management of urban areas (Stren, 1991).

Transportation planning should normally involve a forecast of how future travel demand is affected by land use as well as how transportation policies may be used to modify land use. To a large extent, however, this has not been achieved in many of the developing countries. For example, Aljoufie (2014) found that isolated land use and transportation policy interventions which are limited in their capacity are the practice in many instances. Several reasons have also been adduced for this. Garba (2004) explained that there is usually the problem of multiplicity of government agencies and departments involved in urban management and so the multiplicity of development objectives. Because these are not being coordinated as well as continuously revised in the development process, planning often fails. He went further to say that where planning involves multiple participation each participating agency requires clearly defined institutional responsibilities while the whole requires a framework for cooperation so as to achieve concerted effort with others from time to time. This unfortunately is not the case in most instances.

Speaking further on this note, Mandeli (2008) pointed out that the limitations of both conventional urban planning practices and public actions for regulating urban development and service delivery are usually responsible for urbanisation problems. Many of the places witnessing the problem lack appropriate and coordinated policy guidance. In addition, usually there is the challenge of absence of collaboration among government units responsible for the planning duty. He described this situation as “weakness in local management and limited financial and legal power to cope with the urbanisation process” Mandeli (2008: 513).

Garba (2004) builds further on the concept of capacity and noted that this capacity also includes the level of understanding of the public sector of the development problem and not just their capacity to implement appropriate intervention measure. Even where the capacity exists in financial and legal terms, good management capacity should combine both resources available for management as well as develop appropriate institutional structure and practices in management (Garba, 2004). In this sense, the understanding and knowledge capacity of human resources saddled with planning role is a vital part of good management capacity. He also pointed out the problem of multi-agency conflicts which have been found in many places. Aljoufie (2014) gives a typical example of where this deficiency in structure and practices come to play when he noted that isolated land use and transportation policy interventions which are limited in their capacity is still a popular approach.

As earlier pointed out, transportation planning should normally involve a forecast of how future travel demand is affected by land use as well as how transportation policies may be used to modify land use. All too often, however, especially with the use of conventional land use and transportation planning practices, the awareness of the relationship between the two does not reflect in planning policies. As Aljoufie puts it: “the conventional practice focuses on separate visions, scenarios, plans, policies and projects related to a specific land use or transport issue” (Aljoufie, 2014: 205). The wider impact of development plans and policies on both land use and transport is often not considered. This is the case with many developing countries of the world (Aljoufie, 2014; Mandeli, 2008; Al-Hathloul et al, 2004).

It is usually the case that transport planners and land-use planners are working independently of one another with different goals and expectations. As a result, planners keep coming up with new policies, reviewed master-plans and other attempts from time to time. But these efforts usually have too little effect on the problems being tackled so that urbanisation challenges keep rising (Aljoufie, 2014). Aljoufie shows the situation in Jeddah to be such that: “Urban development policies have not considered the consequences for transportation. Conversely, transportation policies have not addressed the long term effects of different policies on urban development”. This is the case in many other developing countries of the world (Akinbami and Fadare, 1997).

Another cause of the problem has also been noted. Mandeli (2008) remarks that ascertaining the effectiveness of policies would require time but more often than not policy makers always want immediate result. Furthermore, good policies do fail when they are not implemented properly, especially when municipal authority implementing plans are not adequately empowered legally to enforce such plans and when the roles are not clearly marked out. Garba (2004) emphasised this issue of authority and discretion further by showing that some countries leave planning to national government and this restrict the ability of the local administration to plan for itself as well as cause delay in decision making and implementation process.

Other factors that might contribute are the organisation behaviour and practices, political philosophy of the country, the social orientation of the citizenry, and the attitude towards administrations as well as the system of governance. According to Garba (2004: 596), these all affect the ability of city government to effectively manage urban development.

5.0 Transport development approaches: What might work

The realisation of failures that result from the disaggregated type of planning is therefore bringing a new way of conceiving urban planning that tries to treat both transport and land use development as one. Such measures include participatory planning, sustainable transportation approaches, “inclusive city” (Mandeli, 2008), sustainable smart growth, participatory planning, transit-oriented development (Aljoufie, 2014), job-housing balance and many others. Planning approaches that shifts emphasis from spatial planning to “strategic thinking” and “public policy management” concepts are being promoted by multilateral agencies such as World Bank, United Nations Development Programme (UNDP), and United Nations Human Settlements Programme (UN-Habitat) (Mandeli, 2004).

The adoption of participatory planning is an approach to dealing with the problem of planning (Oduwaye, 2009) to achieve the “inclusive city” and improve the capacity of local governments and other stakeholders in achieving good governance. This method, as noted by Mandeli (2004) is not generally agreed to because of the mix of risks and opportunities it offers. In addition, this method would depend on the political will and an institutional environment that allows it. In this respect, as Garba (2004: 596) notes, appropriate organisational behaviour and practices are essential. “Certain behaviours and practices such as the acceptance of change as constant, aspiration to a high level of effectiveness and efficiency, continuous monitoring and assessment and improvement of activities, practices and procedures, and establishing a feedback mechanism to policy and decision making are necessary for effectiveness in urban management”. Jobs-housing balance is another planning concept that aims at achieving a balance between residential accommodation and the number of job opportunities in a given neighbourhood within the metropolitan area (Cervero, 1989; Giuliano, 1991). It is based on the assumption that workers choose to live as close as possible to their place of employment and that the shorter the distance between home and work the less the need to commute. The major aim is reducing traffic congestion and other transport related problems by reducing the need to travel (Bookout, 1990). One of the problems with this policy is that it places too much emphasis on journey to work while neglecting other factors affecting the decision of where to live such as housing cost, neighbourhood quality, and availability of recreational infrastructures amidst other.

Sustainable transport is yet another approach. Oduwaye (2009) argues that urban planning has a role to play if sustainable development is to be achieved. He identifies urban planning as a means to an end rather than an end in itself by providing the needed instrument for the achievement of sustainable development. Sustainability is a concept that has gained relevance over the years. It was popularised by the World Commission Environment and Development’s (WCED) definition of sustainable development as a “development that meet the needs of the present without compromising the ability of the future generation to meet their own needs” (WCED, 1987: 43). Since most urban problems being faced are consequences of poor planning, imbuing sustainability as a culture has been proposed as a way of addressing urban problems (Barredo et al, 2004).

However, these new policies have not become widely adopted in developing countries. Aljoufie (2014) notes that integrated land use and transportation planning has not been as rapidly adopted as one would expect despite available knowledge. These are not without reasons. Aljoufie (2014) noted that one of the challenges responsible for this is the availability of tool to undertake such planning. Mandeli (2008) too suggests that disaggregated planning may be another reason for this poor take off.

6.0 Conclusion

This paper emphasises two major issues: it has discussed published literature relating to the relationship between transport development and urban planning; it has also highlighted some urban transport development approaches that have failed and suggested options that are being considered to address the challenges. These particularly address the need to understand the nature of the planning challenges in cities of developing countries and how they can be addressed using appropriate solutions. The discussion in this

paper therefore adds to the literature on the need to develop appropriate approaches to addressing urbanisation in developing countries.

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Research on the Five-Dimension Cooperative Education Mode of Local Universities in the Concept of Production-Education Integration —A Case Study of Applied Chemistry Major of Yancheng Teachers University

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Abstract

Under the background of production-education integration, cooperation between school and government, school and industry, school and enterprises, and school and research institutes, the construction of five-dimensional collaborative education mode needs to be oriented to serve the regional chemical industry. The five parties, such as schools, local governments, enterprises, industries and research institutes, participated in the construction of five-dimensional collaborative education mode, focusing on the construction of collaborative education platform, talent training objectives, curriculum system, teaching staff, practical teaching system and institutional mechanism in order to promote the integration of the curriculum chain, the talent chain and the industrial chain. The construction of this mode has an important reference value for realizing the scientific development of applied chemistry talent training in China.

Keywords: local colleges; integration of production and education; school-enterprise cooperation; five-dimensional force drive collaborative education mode

1. Introduction

The chemical industry is a pillar industry that is related to the economic lifeline and safety of the country. There is a strong demand for applied high-level professionals engaged in production, R&D working and management in chemical industry, environmental, materials and related disciplines, who has strong

engineering practice ability, research ability, innovation consciousness, a sound personality, ideals, beliefs and social responsibility, and international vision. However, there is still a certain gap between the quality and quantity of talents cultivated by universities and the needs of the industry, which cannot meet the needs of the society ^[1-3]. Aim at the actuality, the local application-oriented undergraduate colleges should strengthen cooperation with local governments, industries, enterprises and research institutes to promote the integration of curriculum chain, talent chain and industrial chain, realizing the scientific development of personnel training, and continuously improving the training quality of applied talents. As an applied local undergraduate college, Yancheng Teachers University explored and constructed the five-dimensional collaborative education mode of applied chemistry major under the concept of integration of production and education, and obtained some achievements.

2. Analysis of the demand of applied chemistry professionals

The chemical industry is an important pillar industry of China and plays a pivotal role in the development of the national economy. The chemical industry, as the basic engineering technology of material and energy production, determines its important position in the unshakable basic industry in the future society. Green chemical industry and ecological chemical industry are the future development direction of China's chemical industry. With the transformation and development of China's economy, the demand for talents has shifted from the traditional single professional talent to the demand for high-skilled and interdisciplinary talents. With the development of coastal development in Jiangsu as a national strategy, key bases such as petrochemical industry, fine chemicals and new materials have been settled in Yancheng, and the chemical industry has been become the second pillar industry of Yancheng. Therefore, the Yancheng area has a very high demand for high-quality chemical talents. As a local college in Yancheng, how Yancheng Teachers University adapts to Yancheng's development strategy and cultivates a large number of high-quality chemical professionals has become the research focus of education and teaching reform.

3. The construction of five-dimensional force drive collaborative education mode under the concept of integration of production and education

The construction of the five-dimensional force drive collaborative education mode under the concept of integration of production and education is to stimulate the vitality of each subject and to cooperate closely, so that the supply side and the demand side of the talent cultivation can be fully matched in the quantity, quality and structure.

3.1 The goals of construction

The goal of integration of production and education is to achieve "four dockings". Firstly, specialty development and industrial demand docking are achieved to enhance the ability to cultivate talents that meet the needs of industrial development. Secondly, graduation requirements and professional qualification certificate docking are achieved to make professional qualification standards, industry technology

specification as the basis for the formulation of talent training specifications, constructing the professional qualification certificate and the academic certificate "Communication between Double Certifications" system. Thirdly, the curriculum setting and the professional standards docking are achieved to optimize and rebuild the curriculum construction based on the target requirements. Fourthly, the teaching process and the production practice docking are achieved to strengthen practical training, and continuously improve students' ability to solve practical engineering problems based on production practice.

3.2 The content and approaches of construction

3.2.1 With the integration of production and education as the starting point, build a five-dimensional force drive collaborative education platform.

The applied chemistry major of Yancheng Teachers University was established in 1999. It was selected as a specialty construction center for colleges and universities in Jiangsu Province in 2010. In 2012, it was awarded the key specialty of the "12th Five-Year" Provincial Higher Education Institutions in Jiangsu Province. In the same year, it was awarded the "12th five-year" pilot project of comprehensive professional reform by the Ministry of Education. The applied chemistry major of Yancheng Teachers University is now a brand specialty in Jiangsu Province. It signed a strategic cooperation agreement with Jiangsu Huifeng Agrochemical Co., Ltd., Jiangsu Dahua Chemical Industry Co., Ltd., Yancheng Yueda Dongfang Automobile Industry Development and Investment Co., Ltd., Nanjing University Yancheng Environmental Protection Technology and Engineering Research Institute. The mode of running a school in which the government, chemical industry, related chemical enterprises, scientific research institutes and universities participate in the whole process of talent training has been opened up. The collaborative innovation and education platform for the participation of the five parties has been established in this mode, including the five parties joint setting up training objectives, revision of personnel training programs to meet the social demand of talent training. The five parties jointly built practical teaching environment and practice bases, designed practice-oriented curriculum system and innovated practice training methods. The five parties jointly built "double-quality teacher" teaching body to conduct teaching research and optimize the structure of the teaching staff. The five parties co-constructed curriculum resources, updated teaching resources, and optimized course content. Multi-dimensional coordinated quality system was adopted to evaluate and ensure the sustainable development of cooperative education, so as to jointly improve the quality of applied talents and meet the talent demand for the development of the chemical industry of Yancheng City.

3.2.2 Guided by the demand of chemical industry in Yancheng, clarify the target of talent training.

According to the demand of applied chemistry professionals in the development of chemical industry in Yancheng City, the goal of cultivation is applied and inter-disciplinary talents with innovative spirit and practical ability, who have the basic theories, basic knowledge and basic skills of chemistry and chemical engineering and related disciplines, strong engineering practice ability, research ability and innovation consciousness, sound personality, ideals and beliefs, social responsibility and international vision. Graduates of this major are expected to engage in applied research, teaching, production and management in research institutions, higher education institutions, enterprises and companies.

3.2.3 Based on the standard of the chemical industry, build a curriculum system.

Based on the goal of talent training, the education and teaching concepts of four new (new ideas, new models, new content, new technologies) and the industry standards and norms of the chemical industry, the “5+1” (ie, five platforms and a link) curriculum system which is coordinated with the required capabilities and quality of the industry has been built through cooperating with Jiangsu Huifeng Agrochemical Co., Ltd., Nanjing University Yancheng Environmental Protection Technology and Engineering Research Institute and surrounding chemical companies. Among them, the “five platforms” included the general education curriculum platform, the subject curriculum platform, the professional curriculum platform, the innovation and entrepreneurship curriculum platform, and the cross-over and personality development curriculum platform; the “one link” refers to the centralized practice.

The "5+1" curriculum system fully reflected the high degree of unity of theory and practice, positions and skills, industry standards and training specifications. At the same time, in order to meet the demand of the college students' individualization development, innovative entrepreneurship courses and special courses on student crossover and personality development have been set up.

The general education curriculum platform is the basic part of the students' knowledge structure and ability accomplishment training. It is divided into two parts: compulsory and elective courses, including ideological and political theory, university sports, college English, safety education, reading and writing, college students' mental health education and courses of humanities and arts. The subject curriculum platform covers the basic knowledge, basic theory, basic quality and basic ability of the chemical industry. The curriculum system of the subject curriculum platform covers science, engineering and other disciplines, including advanced mathematics, university physics, high-level language programming, inorganic chemistry, and organic course. The professional curriculum platform consists of professional essential courses and professional elective courses. The curriculum of the professional curriculum platform is time-sensitive and should be revised with the adjustment of industrial structure and industry development requirements, mainly including analytical chemistry, physical chemistry, chemical engineering principles, chemical reaction engineering, chemical thermodynamics, polymer chemistry, basic chemistry experiments and other courses. The innovation and entrepreneurship curriculum platform is a curriculum for cultivating students' entrepreneurial awareness, innovative spirit, and innovative entrepreneurship. It is divided into two parts: compulsory and elective. Its compulsory courses mainly included entrepreneurial foundation and innovative entrepreneurial thinking training. The elective courses mainly included innovation and entrepreneurship activities, professional skills training, innovation and entrepreneurship practice training and professional science and technology guidance and training. The cross-discipline and personality development curriculum is to make up for the lack of curriculum for the discipline of Chinese traditional culture and humanities, which fully reflected the integration of arts and sciences and included cross-curricular and self-learning courses. The concentrated practice link is to improve students' practical ability, better connect with industry and industry standards, and better integrate school learning with corporate work, including professional trainee, professional internship, metalworking internship, graduation design, and curriculum design.

3.2.4. Based on the new teaching ideas and methods, establish a double-quality-teacher teaching team.

In the five-dimension cooperative education mode, the applied chemistry major of Yancheng Teachers University implemented the teaching concept and method of "synchronization of teaching and industry development", and employed industry or enterprise experts to join the teaching team to form a double-quality-teacher teaching team^[4-6]. The main role of industry or enterprise experts is to integrate industry development trends, real business cases, and enterprise actual R&D and other projects into the curriculum, to improve students' ability to solve specific engineering problems. In the teaching method, the existing teaching modes were reformed by making full use of the existing MOOC resources, and the teaching center was turned from the teacher to the student. The student is no longer the passive recipient of knowledge, but the active constructor of knowledge. Using the platform of the MOOC, many study groups were established to enable teachers and students to communicate freely to improve teaching efficiency, and service the cultivation of innovative talents.

3.2.5. Based on the actual R&D project, construct a practical teaching system of deep integration of production and education and deep cooperation between schools and enterprises.

Based on the actual development project of cooperative enterprises, the practical teaching system that realized the deep integration of the production practice and the teaching process was constructed in the applied chemistry major of Yancheng Teachers University. In the above practical teaching system, university teachers and students are the main body, and the teaching process is arranged with reference to the actual production operation process.

The deep cooperation between the school and the enterprise is mainly to jointly build the internal and external training bases to provide students with practical teaching scenarios that are consistent with the actual positions of enterprises and industries. At the same time, the real training environments were provided for students to deeply understand the production environment, corporate culture and job requirements. In this way, the experiential cultivation of students is realized, and the platform for assessing students is provided for the enterprise, which narrows the distance between the learning process and the work position, and truly realizes the seamless connection between the talent cultivation and the social needs. The practical teaching mode of multi-dimensional collaborative education under the concept of integration of production and education mainly included the following categories: Firstly, the practical teaching mode of teaching-learning-doing integration. Based on the actual project of the enterprise, the teaching mode of teaching-learning-doing integration was constructed. In such teaching mode, the teaching was carried out around the completed project and the content of theoretical courses could be applied to practice in a timely manner to improve students' ability to solve practical problems. Secondly, the practice teaching mode guided by science and technology competition. Students' innovative and practical ability could be promoted through science and technology competition as the carrier. By encouraging students to participate in the national college students' "Challenge Cup" contest, the National College Student Chemical Design Competition, the Jiangsu University Student Chemistry and Chemical Experiment Competition and other important competitions, the competition rules and contents are integrated into the practice teaching process to cultivate students' collaborative ability and innovative thinking.

3.2.6. To ensure efficient and sustainable development, improve the mechanism of integration of production and education.

The five-dimensional collaborative education mode under the concept of integration of production and education required a sound and integrated multi-cooperative education mechanism, including school-enterprise cooperation management methods, school-enterprise collaborative education evaluation and evaluation system, talent introduction work management methods, and fund use methods^[7-8]. The incentive mechanism for mutual benefit and mutual benefit, the operational mechanism for cooperation, the comprehensive scientific guarantee mechanism, and the reasonable and reasonable evaluation mechanism could be constructed through clarify the responsibilities, rights and obligations of the corresponding personnel of the school-enterprise cooperation.

4. Conclusion

Under the background of the production-education integration, the school-government cooperation, the school-industry cooperation, the school-enterprises cooperation, and the school-research institutes cooperation, the construction of the five-dimension cooperative education mode needs to be oriented by serving the regional chemical industry, with the participation of the government, relevant industries, enterprises, research institutes and schools, with the emphasis on such six aspects as multi-dimension cooperative education platform, talent training objectives, curriculum system, teaching staff, practical teaching system and institutional mechanism. The construction of this mode has an important reference value for promoting the integration of curriculum chain, the talent chain and the industrial chain, and realizing the scientific development of applied chemistry talent training in China.

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Teachers of Dine Language and Culture Building Enduring Systems of Support

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Abstract

In response to the question, “How do we build enduring systems of support for our children within our classrooms and communities?” we examined the learning logs of Dine teachers in a graduate course: Foundations of Bilingual Multicultural Education. We asked, “Who are you now? How will you continue to grow and develop professionally? How does your understanding of history, research and current practice in the field of Navajo education inform and improve your own teaching and learning?” We attempted to gain a sense of the whole from this rich data source which focuses on concrete events in the stories of the participants, listening for the unique stories of how teachers learned to value their language and why they continue to teach it, exploring the institutions of literacy and power in which teachers work and live. Each teacher understands the history of language teaching in a different way; each teacher passes this understanding on to her students in a different way. The texts of the reading logs challenged and moved our thinking as researchers beyond our understanding when this process began.

The deeper meaning behind my teaching and philosophy is to ensure that we do not lose our beautiful culture in the midst of western culture. With my knowledge, I want to continue on the teachings of our ancestors and their way of life and language. These are the teachings that made our people strong, passionate, humble, and resilient. (Revaline Nez, Navajo Language and Culture teacher STAR School, 2018)

Prior decades of U.S. government policy to suppress NA/AN language use in schools had devastating results for NA/AN students and continuing negative effects on parent and community engagement. (US Department of Education, 2018)

We acknowledge the history of language suppression based on federal language policy in Navajo communities. (Reyhner 1992, US Department of Education, 2018). From this historical and social perspective, we ask, “How do we build enduring systems of support for our children within our classrooms and communities?” We know that American Indian students learn best when they see their culture, language and experience reflected in the curriculum. (Balter & Grossman, 2009; Barnhardt, 2014; Haig-Brown & Dannenmann, 2008; Kana’iaupuni, Ledward & Jensen, 2010; Reyhner & Hurtado, 2008; Styres & Zinga, 2013, Brayboy and Castagno 2009). Native American children who learn their heritage language in the classroom in strong language revitalization programs learn English at about the same rate as their

peers who are not enrolled in an indigenous language immersion program. (Reyhner, 2006; Rosier & Holm, 1980; Wilson & Kamana, 2011; Holm, 2006; May, Hill & Tiakiwai, 2004, McCarty, 2003, 2013; Tedlick, Christian & Fortune, 2011)

Johnson and Wilson (2005) describe lessons learned from their work with the Window Rock Immersion program and describe what makes a difference; the use of the Dine language as a medium of instruction, consistent integration of Dine culture in instruction. August, Goldenberg and Rueda (2006) discuss the need for systems that are “intensive, elaborate and enduring” to accomplish teacher change. McCarty (1995, 2013) discusses her research in Navajo dual language classrooms. She writes, “School power relations must be democratized such that bilingual teachers control their own pedagogy. The latter carries a heightened significance in American Indian and other minority communities, as it entails a basic reversal of historic role relations.... for it is only when teachers feel and are validated in their work that they can create the same conditions for their students.”

Parents can and should be active partners in school improvement, and can build local tribal community ownership of the schools. Research suggests that educators who involve families in their children’s education can strengthen their own instructional effectiveness with English learners. Chen, Kyle and McIntyre (2008) document the success of their work with teachers to support building background strategies and to recognize the rich funds of knowledge of the family and the community (Moll and Gonzalez, 2004). Parent workshops were developed for “We R Family” a 21st Century Community Learning Center Program by Valencia Edgewater who extended this model to weekend Diné language classes for parents and community members in the Hard Rocks Chapter (Landry, 2015). In her book, *Bringing our languages home; Language revitalization for families*, Leanne Hinton (2013 p. xiv) reminds us, “Those who dream of language revitalization ultimately desire the natural transmission of the language from parent to child and use it in daily life.”

This inquiry is undertaken through narrative inquiry. (Clandinin & Connelly 2000) We examined the learning logs of Dine teachers in BME 530 Foundations of Bilingual Multicultural Education. We asked participants to describe their personal philosophy of education: Your personal philosophy of education should reflect your core beliefs, values and views. It should display the ideals that you want to promote as an educator of children from many linguistic and cultural backgrounds. Your personal philosophy of education should provide a focus for your teaching. It should be based on and spring from your own deeply felt principles as well as from your theoretical knowledge base. It should include your vision of yourself as a life-long teacher and learner. Who are you now? How will you function in the classroom and how will you continue to grow and develop professionally? How does your understanding of history, research and current practice in the field of ESL inform and improve your own teaching and learning? How does the structure of an ESL program affect teaching and learning within the program? We marked the learning logs for passages which we found interesting or important. We attempted to gain a sense of the whole from this rich data source which focuses on concrete events in the stories of the participants, listening for the unique stories of how teachers learned to value their language and why they continue to teach it, exploring the institutions of literacy and power in which Dine teachers work and live. Each teacher understands the

history of language teaching in a different way; each teacher passes this understanding on to her students in a different way. The texts of the reading logs challenged and moved our thinking as researchers beyond our understanding when this process began.

We built on the theoretical foundation of critical indigenous pedagogy; theory grounded in the social-historical conditions of the community (Trinidad 2011, 2012). Critical indigenous pedagogy CIP is grounded in the positionality of the indigenous researcher as a member the community. CIP reaches back to deconstruct the Eurocentric models of the past to regain the critical consciousness of the cultural, historical and linguistic roots of indigenous peoples. This research process seeks to gain a critical consciousness through the teachings, stories and actions of indigenous peoples in their schools and in their communities. The transformative knowledge gained from this fresh view of the curriculum supports quality education for native communities. “Through CIP, indigenization makes the concept of empowerment specific to a cultural group and its historic experiences and, most importantly, makes it ecologically valid and credible to a community knowledge base.” (Trinidad, 2011)

CIP research provides a fresh view of the process of knowledge construction. One example of this circular perspective is the Diné education philosophy. (Benally, 1994) The Diné education philosophy is a transformative knowledge contraction process. The first stage is thinking Nitsáhakees. At this stage the researcher begins with an awareness of the process of critical investigation. The direction of this stage is the East. The direction of the next stage in research is the south: Nahat’á (Tr: planning). At this stage the researcher identifies resources and sources for investigation. The third stage is the west: Íiná (Tr: life). At this stage the researcher applies ideas and gains new information. The fourth stage is the north: Siihasin (Tr: stability). At this stage the researcher evaluates and assesses her satisfaction with the research and prepares to formulate new research questions. This framework is used in research to connect personal and cultural knowledge, stories, experiences, and social interactions. The researcher views the community from a fresh vantage point; from the perspective of those who hold knowledge. The researcher describes how this knowledge is transmitted in learning communities which include schools, families, recreational organizations, agricultural units, or religious institutions.

We begin with the reflections of the Dine teachers:

A fifth-grade teacher describes how she balances the Dine framework with common core standards.

I plan to be an advocate for my students in different capacities. I plan to push for the creation of a culturally relevant curriculum in my school system. I have already created different culturally relevant material concerning the common core standards. I plan to continue to develop and use the more culturally relevant content in my classroom. I am in the process of searching for different interactive technology that is Navajo language based so that my students will be exposed to their language daily. I genuinely believe in the duality of the Navajo and Western way of life. I firmly believe that students that have a strong sense of identity and cultural awareness will be successful inside and outside the classroom.

A Dine language and culture teacher explores her role as teacher and learner:

I believe that learning about our own culture and others can teach respect. I think all students will benefit from such teachings because it allows for one to be a life long learner. Johnson and Legatz (2006) briefly describe this in their article: "This provides for relevant education to become successful in a multicultural society as our mission states and to carry on the vision of Dine values of life-long learning" (Johnson & Legatz, 2006, p. 27). For me to effectively carry out and live my philosophical views I need to learn continuously. There are three main places of my knowledge source, which stems from students, professional, and personal experiences. My children and students are my most excellent teachers, and I am always learning something new from them every day. My next source is learning from my personal experiences. Finally, I can continue to grow my knowledge by attending conferences and completing my academic studies. Conferences and attending classes are where I can also continue to learn from research, articles, books, oral histories, and listening to other educators and Diné traditional practitioners. There is still a lot for me to learn and to transfer down to the next generation. The deeper meaning behind my teaching and philosophy is to ensure that we do not lose our beautiful culture in the mist of western culture. With my knowledge, I want to continue on the teachings of our ancestors and their way of life and language. These are the teachings that made our people strong, passionate, humble, and resilient.

A Dine language teacher shares a story of arrival in the community where she lives and teaches:

I am very fortunate to have been raised by my grandmother. Her teachings and her beliefs are what I picked up when I was growing up. My grandmother was one of four siblings who were of the Ta'neezahnii clan that settled down in Rock Point over a hundred years ago. The history of our clan began long after the Navajo Long Walk. The history starts with my great, great grandfather whose name was Tsin Sikaadnii Tsoh. He was captured and taken to Fort Sumner where he spent all four years working at a trading post. The conditions were harsh for the people that were imprisoned there. They were exposed to harsh winters, heat, hunger, and foreign foods. He found that the only way to survive was to work alongside other workers. One day, he saw a necklace made of red coral beads, and he vowed to work for it, and it took him four years to obtain the necklace. He knew that the necklace would serve as payment for his future wife.

The four years allowed for a peace treaty between the Navajo people and the government in 1868. The Navajos were allowed to go back to their lands, and some knew where to go. Others just settled down where they could. My great, great grandfather kept walking and walking until he was close to his home. As he got closer and closer to Round Rock, he saw two women sitting under a tree. He stopped to chat with the women and found out that they had been alone for months. He then asked the mother to be his wife and offered the red coral necklace as an offering. The other woman was the mother's daughter. They then moved and settled down in Rock Point.

The mother had four children of which are my direct descendants. The daughter also had children for my great, great grandfather. Between the two women, two groups of Ta'neezahnii families populated

Rock Point. Many of our elders have left us but we continue to carry on our clans. We cannot do without learning about our past because it helps us understand what is important. Our values and beliefs come from the environment that we grew up in.

A third grade teacher reflects on the values of the family and the school

I remember my grandparent's teachings. They woke up very early to start their daily chores. I can still recall my maternal grandma telling me "wake up and don't let poverty overtake you. Get to work!" (in Navajo). My paternal grandma was a woman of prayer. I recall waking up as she called to Diyin God for strength, help, and wisdom in her daily task as she prayed in Navajo in the early dawn hours. My dad was machinist by trade, but he worked with the Navajo Nation Head Start program as an Agency Fleet Coordinator for over 30 years. His job focused on the safety and maintenance of the Head Start school buses in the Shiprock agency. He also assisted with basic maintenance at the agency preschool buildings. My mom has been employed with Central Consolidated School District for 26 years. She has worked as a para-professional for 25 years with Newcomb Elementary, and she has worked as a 1st grade teacher at Nataani Nez Elementary for one year. She also drove the school bus when they needed a substitute driver.

An art teacher invites parents to create community art projects:

At Pinon Middle School, I promoted parental involvement. I invited parents to come and create with their children at our after school art activities. I needed their support to educate their children. The grades I worked with was 6th thru 8th. The purpose is to promote cultural values in their creations of artwork. Most of the images were of their heritage. I believe that arts integrate teaching is culturally responsive and creates learning that is relevant in student's lives. We learned the art techniques and the use of materials in drawing and sculpting. We provided art materials and some snacks. Parental involvement was a success and we created a lot of art and installed a big sculpture at the Pinon Health Center. The sculpture is an image of a Navajo women standing holding a child in a cradleboard. We called it "Mother and Child".

A teacher returns to the theme of balance in her work in the first grade classroom

I am filled with joy that I am given the opportunity to teach and enhance the knowledge of 23 first graders at Tsaile Public School. Being that I was privileged in acquiring early on the important concepts of Dine language/culture, I feel that it is my duty to serve my students in the same fashion. I have already begun teaching basic concepts of language and culture in my classroom. I truly believe that a harmonious balance of learning a Dine based alongside a Western based education will support my future work with Dine language and culture by shaping and motivating further steps to take to successfully and appropriately implement curriculums centered on language and culture revitalization. Moreover, it is vital that indigenous research and theory recognize the virtues of teaching and learning through a balanced Dine way of thinking and living.

In our work as teacher educators, we call for teachers to examine the relations of power and the ideologies which define their roles as teachers of Diné language and culture and to apply the insights gained from this

process to their work. We see an opportunity to positively impact the current focus on “student achievement” and “school improvement” by expanding schools’ thinking about how they can focus their efforts to enhance Navajo student learning and expanding conventional ideas of what effective, integrated, meaningful teaching and learning can look like in schools with Navajo learners. We encourage the kinds of dynamic school and community structures that create the conditions for indigenous learners and the types of dynamic professional training that helps teachers to incorporate the strategies that make a difference for Navajo student success. We envision a school that could fully involve the family in an immersive school experience that is rooted in Navajo philosophy and deeply aligned with the cultural significance of the four directions. Like a *hogan* with its door facing East, every part of the school experience and curriculum would be built on the foundation of an indigenous world view, and embedded in the places, practices, language, and activities of the Diné. In this way, the family could be involved authentically, bringing all dimensions of the sophisticated indigenous knowledge system to bear on the learning experience, and rooting out the remnants of false hierarchies that suggest the Western knowledge system is better or more highly developed. Knowledge of seasons, constellations, ceremonial healing, plant and animal life, agriculture, ecological resource management, cosmology, etc. would form the curriculum of such a school. The purpose of the school would be for students to learn who they are, and to master the ways of life that are organized around the daily movement of the sun. In this model, “family involvement” is indeed a best practice, interpreted around the relationships of *k’é*, the kinship among clans and among all five-fingered people who live upon the earth's surface. With this vision as teacher educators we seek to establish systems that are intensive, elaborative and enduring for future generations of Dine teachers and students.

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Analysis of the Quality Indicator of the Paint Process of a Metal mechanical Industry

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Abstract

To ensure survival in a highly demanding scenario, it is critical that organizations return their efforts to the proper execution of the internal processes that make up their productive chains. From this perspective, the understanding that quality products and processes are reflected in the company's productivity, especially in customer satisfaction, as way of guaranteeing a competitive position in the growing market. The objective present work aims to analyze the causes of the main problem of the painting process that impacts the quality indicator, through the use of the problem solving method and the application of quality tools. The data was first collected and organized in a way that facilitated problem analysis and decision making. A brainstorming meeting with the representatives of the sectors directly related to the process was carried out, in order to discuss the causes of the high index of the problem related to the ink layer and to delimit the actions necessary to seek the decrease of occurrences. After the actions were carried out, it was possible to observe a gradual increase in the indicator over the months, which reached the goal established by the organizationt.

Keywords: Productive systems. Quality Indicator. Quality tools. PDCA

1. Introduction

With increasing customer demand, as organizations have experienced many changes without the definition of quality and productivity standards, their strategies for analysis and production of productive systems. In this context, the current scenario requires companies to be committed to the continuous improvement of their products and processes.

Quality is no longer a difference and has become a process for pursuing continuous improvement and satisfaction of internal and external customers. In this way, a competitive advantage of organizations is often the selling price. Thus, for a company to deliver value to the customer, it must necessarily reduce losses and reevaluate costs.

According to Lobo e Silva (2014), Quality is a management philosophy that seeks to integrate all departments of the company, in a culture that demands quality in the aspects of each operation, so that all activities are carried out correctly the first time, reducing losses and meeting customer needs and organizational goals. According to Tubino (2015), as long as the quality of the product is preserved, a company must seek the lowest possible price, and consequently increase sales volume.

Quality management provides for the elimination or reduction of processes that do not add value to the product, generating costs unnecessary for the organization, such as losses, failures and rework. These problems of production, when measured, verified and monitored, enable us to analyze the organization in terms of efficiency and effectiveness of its processes.

The company where the research was carried out works in the production of road implements. Currently, it has two units and approximately 600 employees, constituting a portfolio of twelve products, in addition to the manufacture of spare parts.

This study aims to analyze the paint process of the tipping road implement and provide the subsidies for management to eliminate the causes of the main problem that impacts on the industry indicator - the low ink layer - seeking to reduce the occurrence index and, consequently, perfecting the process. For that, we analyzed the indicators of this process since the year 2016, as well as its main characteristics.

The results were obtained following the iterative four-step management method known as PDCA, widely used tool to maintain and improve results in process control. Figure 1 presents concepts of the PDCA cycle recommended for improvements, constituting as a means of solving problems that characterizes extremely important aspects within the concepts of Total Quality Control (TQC). Also known in Japan for QC Story. (Campos, 2014), these concepts seek to contemplate costs and reliability, aiming at zero defects, with a systemic focus on the production process, not enough to inspect and eliminate failures, but going beyond, implementing an integrated work structure to any organization, methodical and documented, to ensure customer satisfaction and more competitive costs. (LOBO, SILVA, 2014).

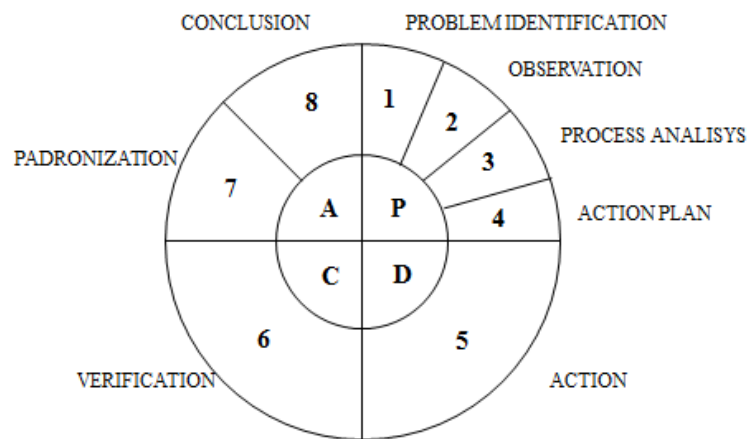


Figure 1 – PDCA Cycle for Improvements (QC Story)

Source: Campos (2014, p. 69)

The PDCA is a cycle that begins in the planning phase aims to establish goals, and procedures, processes and control guidelines that should be executed on the means for which the goal can be reached. This is the most complex stage of PDCA improvement, where the more information associated with planning, the greater the likelihood that the goal will be achieved.

According to Werkema (2011), at the end of the planning phase, a plan of action, commonly known as 5W1H, must be set to block the root causes of a problem, 5W1H are the initials of: what will be done, when will be done, why it will be done, who will do it, where it will be done and how it will be done.

The second stage concerns the execution of processes as defined in the planning phase, including also the collection of data required for the next step. (CAMPOS, 2014)

After completing all the steps, it is necessary to verify if the data collected are in accordance with the planned goal and if the blocking actions adopted were effective. At the end, Corrective Actions are performed for the detected nonconformities, so that they do not occur again. In this sense, it is important to emphasize the difference between the words "method" and "tool", where the method is defined as the sequence that will be used to achieve a proposed goal, on the other hand, the tool will be the resource to develop and apply the method. (CAMPOS, 2014).

With the intention of encouraging the reduction of the occurrence index of the problems, and consequent improvement of the process, data and images regarding the thickness of the layers of ink were analyzed since 2016.

2. Methodological Procedures

The process control and increase of errors that permeate the painting stage were evaluated and revised through the PDCA methodology. The information sheets for the application of the auxiliary tools to the methodology were collected from the checking sheets, internal documents to identify problems, their causative areas and detailed descriptions. Figure 2 presents the description of the PDCA Cycle, based on the Japanese method called QC Story, brought by Campos (2014), used to obtain the results.

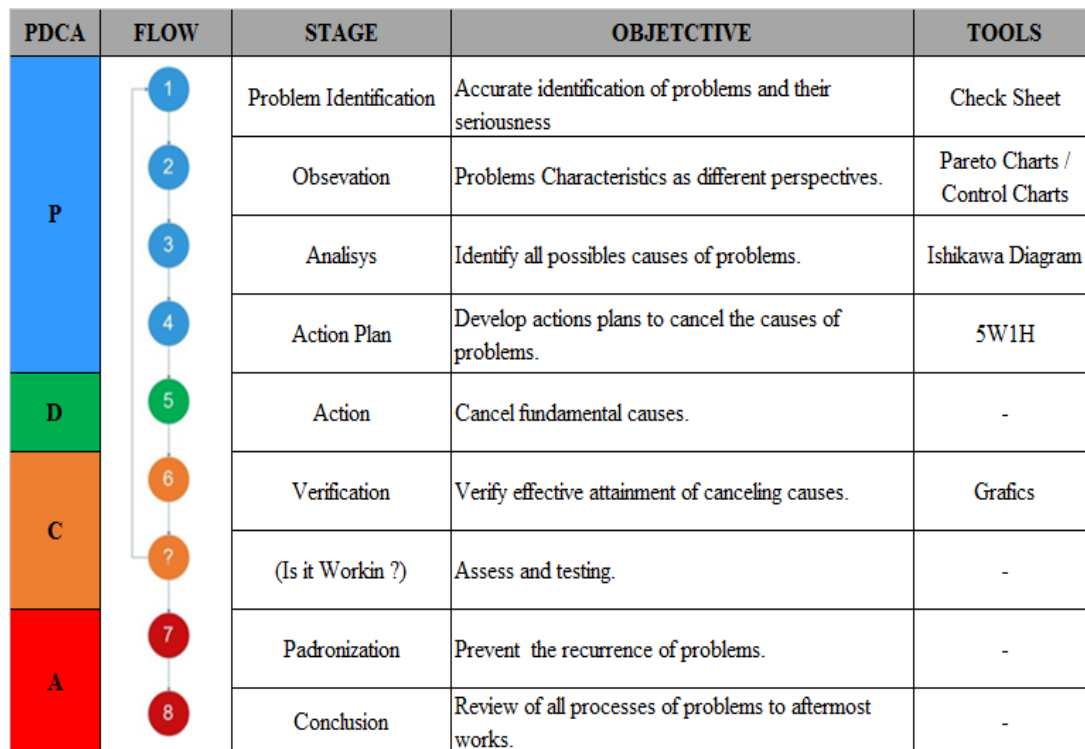


Figure 2 – Troubleshooting method – QC Story

Source: Adapted from Campos (2014)

Thus, following the steps, were performed:

a. Planning: (1) The problem identified by the management of the plant is related to the component of TQC "Product Quality", related to the company's painting process, as one of the fundamental processes in the manufacture of road implements and high value aggregate to the final customer, since it matches the appearance and aesthetics of the product. To identify it, historical data were collected from 2016 to May 2017, recorded from the quality inspectors' point of view through the check sheet (2). In order to raise the characteristics of the problem, the Pareto Chart was used, in order to stratify the data of the problems that most impacted the process and prioritize the direction of the actions. Control charts for analysis of the main problem affecting the indicator were generated, as well as those observed in the regions of greatest occurrence of problems in the main product manufactured by the Tipping implement. (3) A brainstorming meeting was held in June 2017 to analyze the problem, where the team involved used the Ishikawa Diagram to analyze the most probable causes, in order to avoid their recurrence, seeking to favor ideas in the construction of the diagram. (4) In the final phase of planning, the action plan was constructed, filling the table with the definitions of 5W1H.

b. Action: In addition to the proposals in the action plan, carried out by the responsible ones according to the established deadlines, other actions of monitoring the sector's indicator for employee awareness were established.

c. Verification: In the verification step, new data were collected after blocking actions and compared to the initial results of the process. It was observed that the blockages were effective, in this way, the final stages were given continuity.

d. Standardization and Conclusion: Finally, the new methods implemented were standardized from

the revision of work instructions available in the sector and the employees were trained in the new documentation. At the conclusion of the problem solving process and application of the PDCA for improvements, those involved recapitulated the steps and made suggestions for analysis of future problems.

Through the execution of all the steps of the proposed method, it was tried to reduce the index of the main problem that affects the indicator of quality of the process of painting of road implements.

3. Results

For an understanding of the case studies, there is a need to have a process, since the finished products are supplied from two industrial sectors: the first is responsible for the installation of the vehicle and the traction and the second for products such as trailers, semitrailers, buckets and bodies, known as road implements. In this way, implements can perform their load transport functions. Figure 3 shows the interrelationship between the three processes of manufacture of road implements, in addition to the parts manufacturing sector.

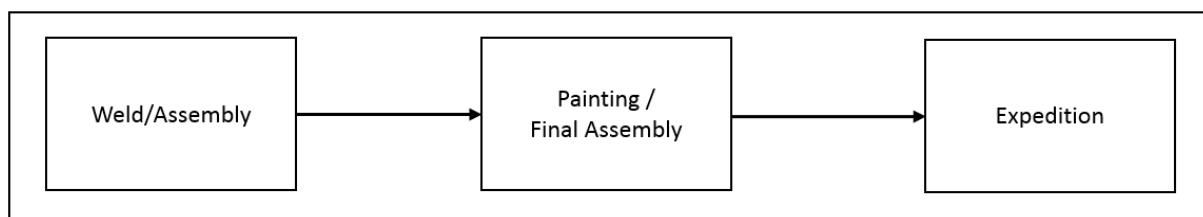


Figure 3 – Process of manufacture of road implements.

Source: Authors

- **Welding / Assembly:** It refers to the structural assembly production lines of the implement using steel sheets as its main raw material. Welding is the process of joining the materials (particularly metals), which ensures the continuity of the physical and chemical properties of the material.
- **Finishing:** It is composed of the jet line, where the paint surface is prepared and the paint layer is applied in the color requested by the customer. After being painted, the finishing line still covers the assembly of aesthetic, electrical and pneumatic components. At the end, the product goes to the stock and waits for the billing.
- **Shipment:** When invoiced, the product goes to the shipment where the final tests are carried out and also the last adjustments to be delivered to the customer.

At the end of each stage, quality inspections and controls are performed to ensure that the product meets the organization's requirements for the next process. The inspector has the authority to release or disapprove the product, if it is not compliant, it records the rework that will be necessary for the release, including the time that will be spent.

For each product, there is an inspection criterion defined by the company that is used by the quality inspector. Figure 4 shows the example of the Tipping product, the main implement produced in the unit studied.

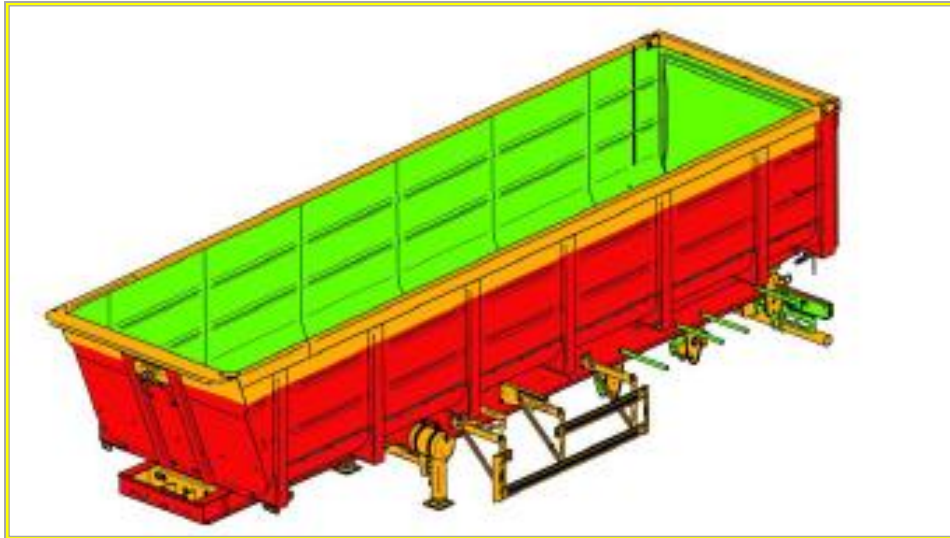


Figure 4 – Paint Acceptability Standard (Implement: Tilting).

Source: Company's stock.

The inspection criterion is followed by the colors of the image:

- Red Zone: Has greater visual exposure, inspection criterion considered critical.
- Orange zone: It has less visual exposure. The inspection criterion is considered as not critical.
- Green zone: It has no visual exposure, internal area of the implement. The inspection criterion is considered irrelevant.

It is worth mentioning that the inspection of the quality related to the painting is performed only in the external area of the product. In the inner area only a coating painting is done to avoid oxidation until delivery of the implement, which with the use of the product is lost due to the friction of the flow of the cargo transported through the structure.

The quality of the three processes is measured by the indicator generated from the inspectors' records, called Percentage of Approved Products, characterized by a target of 80% indicator, meaning that every 100 products, 80 of them must reach the inspector in perfect state, without the need for rework.

As the main object of this study, the quality indicator of the Finishing process will be analyzed, which is characterized as the main obstacle to be improved. From the data collection obtained through the check sheet, the graphs of Figures 5 and 6, which illustrate the reality of the Finishing process, were made, including the sub-processes of painting and final assembly of the components.

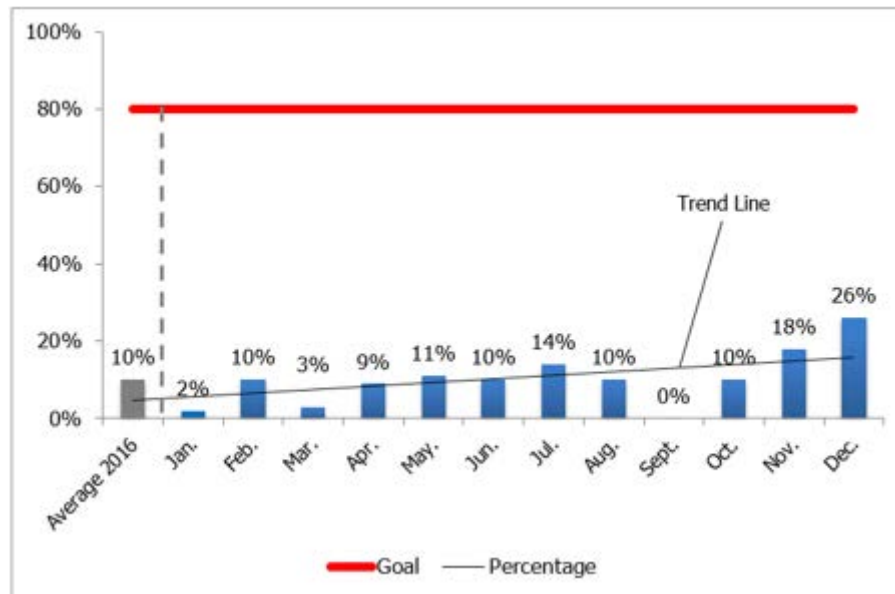


Figure 5 – Percentage of approved products - Completion - 2016

Source: Authors

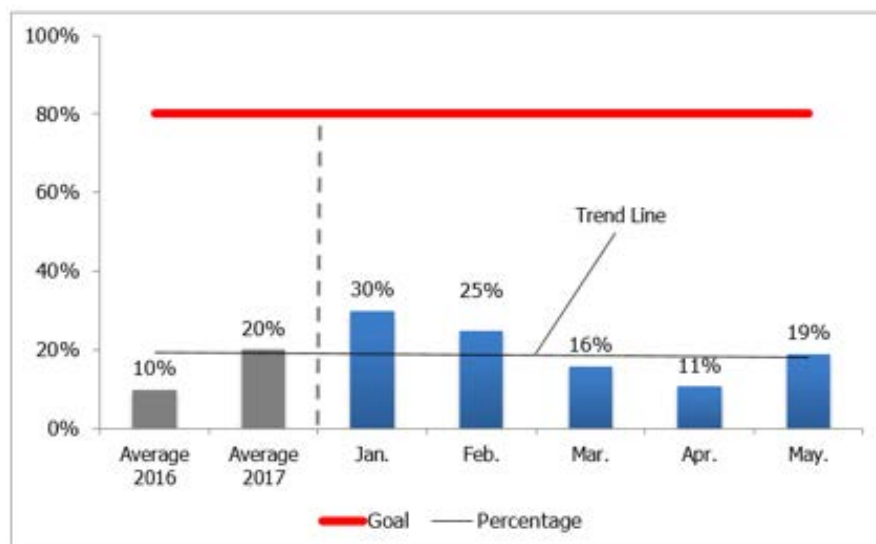


Figure 6 – Percentage of approved products (Finishing - January to May 2017)

Source: Authors

The average for 2016 shows that only 10 of every 100 manufactured products meet customer requirements without doing any kind of repair or rework, 90% of the implements that were produced went through some form of rework before being released to the Expedition.

The trend is repeated during the year 2017, Figure 5, but with an increase, since the average of the period from January to May presented the result of 20%. Since its inception, the indicator (Percentage of Approved Products) is analyzed in a general way, including the painting and assembly lines of the components. It is empirically agreed, from the data in Figures 7 and 8, that the greatest amount of problems to be reworked comes from the painting process, as it is verified through the Pareto Charts.

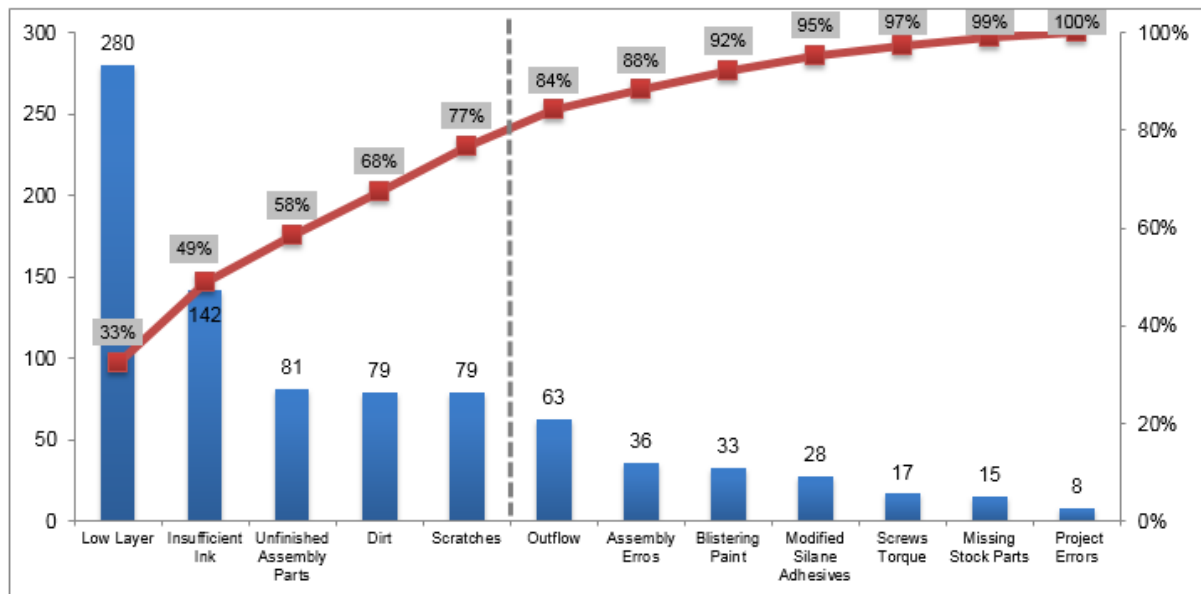


Figure 7 – Main problems evidenced in the quality inspection in the Finishing indicator - Period: January to May 2017

Source: Authors

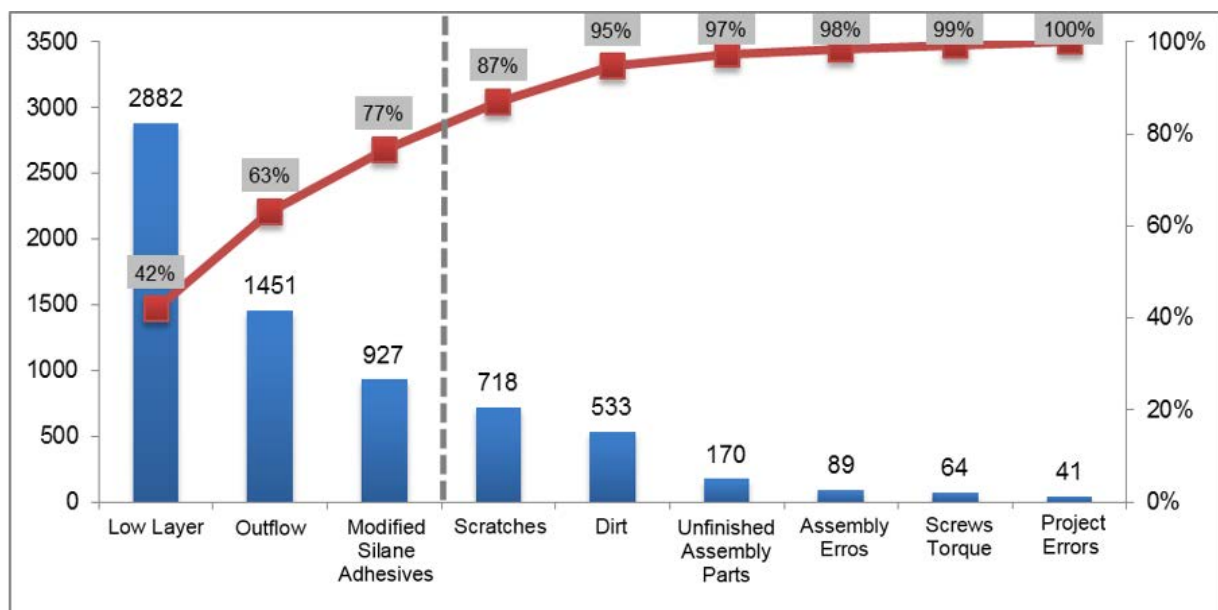


Figure 8 – Main problems evidenced in the quality inspection in the Finishing indicator - Period: January to December 2016

Source: Authors

Through the graphs it is observed that the biggest problem of the process is the "Low Layer", which occurs when there is not enough surface coverage by the paint to maintain a pattern. Still referring to the characterization of the problem, we also analyzed the main points of the product Tipper in which the largest occurrences of the problem are verified.

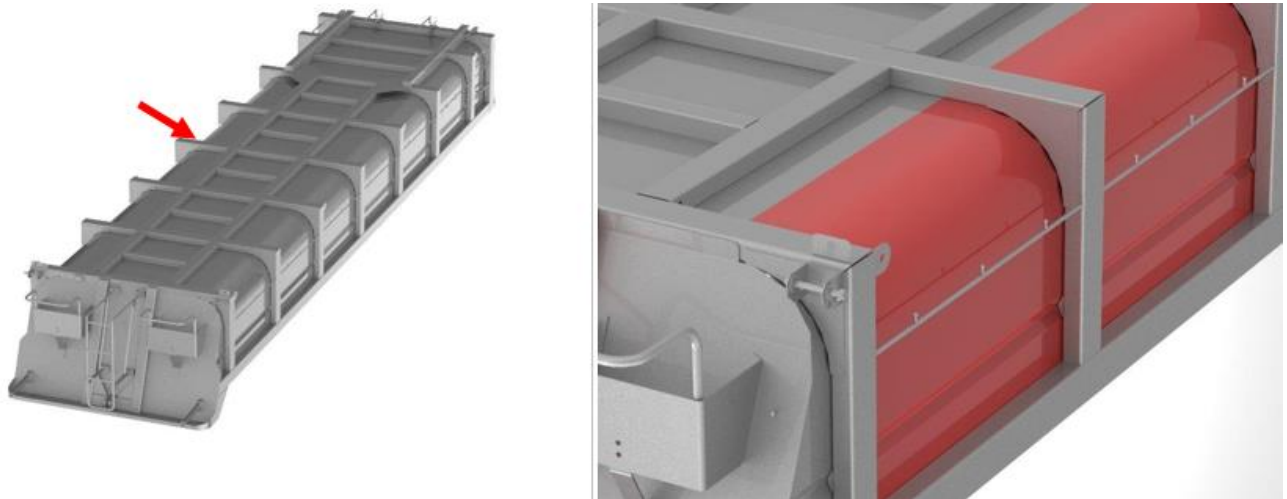


Figure 9 – Critical point of occurrence of the low ink layer - Tipping Box

Source: Adapted from the company's collection.

According to Figure 9 it is possible to observe that the critical point is located in the radius of the fold, between the floor and the side of the load box of the Rocker. Still referring to the low layer problem, the data of the layer measurements, of the Tipper implement, were carried out, carried out by the quality inspector of the month of May of 2017 and organized in a control chart for better visualization. A sample of 125 measurements was used since 10 inspections are done on each product and approximately 100 products are manufactured in the month. The company adopts as ideal values that have a minimum of 70 μ m layer thickness as Lower Specified Limit (LSL).

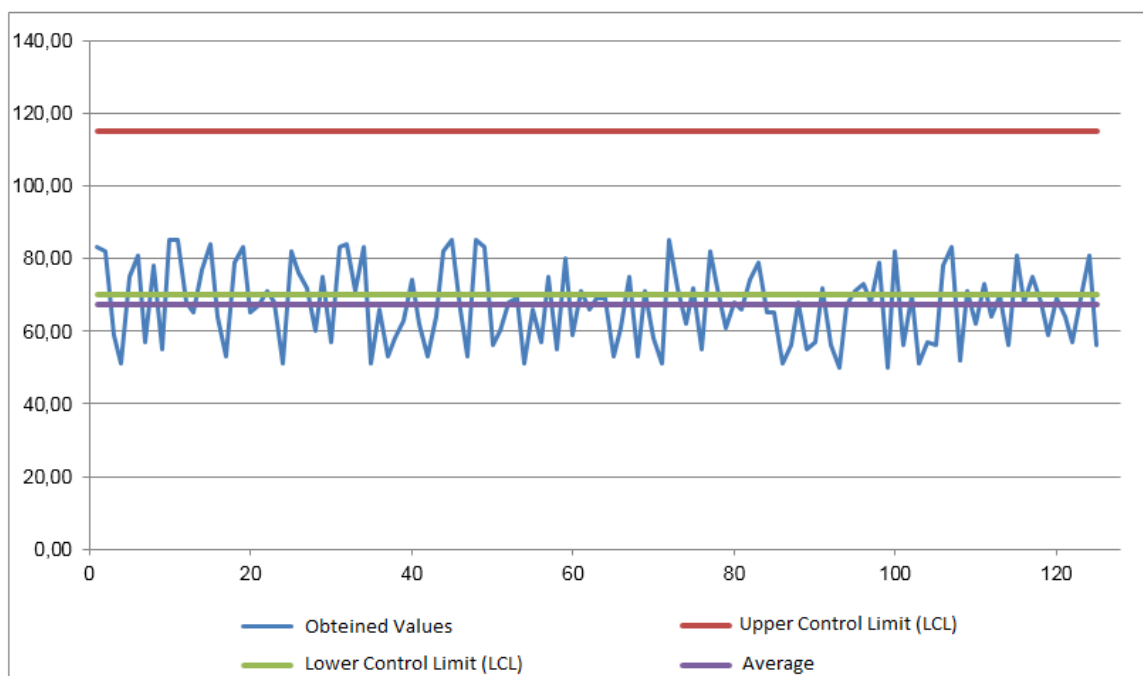


Figure 10 – Control chart showing variation of ink layer measurements (May 2017)

Source: Authors

Control limits are able to define whether a process is under control. When the points collected are located between the Specified Upper Limit (SUL) and the Lower Specified Limit (LSL), it means that the process is under control; however, if the points are outside these limits, it will be evidence that a study of the causes of this variation and, later, corrective actions.

From the graph of Figure 10, it is observed that the process is unstable, since there is a lot of variation between the measures considered low and satisfactory measures, with many values below 70 μ m, according to the specification.

After analyzing the data stratification, we sought to know which factors would be attributed to the causes of the low ink layer in a brainstorm, using the knowledge of the people involved. Among these, were those responsible for the Process Engineering, Quality Management and Coordination departments and representatives of the Finishing Line.

In order to investigate the fundamental causes, the members used the Ishikawa Diagram in the original configuration, analyzing material, labor, working methods, machines, environment and measurements. Figure 11 shows the result of the analysis.

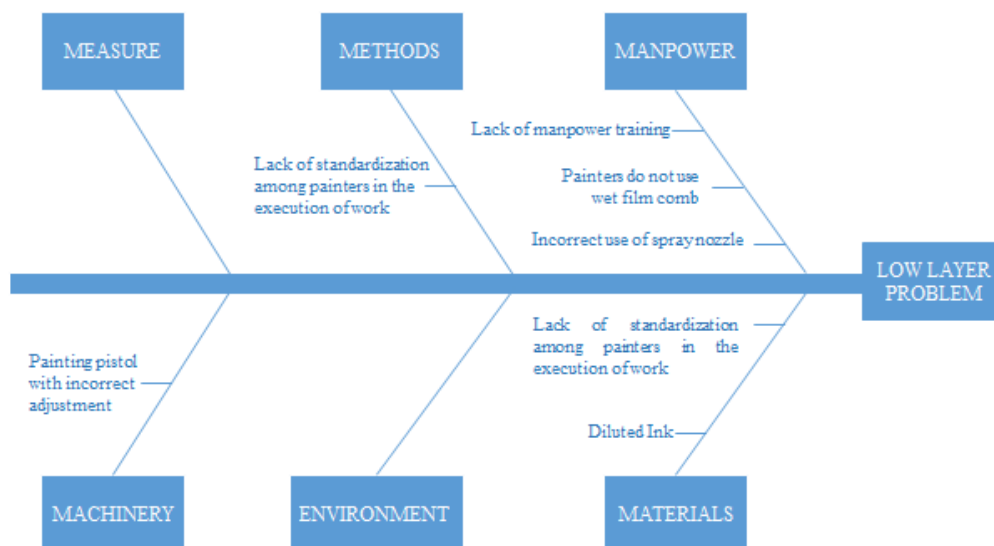


Figure 10 – Analysis of causes from the Ishikawa Diagram.

Source: Authors

After the discussion of the causes, it is observed that the main factor that influences the occurrence of Low Layer relates to the workforce and is directly related to the employees who perform the painting activity. In this way, the action plan based on the 5W1H tool was constructed, according to the reasons.

Table 1 presents, for each case, the actions defined resulting from the analysis of the previous phases, the deadlines and those responsible for reducing the problem index and, consequently, increasing the quality indicator of the process.

Table 1: Action plan.

What?	Who?	When?	Where ?	Why?	How?
Setting the paint application sequence according each product.	Process Engineering	06/2017	Paint Process Line	Lack of standardization among the painters to perform activity.	Informing to employees about the script to paint each product.
Training of recycling information contained in the Instruction of work of the painters and facilitators, referring to the adjustments of the painting machines.	Process Engineering	06/2017	Paint Room / Paint Process Line	Lack of training painters.	Determining and reviewing all the work instructions necessary to carry out the activities and training groups in the standard procedures.
Elaborating parameters inspection of painting machinery.	Process Engineering	06/2017	Paint Process Line	Incorrect spray-nozzle adjustment.	Every day the facilitator will inspect setting of the machine and spray-nozzle use
Training methods in painting application.	Provider	06/2017	Paint Room / Paint Process Line	Lack of training painters	Request providers for training recycling regarding the characteristics of the inks and applications.
Regularizing a daily inspection regarding wet film comb use.	Production	06/2017	Paint Process Line	The Painters do not use wet film comb continuously.	The facilitator will inspect wet film comb use for layer measurement each day.
Review the technical conditions of ink supply.	Process Engineering	08/2017	Document CTF-12	High variability in technical characteristics between colors.	Review of document CTF - 12 and referral to provider.
Inclusion of ink coverage test on quality certificates.	Process Engineering	08/2017	Providers		Asking the provider to include the results in sent certificates.

Starting auditing program to map individual performance.	Quality Management	07/2017	Paint Process Line	Performance monitoring.	Creating a verification checklist to perform auditing once a week with employees.
Implantation of pre-inspection of employees before sent the product to quality inspector.	Production	06/2017	Paint Process Line	Spread quality culture with the painters, warning them about their mistakes and stimulate them to do the right thing at once.	Before sending product to quality inspector, the employees should review the paint of product and rework it when necessary.
Wareness-raising and indicators monitoring	Production	06/2017	Paint Process Line	Valuing people commitment in evolution process.	Using the "Quality Tuesday" to maintain constant training actions.

Source: Authors

Among the 10 actions established, 7 were defined with the purpose of acting on operational problems, strengthening the relationship with most of the causes discussed, from training, awareness and standardization of the methods of accomplishment of the activity.

As well as the analysis of the process, the actions started in June and, in addition to them, other awareness actions were carried out in parallel to these actions. The company has a communication program promoted by the Quality department weekly responsible for the established directions, named "Quality Tuesday", through the inspectors.

Every Tuesday of the month, during a period of time, the sector indicators and other necessary news related to the process are informed. In this way, the coordinator of the finishing line, together with the person in charge of the Process Engineering sector, initiated a weekly communication to the employees on the follow-up of the actions taken and the indicator.

After analyzing the information and definitions of the actions, it was possible to observe, in Figure 11, the evolution of the results in the indicator of the Finishing process.

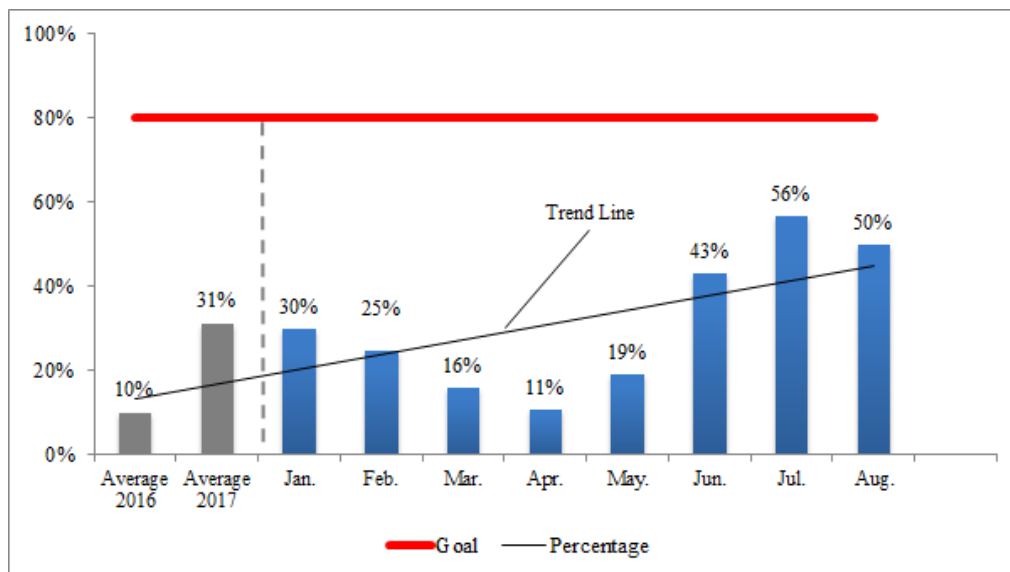


Figure 11 – Percentage of approved products - Finishing - Period: January to August 2017

Source: Authors

As of May, the possibility of increasing gradually and the average of the year 2016, observed the need to restructure the indicator of the finishing process. Therefore, starting in September, it was decided to divide it into "Painting" and "Final Assembly", in order to better structure the information of the problems and facilitate the achievement of the most critical points. The result of the month of September is shown in Figures 12 and 13.

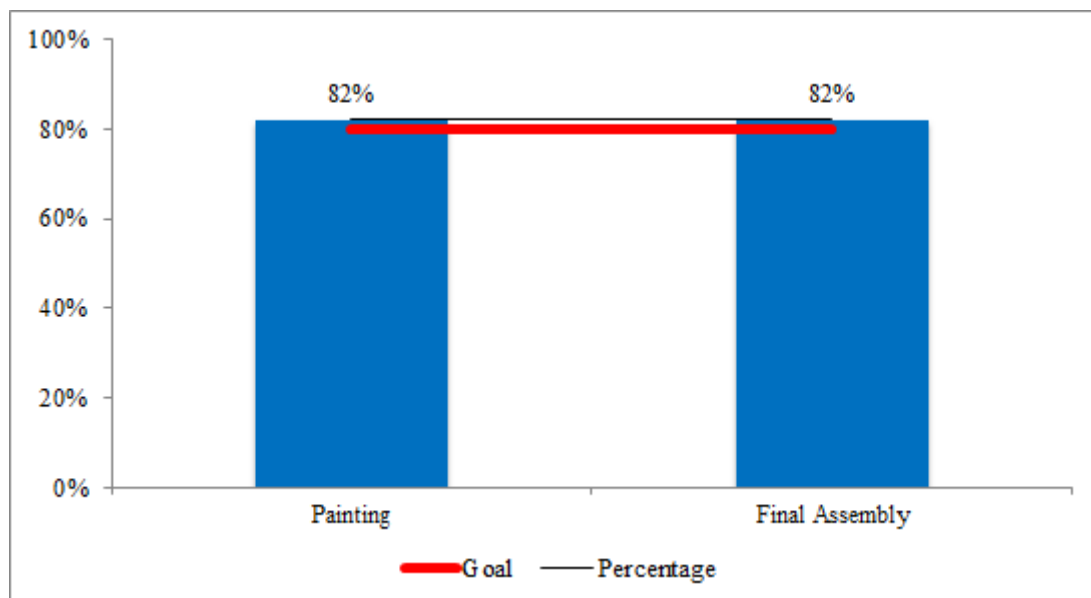


Figure 12: Percentage of approved products - Painting and Final Assembly - September 2017

Source: Authors

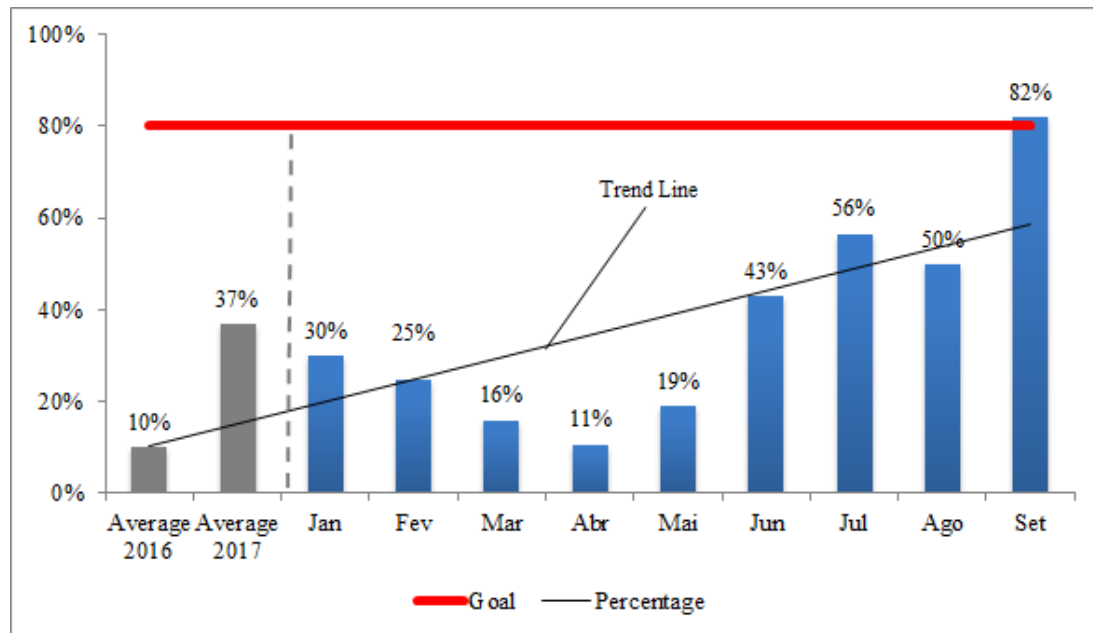


Figure 13: Percentage of approved products - Painting and Final Assembly - 2017

Source: Authors

Both processes have improved significantly, reaching 82% of compliant products and exceeding the target established for the first time since the beginning of the implementation of the program.

The result is consistent with the initial data, where it was clearly observed that the problems regarding the assembly of the components did not contribute to the low quality index. In turn, the painting process that once represented the responsible for inefficiency, is now responsible for raising the indicators.

A total of 125 new samples were collected on the layer measurements carried out by the inspector in the tiltingtruck product, this time in September 2017, and are presented in the Figure 14.

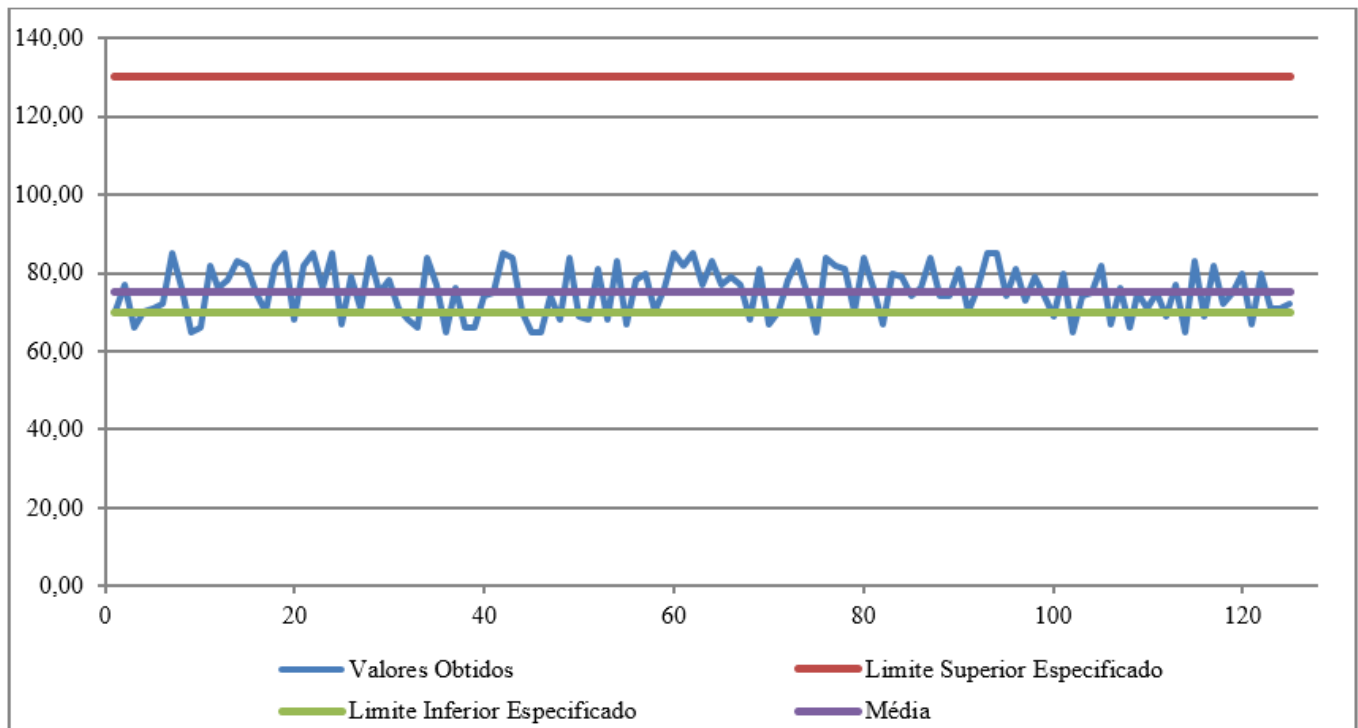


Figure 14: Control chart of ink layer measurements - Period: September 2017

Source: Authors

Contrary to the data obtained in the observation of the problem, the graph of the measurements found in September shows the trend of the process, where most of the measurements are close to the specified value or higher, with few points below 70 μ m.

The effect is also reflected in the costs that the reworking hours cause, which are calculated by the company's Controllershship sector from the times also indicated by the inspector in the check sheet and computed in the ERP system by the Quality Management. According to the evolution of the indicator by the graphs presented, Table 2 lists the number of hours of rework and the costs spent for the rework that gradually decreased.

Table 2: Ratio between rework hours and costs incurred.

Month	Rework Hours	Cost
March	77	R\$ 7.184,83
April	87	R\$ 9.481,63
May	109	R\$ 6.208,93
June	48	R\$ 4.004,67
July	28	R\$ 2.475,58
August	48	R\$ 3.878,52
September	18	R\$ 1.466,24
TOTAL		R\$ 34.650,40

Source: Authors

As of March, the Comptroller's Office started to request that the reworking hours be registered in the ERP system used to verify the cost of labor. Costs can vary regardless of the number of hours performed due to the individual direct labor of each operator and the materials used.

Self-inspection of employees, as an action, stands out as the main factor of the positive increase of the percentage indicator, due to all the work of study and implementation of the tools, as well as the training done. The methods now standardized were crucial for the realization of new training, which by consequence could raise the degree of skill of the painters in the execution of their tasks.

In the conclusion stage, following the PDCA reasoning, with the return to the beginning of the problem-solving process, it is possible to verify an increase in the volume of data for analysis, especially with respect to the materials used in the reworking.

4. Conclusion

The study demonstrated the effectiveness of the method of problem solving brought by Campos (2014), together with the application of quality tools, since the percentage of products approved in the painting process reached the goal sought by the organization in September, resulting in 82% of products according to the established requirements, without having to rework them.

The differential provided in the application of quality tools is the viability of standardized and organized data that contribute to information and analysis of performance and support decision making at the operational and strategic level. Allied to the PDCA method, they are proven to be efficient instruments in the process of continuous improvement in the production process of painting, because only the results are advanced when graphic techniques and in-depth studies are used, as emphasized in the analysis phase of the problem analysis.

Throughout the presented results it was possible to observe the influence of the training and the realizations of the tools in the human scope, acting on the problems correlated and arranged in the Ishikawa Diagram. The involvement of people who are directly related to the process was of fundamental importance for the success of the proposed method, especially those that perform the painting activity, emphasizing the definition of Lobo e Silva (2014) with regard to quality as being the perfect execution at the origin and understanding that quality is in people.

The costs generated by internal failures are hardly seen, but a significant decrease can be observed, which can be accompanied indirectly in the decrease of materials used for reworking.

Through the success obtained, it is guided by the experience of the reorganizations of the activities related to quality, for the phase of total implantation, with the potentiality of extension to the other processes that need a deep analysis in its unsatisfactory results.

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ORGANIZATIONAL LEARNING:

A case study resulting from the investments programming in a credit union in Santa Catarina - Brazil

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Abstract

Organizational Learning (OL) is a research area that presents several approaches to understand how an organization learns. Among the most present approaches in research, we have the 4i framework that proposes the OL through four subprocesses: intuition, interpretation, integration and institutionalization.

This study sought to understand how the OL process occurred in the investments programming in a Credit Union in Santa Catarina, southern Brazil. Two employees directly involved with the Programmed Future program were interviewed. The report draws a parallel between the subprocesses of the 4i framework and the learning processes that took place in the Union.

Keywords: Organizational Learning; 4i framework; Credit Unions.

1. Introduction

Organizational Learning (OL) is an active metaphor in research that seeks to understand how organizations learn. In the knowledge age, this has become the main asset of an organization, as well as its competitive edge or what keeps an organization running.

The field of action of the OL is in understanding the learning processes of team level, organization and interorganizations or network. In the world where information and change happen quickly, learning processes bring a differential to organizations in adapting or proposing these changes. The relationship with labor changed, where man was seen as an extension of the machine now becomes the main capital in relation to differences between organizations.

When we present the current scenario of Financial Institutions we have a homogeneity of products and services offered, including the sharing and centralization of products to reduce operating expenses. Nowadays, the same card and the same advantages are marketed by various financial institutions. Credit unions differ from other financial institutions because their clients are associated with the cooperative and therefore own the business. However, the challenge of organizations to adapt to new markets and competitiveness is an eminent reality, in which they must learn to do differently in order to keep growing in Brazil. In Santa Catarina, we can say that there is a favorable scenario for cooperation, where Credit Unions grow up to double digits every year.

In this context, we searched for to understand how occurred the institutionalization of the practice of investment programming in a Credit Union in Santa Catarina from its intuition to its institutionalization through the 4is framework.

2. Case Description

This research was carried out in a Credit Union in the state of Santa Catarina, southern Brazil, which has been operating in the market for more than 10 years. As a Credit Union, its clients are also its owners and participate in decisions through democratic management. Its objective is to foster local development through financial solutions at a fair price and, therefore, becomes a beacon of prices in the regions it operates.

Early in its history due to the credit appetite of the Credit Union region agencies, this organization was impelled to build fast fundraising actions so that it could continue to develop its credit portfolio. As usual, a catch-up campaign was quickly envisaged, that is, to challenge the agencies to make efforts to raise funds (investments) so this new amount of resources could be invested in credit. This episode occurred in the

second half of 2014, where, according to information management tool SAS Institute Inc. (2018), the Credit Union adjusted excess liquidity was below R\$ 1,000,000.00 (one million reais). which could completely compromise the expansion since the average of new credit operations growth was R\$ 5,000,000.00 (five million reais) per month.

As a result, the fundraising campaign was built so that it could boost the raise of resources, both investment applications in the act and the investments programming of applications to build a portfolio of investments programming. Criteria were established for the awards through gifts to outstanding collaborators: those who applied the most in resources and those who made the most investment programming.

In search of winning the campaign award, one of the collaborators, in addition to making large volumes of investments, started selling investments programming for a good part of the portfolio of associates that was under his management. As the criteria for the application of balances and the number of schedules were similar, soon this collaborator was at the top of the ranking leaving many colleagues unable to compete with him for more resources that they captured. The Credit Union understood that it would have left an "opening" in the regulation that allowed the employee to win the campaign even though it seemed unfair to the others.

Soon, after the first days of the identification of the case came the surprise: the smaller values of investments programmed monthly had a positive impact on the excess liquidity index. The Credit Union with the same outstanding balance of the investment portfolio had excess liquidity three times higher than normal. In view of this, the board thought about the possibility of disseminating the practice thinking about the future of the Union and its members, encouraging them to plan their goals, making monthly applications of small values. For the action to be structured, some advisory services were called to a committee to consider what strategies would be adopted to communicate to associates this possibility and how employees could be financial advisors thinking about the future of associates. In this committee came the idea of the Programmed Future program.

This program was no longer a temporary funding campaign and has become part of the account opening and association routines, as well as the daily contact of business managers with their associates. An identity was created where several "dreams" were exposed to the associates in the communication of the agencies, in the ATMs and in the payment spaces in the boxes and attendance in the agencies. Parts such as folders, billboards, and more were created with travel pictures, diplomas, and reforms that could exemplify the objectives that the Programmed Future could help the members conquer. In December 2014 there were 181 investments programming, a total of R\$ 19,510.00 (nineteen thousand five hundred and ten reais) in investments monthly. At the end of September 2018, four years later, there were 2,448 investments programming, a total of R\$ 465,845.00 (four hundred and six thousand, eight hundred and forty-five reais) in investments monthly (ORACLE, 2018).

At the end of 2014, the cooperative's adjusted surplus liquidity after the funding campaign was at a level above R \$ 10,000,000.00 (ten million reais). At the end of September 2018, the amount available for credit applications was over R\$ 90,000,000.00 (ninety million reais) (SAS INSTITUITE INC, 2018). It is important to highlight that other actions also drove the growth of deposits, such as external campaigns with

premiums for members. The first one was called Future Prizewinning, an allusion to the Programmed Future program in a prize-winning version for the Credit Union's members.

In addition to obtaining resources to continue the Credit Union's expansion, organization considered young for its segment, this program was marketed as a financial education tool and vision of the future of the Cooperative towards its members, encouraging them to be programmed for the future.

3. Methodological Procedures

This is a qualitative research, with descriptive objectives through the technical procedure of case study in the interpretation of the data collected with the existing literature of Organizational Learning. For Penna (2004) when a qualitative research is proposed, this implies an understanding and interpretation of the phenomena by the researcher. She also says that most authors consider that all research is interpretive, since it is guided by the subjectivity of those who research about how the phenomena are described.

The bibliographic research was also explored to support the construct used to draw a parallel between research and classical literature and the latest research on the subject. According to Marconi and Lakatos (2003), the bibliographic research makes it possible to put the researcher in contact with all the scientific content published until then. The research was built from the information collected through a semi-structured interview. The questions were structured to identify the four moments related to the 4i framework. This choice was justified by the possibility of investigating more details of the learning process. Through the semi-structured interview proposal, it was possible to spontaneously explore the experiences without compromising the research objective. (COLAUTO & BEUREN, 2012)

Two employees of the cooperative were interviewed: a director and a business advisor, both active in the process since the first funding campaign that generated the program.

4. Discussion of the Case

For the discussion of the case through the Organizational Learning point of view, the 4i framework is proposed. "The 4i framework of organizational learning contains four (sub) related processes - intuiting, interpreting, integrating and institutionalizing that occur at three levels: individual, group and organization" (CROSSAN, LANE and WHITE 1999: 524).

The moment when the management of the Credit Union realized that the programming of investments generated a positive result in the excess liquidity was classified as the intuition subprocess. Intuition is a subjective condition, that is, of people since it is a question of identifying possibilities without concrete evidence. It is from this that the individual creates form and meaning for the formation of an idea (CROSSAN, LANE, WHITE, 1999).

Even without having concrete data to attribute the improvement of excess liquidity to the investments programming, a belief was created that the only change made at the time of the improvement was the investments programming and the justification for the result was placed on it.

From the moment intuition began to be analyzed as a possibility, we have the subprocess of interpretation. According to Versani et al. (2018, p. 164), the interpretation is: "how people explained visions, expectations

and insights to themselves as well as to others by mentioning some of the activities involved." The elaboration of the idea for investment programming, the correlation of this with the numbers of excess liquidity performed were understood as a possibility of increasing the liquidity index.

The next step within the proposed framework is integration. For Albuquerque and Teixeira (2016, p.29) "the focus of this stage is conscious collective action. At this moment the idea that until then was in the mind or the paper begins to come true. The integration stage is at the group level. " After the individual intuitive process and the structuring of the idea, it was shared with the group of advisors so that they could think of a strategy so that the whole Union, in its agencies, could adopt the practice.

Finally, after tracing the strategy, began the visits and training of the Programmed Future. All employees were made aware of the importance of the program to the Credit Union and its members. The offer of investments programming was inserted in the opening of accounts and association, where employees encourage physical members to program on average 10% of their income and legal members according to the segment a percentage that could supply the necessary amount for the payment of the thirteenth salary payroll or future investments. At this stage, we have the subprocess of institutionalization.

For Vernasi et al. (2018), institutionalization is characterized by the formal adoption of practices that guide behaviors and changes in an organization. This step is directly linked to well-defined routines and processes, plans and expansion strategies, which is directly related to the Credit Union context (DUTTA and CROSSAN, 2005).

According to Crossan, Maurer and White (2011), when innovation persists, it becomes institutionalized. This process promotes changes in the organization and these changes change the results. The cycle does not end; therefore, the new institutionalized routines are feedback for new processes of intuition and interpretation (CROSSAN, LANE, WHITE, 1999).

In this research it can be observed that the institutionalization of the Programmed Future generated feedback for the intuition and interpretation of the external fundraising campaign. This was a campaign under the Future Prizewinning that rewarded members due to the investments made in the Credit Union during the period of validity.

5. Final Considerations

The 4i framework is present in the classical literature, however, even in the most recent research it is possible to understand the processes of Organizational Learning in an objective way. His four-subprocess proposition exemplifies learning from the individual level to the level of group and organization. In the context of the learning that occurred in the investments programming in the Credit Union, one can observe how each stage of learning happened from the intuition until the institutionalization of the new routine.

By observing the processes in isolation, we can think about how each of them happened and the quality of maturation of these so that the next one could exploit the full potential of the original intuition. The commitment of the group to innovation was a decisive factor in the institutionalization, since it was through him that the idea elaborated and interpreted was institutionalized and remains until the present day, even among the collaborators who did not have the experience of living the moment of presentation of the program.

Nowadays, the Credit Union does not formally use the term Programmed Future, however, the incentive for the programming of investment by the employees continues, and they share with the new collaborators the importance of programming investments both for the expansion of the Credit Union and for the financial education of members.

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Systematic review of the epidemiology of oral cancer in Brazil

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ABSTRACT

Considering the role of epidemiological information in planning and effective interventions, the purpose of this study was to systematically review the epidemiology of squamous cell carcinoma in Brazil. We searched the PubMed, LILACS, BBO and Cochrane databases using keywords "oral squamous cell carcinoma", "oral squamous cell carcinoma", "oral squamous cell carcinoma" and their equivalents in English and Spanish, in combination with epidemiology, prevalence, frequency, and Brazil by 2018, excluding studies that did not address the epidemiology of this neoplasm or those conducted in other countries. The mean age of the patients was 56.6 years, with a higher prevalence in males 3.29: 1, mainly located in tongue, 42% and mouth floor 22%. Associated risk factors are tobacco (72.85%) and alcohol (66.65%). It was observed that 47% of patients present with regional metastases at the time of cancer discovery. According to the observed observational studies it can be concluded that the epidemiological data of Brazil are high in comparison to other countries, especially the number of metastases, indicating the late diagnosis of the disease

Key words: Mouth cancer. Oral squamous cell carcinoma. Malignant neoplasm. Epidemiology

INTRODUCTION

Mouth cancer or oral cancer is according to WHO, the cancer that affects the lips and the interior of the oral cavity. Among the most prevalent malignant neoplasms of the mouth in Brazil, it can be highlighted that squamous cell carcinoma (SCC) is the most commonly found, corresponding to about 90% of the diagnosed cases. The diagnosis is late, which results in a survival rate of less than 50% (Pimenta Amaral et al., 2004; Gervásio et al., 2001).

Clinically ECC is a pathology that has a predilection for elderly men. The lesion has several aspects, and may be exophytic, endophytic (invasive, ulcerated), leucoplasic, erythroplastic or erythroleukoplasic (Neville et al., 2009).

This pathology is between the fifth and seventh most prevalent type of cancer, depending on the region of the world (Gervásio et al., 2001, Faggons et al., 2015), and has become an alarming problem of health and social conditions around the world, with variations in incidence up to 20 times in some regions of the planet (Warnakulasuriya, 2009).

With an annual incidence of almost 300,000 new cases in the world, developing countries, among them Brazil, correspond to almost 2/3 (two thirds) of these numbers (Sharma et al., 2010; Oliveira et al., 2015). Saba et al. (2011) stated that there are more than half a million people with oral squamous cell carcinoma in the world.

MATERIALS AND METHODS

The present study was submitted to the Research Ethics Committee of the São Leopoldo Mandic Faculty and exempted from being submitted to the analysis according to protocol nº 2017/7705 (Annex A).

The methodology of this study followed the methodological guidelines for the elaboration of a systematic review of comparative observational studies on risk factors and prognosis of the Ministry of Health.

We selected articles published in the international and national literature on Oral Squamous Cell Carcinoma, taking into account the prevalence of gender, age, ethnicity, intraoral anatomical site, alcoholism, smoking and the occurrence of local metastases. The publications were selected for their titles and / or abstracts, and later analyzed by inclusion and exclusion criteria.

SYSTEMATIC REVIEW

EPIDEMIOLOGY

Bonfante et al. (2014) performed a systematic review of authorization records for radiotherapy and / or chemotherapy by the Unified Health System, between 2000 and 2006, whose objective was "to analyze the specific five-year survival and associated factors for oral cancer in Brazil." It was a retrospective cohort, whose data source was the Onco Base, which performed the probabilistic-deterministic relationship of all records.

The study included patients diagnosed between 2002 and 2003 with oral cancer, except lip, and age between 19 and 100 years (N = 6,180). The specific five-year survival rate was 60%. They were associated with the lowest specific survival age > 40 years; stage III or IV; location of tumor on tongue, floor of mouth and base of tongue; have not undergone surgical treatment, only chemotherapy and / or radiotherapy and reside in certain states of Brazil.

Pimenta Amaral et al. (2009) reviewed the records of patients with SCC in the tongue and floor of the mouth between 1965 and 1998 at the A. C. Camargo Cancer Hospital in São Paulo. This study included 193 patients between 29 and 89 years of age, where 44% were in clinical stage I, and 56% in clinical stage

II. 27 patients had lymph node metastasis. The only factor associated with the presence of occult metastasis was the fact that there was muscle infiltration; for tumors in the tongue there was the presence of vascular embolism and desmoplastic reaction; and for floor of mouth, a histological gradient. The factor associated with tumor-free prognosis at five years was the presence of muscle infiltrate, the patient's gender, and the clinical stage. Tumors in the tongue and early-stage floor of the mouth that presented muscle infiltrate showed a greater probability of hidden metastasis and shorter survival.

Santos et al. (2010) presented a study that demonstrated a high incidence of oral cancer mortality throughout Brazil, mainly due to the delay in diagnosis. The objective of the authors was to conduct a cross-sectional study in 74 patients diagnosed with SCC in a hospital in Alagoas, through a semi-structured interview to obtain: sociodemographic data, the type of professional help sought by the patients, the symptomatology and the stage of the tumor at the moment of the diagnosis. According to the results obtained in this study, the patients usually sought a physician, not a dentist, even with the lesion being in the mouth, only being referred to the specialist already in advanced stages of the disease.

Rotundo et al. (2013) evaluated the association of prosthesis use with the risk of oral cancer arising from a survey of 71 cases of oral cancer in two hospitals in São Paulo, and 240 cases without the disease. All cases have been confirmed to be squamous cell carcinoma in the mouth in patients with complaints of pain due to maladaptive prostheses. Although still controversial, this study indicated the hypothesis of an association between trauma due to poorly adapted prostheses and the appearance of oral cancer, a factor not elucidated in the world literature, requiring more comprehensive studies.

Perussi et al. (2002) verified the influence of the sex variables and the location of the primary tumor on survival in the elderly with cancer of the mouth. To this end, the authors conducted a retrospective study of 1440 clinical files of patients with squamous cell carcinoma of the mouth of the Head and Neck Surgery Service of Hospital Heliópolis, São Paulo, 1978-1997. There were 562 elderly and 878 in the 1st and 2nd ages, comparing the frequencies of the study variables (sex and tumor location).

The results of the work described above demonstrated that the frequency of oral cancer in the elderly remained stable in the period studied (39.5% in 1978-87 vs 38.2% in 1989-1997). The male / female ratio was 3: 1 in patients over 60 years and 8: 1 before 60 years. It was observed a predominance in the elderly of cancer of the region of jugal mucosa (56%) and palate (47%) when compared to tumors of younger patients located on tongue and floor (67%) and tongue (62%). The study concluded that there is a greater proportion of women with oral cancer among the elderly when correlated to the 1st and 2nd ages. Comparatively, palatal tumors were more frequent in individuals younger than 60 years, while tongue and floor localization occurred more frequently in patients aged 60 years and older. The differences observed in relation to gender and location were not reflected in changes in survival of the patients studied.

Losi-Guembarovski et al. (2009) stated that oral carcinoma is the sixth most common CA type worldwide, and the seventh most common type in Brazil, which is the country with the highest incidence rate of this disease in Latin America. With an average of five years of survival - one of the lowest rates among cancers in general. The objective of the present study was to compare the epidemiological, clinical and histological characteristics of 91 patients with oral SCC, with a mean age of 58.62 ± 10.46 years and the male / female ratio of 6.6: 1.0 (79 male and 12 female). Descendants of Europeans were predominant, with 79 patients

(86.8%). Eighty-five individuals were smokers (93.4%) and 70 (76.9%) regularly consumed alcohol. The anatomical distribution of the tumor was: 27 patients (29.7%) with tongue tumor; 18 (19.8%) on the floor of the mouth; 11 (12.1%) in oropharynx; and 11 (12.1%) in unspecified oral mucosa. Fifty-seven patients (62.6%) had involvement of lymph nodes and three had distant metastases (3.3%). Surgery and radiotherapy were applied in 43.2% of the patients.

Oliveira et al. (2015) observed demographic, clinical and therapeutic characteristics, as well as risk factors for assessing the prognosis of patients with primary oral SCC between 2000 and 2010 in public hospitals in Uruguay. The demographic and clinical characteristics, risk factors, and treatment used were considered. Of the 200 patients with oral SCC, 79.4% were men (3.8: 1 man / woman), with a mean age of 60.75 ± 11.26 . Alcohol consumption and tobacco use were reported by 85.3% and 63.5% of the patients, respectively. The most affected site was the language (42.5%). Surgery was the most common treatment option and there was a 58.5% survival rate.

Marocchio et al. (2010) evaluated differences in data presented between patients with SCC between the years 1960 and 2008, in a total of 1,564 cases reviewed. The analyzed variables were sex, age, ethnicity, prevalent anatomic site, duration and size of the lesion. In their findings, men are more affected than women, in a ratio of 3: 1. There is a significant increase in lesion appearance in patients over 80 years of age. The gum was the most affected site, followed by the lower lip. Small lesions were found, and the development time of these lesions was also short.

Marques et al. (2008) associated oral hygiene practices with the appearance of oral CA. To do so, they performed a control case study in hospitals in the metropolitan area of São Paulo from 1998 to 2002 in a total of 309 patients with ECC in the mouth and 468 control cases. The authors concluded that total prosthesis use is not associated with oral cancer but is strongly associated with gingival bleeding. Those patients who never visited a dental surgeon were more likely to have oral CA. Indicating a certain predisposition for oral cancer, independent of tobacco use and alcohol consumption.

Durazzo et al. (2005) reviewed the records of patients who underwent oral cancer surgery at a School Hospital between 1994 and 2002, in order to describe the clinical and epidemiological characteristics of the same. The results showed that a total of 374 patients were operated on. The ages ranged from 14 to 94 years (mean = 57.4 years), being 255 men (68.2%), and 295 Caucasian (80.6%). The majority of patients had tumors on the tongue and / or floor of the mouth (5.6%), while 20.3% had lip cancer. Squamous cell carcinoma was found in 90.3% of the cases. Approximately 62% did not present regional metastases, and there was a relative incidence in young patients (40 years or less) of 8.6%.

Gervásio et al. (2001) analyzed the records of 740 patients with oral squamous cell carcinoma in two Belo Horizonte hospitals between 1986 and 1996. The male / female ratio was 4.8: 1. The mean age was 58.6 years. The majority The study showed a relationship of lesion development with smoking and alcohol habits.

In a study of 91 patients, 37 cases of squamous cell carcinoma in the lip and 54 cases in the oral cavity, Batista et al. (2010) observed a predominance of men. Of these, 66.7% were Caucasians, 88.23% were intraoral lesions and 87.5% were lesions on the lips. The vast majority, in both cases, were alcoholics and

smokers, and in the case of patients who had carcinoma on their lips, they had been frequently exposed to the sun. The lower lip was the most affected (89.19%).

In relation to metastases, Batista et al. (2010), by the Cox analysis, observed with respect to the microscopic findings that there were a significant number of cases with intense inflammatory infiltrate located adjacent to the lip tumor, in relation to the intraoral one. Quantitative analysis of the proliferation index demonstrated a high percentage of PCNA and Ki 67 - positive cells in oral SCC, when compared to CCEL, in any of the stages.

Maleki et al. (2015) conducted a systematic review of oral cancer in Iran. This publication stated that the mean age of the patients was 54 years \pm 15.1 years, with the tongue being the most affected site in 29.9% the most prevalent type of malignant neoplasm was SCC in 70% of cases. The authors found the association with tobacco as the main risk factor associated with the conclusion that the study can help to improve the current programs and interventions for the control and combat of CCE.

Feller & Lemmer (2012) stated in an epidemiological study in the USA that oral SCC more often affects men than women 1.5: 1 most likely because more men than women enjoy high-risk habits. The likelihood of developing oral SCC increases with the exposure period to risk factors, and increasing age adds to the new dimension of age-related mutagenesis and epigenetic changes. In this country the median age of diagnosis of SCC is 62 years. However, the incidence of oral SCC in people under the age of 45 is increasing. The reason for this is unclear according to the authors.

In Western countries, oral SCC affects the tongue in 20% - 40% of cases and the floor of the mouth in 15% - 20% of cases, and together these sites about 50% of all cases of oral SCC. The gums, palate, retromolar area and jugal and labial mucosa are less frequently affected oral sites.

Al-Jaber et al. (2016) through a systematic review evaluated the epidemiology of oral cancer in Arab countries. They reported that oral cancer patients were mostly in the fifth to sixth decades of life, and the incidence at younger ages was reported in some Arab countries. Yemenis have an alarmingly high prevalence of OC among people under 45 years of age. Exposures to alcohol consumption and solar radiation were cited as possible risk factors. The sites most affected were tongue, floor of the mouth and lower lip at the affected site were attributed to the sociocultural behavior of the populations studied. SCC was the most commonly detected tumor and, in general, patients were in the late stages (III and IV) at the time of diagnosis.

CONCLUSION

Based on the results of this systematic review it can be concluded that:

- a) squamous cell carcinoma has male predilection in the age range between 50 and 60 years;
- b) the main sites of intraoral location in the patients found were the tongue, followed by the floor of the mouth and the gingiva;
- c) among the risk factors for the appearance of CCEO, smoking and alcoholism were habit of 72.85% and 66.65% respectively of the patients;
- d) about half of the patients already had regional metastases at the time of the discovery of the disease;

e) data on survival analysis after 5 years could not be compared due to the methodological disparity of the included studies.

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Perceptions and Attitudes of Academic Staff Towards Agricultural Training in Kenyan Universities

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Abstract

Agricultural productivity in Africa does not match that of the number of professional graduates working within the sector. This raises question on suitability of university training to needed graduate competencies. Under "PREPARE BSc project", ninety-five lecturers selected from academic disciplines were interviewed to collect data on lecturers' perceptions and attitudes on learning environment, curriculum development, teaching and learning, and assessment activities. Over 80% of the respondents stated that curricula were adequate in content, but poorly aligned to teaching and learning activities. They (71.4%) thought they were competent in lecture and laboratory teaching methodologies, but the university learning environment (53.4%) and field training arrangements (73.9%) were poorly aligned with the curricula. There was excessive emphasis on summative assessment (68.4%) at the expense of continuous assessment tests (formative assessment). A need was therefore identified to train staff on aligning curricula, teaching and assessment methods to learning environment and expected graduate competencies.

Key words: Graduates of agriculture, curriculum alignment, teaching and assessment methodologies, agricultural faculty quality

1. Introduction

Globally, universities are mandated to equip personnel with knowledge and skills demanded by the job market and society. Before 1990, universities admitted fewer students who were motivated to learn and eventually provide solutions to problems affecting their societies (RELMA, 2002). However, since then, there has been increased student numbers and diversity of academic capabilities and cultural backgrounds (Fry, Ketteridge & Marshall, 2009). Consequently, lecturing (the common teaching method at universities) has failed to provide real-life experiences, and proved inadequate for production of graduates having competencies in critical thinking and problem-solving (Odhiambo, 2011). This has had a negative impact on the quality of graduates in the job market (Onyango, Kunyanga, Karanja & Wahome, 2018).

Teaching and learning is a sum total of attitudes and actions of teachers and students in a given environment. Understanding their nature is helpful in enabling learning to take place in an enjoyable way. Teaching methods in world-class universities are highly dynamic, ever evolving, in order to motivate learners to convert from knowledge containers to creative thinkers and adapt to job market demands (Gamache, 2002). However, many students joining African universities today misconceive learning as an

addition of more knowledge into their pre-existing stores. Lecturers should therefore change this mind-set through their teaching, curricula design and assessment format (Biggs, 2003).

Quality university teaching and learning requires that lectures undergo training in pedagogy for them to become more effective teachers. Incidentally, majority of these academicians are experts in their disciplines and conduct excellent research, but teaching plays a second fiddle (Nyaigotti-Chacha, 2004). In addition, University administration is the corner stone in implementation of an education program and must provide an enabling environment. These include higher education policies, finances, leadership and management, physical facilities, competence and motivation of lecturers and student support services (Kaburu & Embeywa, 2014). However, in the last 15 - 20 years, Kenyan universities have witnessed massive increase in student enrolment without matching increase in financing, staffing and facilities. Consequently, inadequate and run down facilities may compromise quality of graduates (Nyangau, 2014), but the situation in the University of Nairobi is largely unknown.

A project entitled "Enhancing the quality of graduates of agriculture to meet tomorrow's food security challenge (PREPARE BSc)" was implemented in three East African universities, including University of Nairobi. This paper presents results from the component addressing evaluation of academic staffs' preparedness to make necessary transformation for improved graduate competencies.

2. Materials and Methods

2.1 Study site

The data reported in this paper was collected from academic staff of the College of Agriculture and Veterinary Science (CAVS) located at Upper Kabete Campus, 16 kilometres west of Nairobi city, Kenya. The pertinent faculties were Faculty of Agriculture and Faculty of Veterinary Medicine.

2.2 Study approach

A survey of academic staff from the two faculties was conducted using semi-structured questionnaires designed to re-construct the process of delivering quality agricultural education. It was divided into five sections as follows:

- **Characteristics of respondents:** sex; academic qualification, specialization, experience and current position,
- **Conceptualization of curriculum:** knowledge and practices of curriculum design and development,
- **Teaching and learning activities:** traditional and modern teaching methods,
- **Methods used for formative and summative assessment:** question and answer sessions; feedback; examinations; course evaluation and staff appraisal, and
- **Aspects of teaching and learning environment:** physical infrastructure; staff motivation and professionalism; rules, regulations and administration

2.3 Theory of change

From the data collected, analyses of potential modifications of curriculum development skills, teaching, learning and assessment approaches, lecturer - learner relationships and teaching and learning environment

would result in enhanced graduate competencies. The anticipated modifications included constructive alignment of curricula to learning outcomes, training approaches, administration, rules, regulations and guidelines to meet job market demands.

2.2 Selection of respondents

We purposed to interview respondents from the two faculties and each of the nine teaching departments, within which a stratified random sample was obtained with academic positions and gender as strata. A sample of 95 lecturers was thus obtained from 205 academic staff using Cochran's sample size formula (Cochran 1977) as follows:

$$N_o = \frac{z^2 pq}{e^2} \dots\dots\dots \text{Equation 1}$$

Where,

- N_o is the sample size,
- z is the selected critical value of desired confidence level,
- p is the estimated proportion of an attribute that is present in the population,
- q is $p - 1$ and
- e is the desired level of precision.

Equation 2 was used to calculate the final sample size

$$n = \frac{n_o}{\frac{1+n_o-1}{N}} \dots\dots\dots \text{Equation 2}$$

Where,

- n is the final sample size,
- n_o is the sample size derived from equation (1) and
- N is the population size.

2.4 Data analyses

The data collected was entered into computer spread sheets and cleaned of inconsistencies. Proportion for each response category was calculated using cross-tabulations. Demographic data was analyzed using percentages and frequencies. Descriptive statistics were derived to demonstrate the leaning of attitude or opinion towards either positive or negative. Qualitative data was assessed for trends and mindsets.

3. Results

3.1. Characteristics of respondents

The key characteristics of the survey respondents are as shown in Table 1. The respondents from either of the two faculties were fairly similar in terms of university teaching experience and gender distribution. There were more respondents possessing lower academic degrees in Faculty of Veterinary Medicine than in Faculty of Agriculture. Likewise, the Faculty of Agriculture had greater academic diversity with staff

possessing degrees from many universities distributed globally. Their years of university teaching experienced ranged from one year to 45 years with a mean of 14.6 years. According to their academic positions, 25 (26.3%) were tutorial fellows and assistant lecturers, 22 (23.2%) were lecturers, 19 (20.0%) senior lecturers, 10 (10.5%) associate professors and 11 (12.6%) professors.

Table 1: Characteristics of academic staff respondents in CAVS who participated in the survey

Characteristic	Category	Faculty (Proportion, %)	
		Agriculture	Veterinary Medicine
Gender	Male	78.4	84.2
	Female	21.6	15.8
University teaching experience	<10 years	48.6	46.2
	10 - 20 years	21.6	19.2
	>20 years	29.7	34.6
Academic degree	Bachelors	0.0	3.5
	Masters	29.7	36.8
	Ph.D	67.6	57.9
	Others	2.7	0.0
University awarding highest degree	University of Nairobi	56.8	80.7
	North American	27.0	7.0
	European	8.1	5.3
	East African	5.4	0.0
	Other Kenyan	2.7	0.0
	Other African	0.0	1.8
	Australian	0.0	1.8

3.2 Knowledge and practices of curriculum design and development

The academic staff responses on seven attributes of the curricula are shown in Figure 1. The respondents opined that curricula were balanced for the stated learning outcomes (86.7%), they were covered in provided time (80.4%) and stakeholders were involved in their development and review (84.8%). However, some thought that the curricula failed to provide sufficient details (23.9%) for effective delivery, teaching and assessment (30.8%) and philosophical outlook (22.0%). Only small proportion stated that the curricula were insufficiently modern (31.9%) since their delivery rarely had input from invited guest lecturers from the industry and other world class universities (26.5%). From the non-structured comments, respondents suggested that, interpersonal and entrepreneurial skills be incorporated within the curricula.

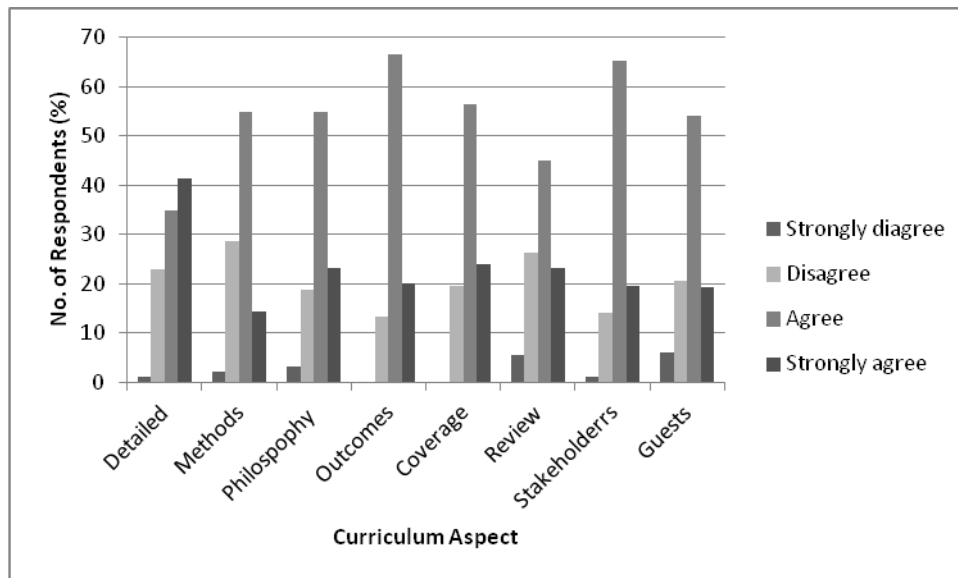


Figure 1. Opinion of lecturers on nature of their undergraduate curricula, their review process and delivery in CAVS

3.4 Teaching and learning activities

The average scores of respondents' opinion on the six aspects of teaching and learning activities are shown in Figure 2.

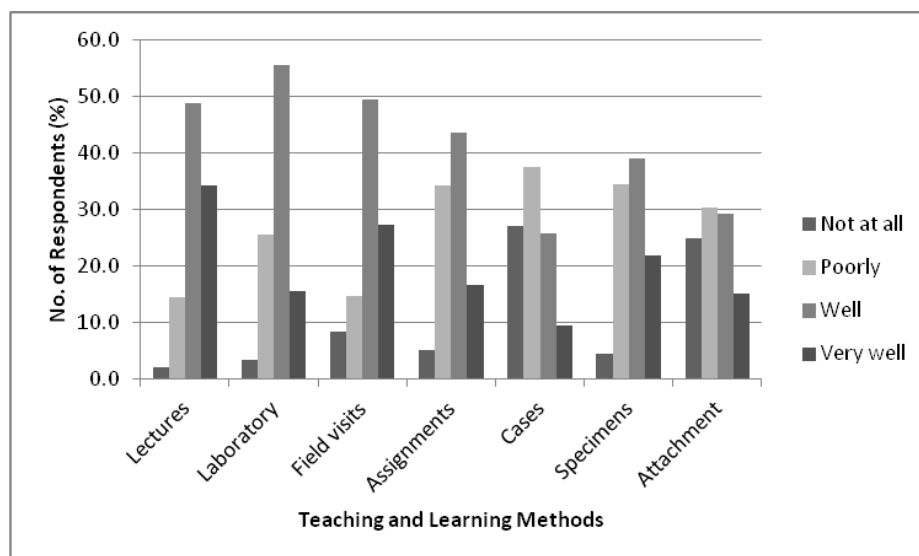


Figure 2. Opinion of lecturers on how best they use various traditional teaching methods, in their course content delivery in CAVS

Traditional lecturing (79.2%) and laboratories exercises (68.0%) were integrated better in teaching and learning activities. In addition, most respondents applied field / farm visits (77%) to complement lectures and laboratory exercises. However, many respondents did not use assignments (40%), case studies (66%) and preserved materials (54.4%) in their teaching. Majority did not think that the industrial attachment (73.9%) as currently carried out was useful for learning. Although majority were computer literate (79%),

knew how to use internet and electronic platforms (50.5%), had one or other social media handles (42.6%), few used them directly for teaching (Fig 3).

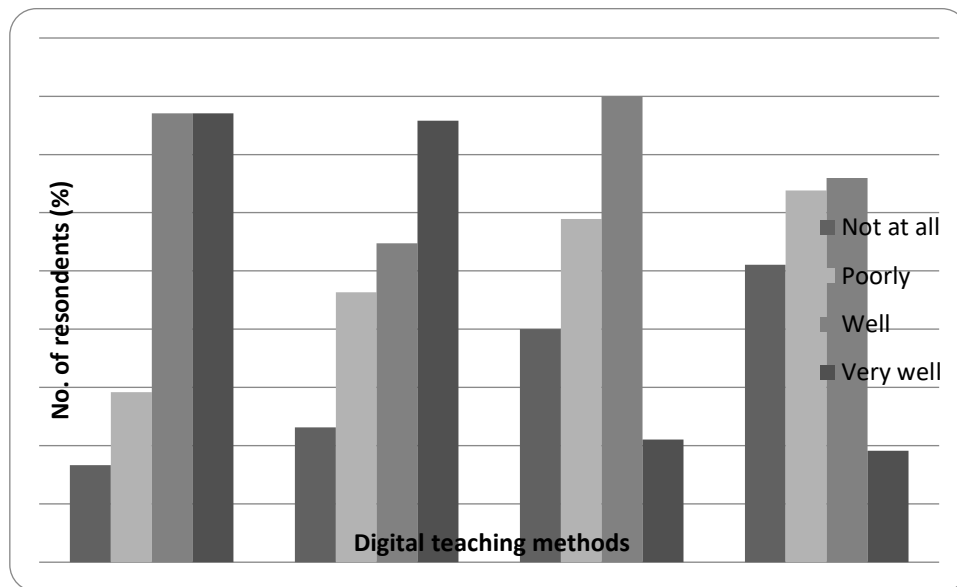


Figure 3 Opinion of lecturers on how best they used modern technology in CAVS

3.5 Methods used for formative and summative assessment

The respondents' opinions on assessing teaching and learning in their undergraduate programs were as shown in Figure 4.

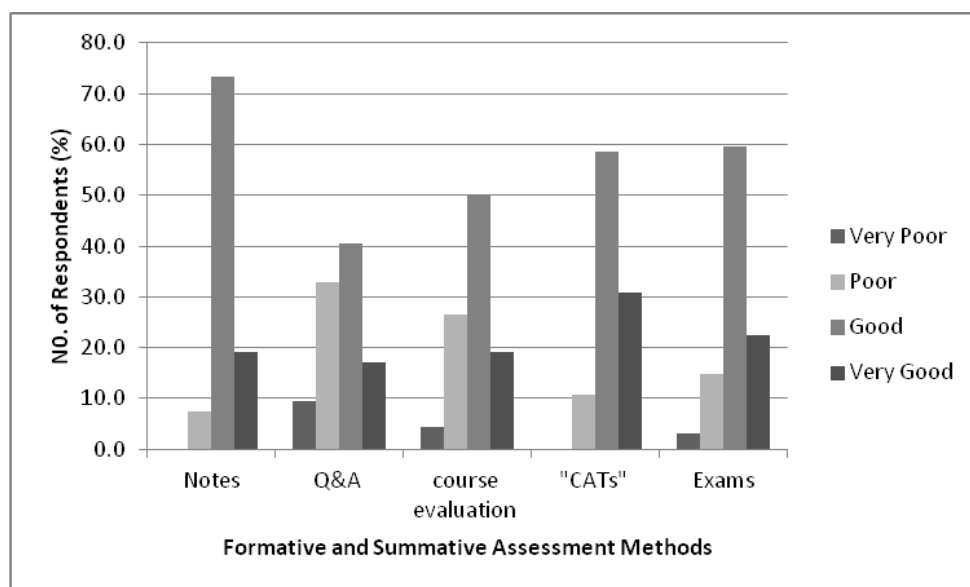


Figure 4. Respondents' knowledge and practices about ways of assessing student learning

The respondents had wealth of experience on summative assessment methods in form of end of topic, mid-semester assessment tests commonly referred to continuous assessment tests (CATs) (79.4%), end of semester examinations (74.7%), student course evaluation (70.8%) and staff evaluation of examination

results (75.3%). Although they rated note taking (notes) as means of assessing communication to students highly (91%), they had less experience on formative classroom assessment and feedback (Q &A) (66.4%).

3.6 Aspects of teaching and learning environment

Among the teaching and learning environment, focus was laid on staff motivation and professionalism and learning infrastructure. Reported levels of motivation and professionalism are shown in Figure 5. Most of the academic staff were motivated and possessed a passion for teaching (68%), were committed to their work (94.6%) and believed that their teaching inspired their students (72.3%). In addition, they were responsive to needs of their students (80.6%), available for consultations outside the classroom time (63.8%), possessed high degree of integrity (83.5%) and were accountable to their administrators (89.2%).

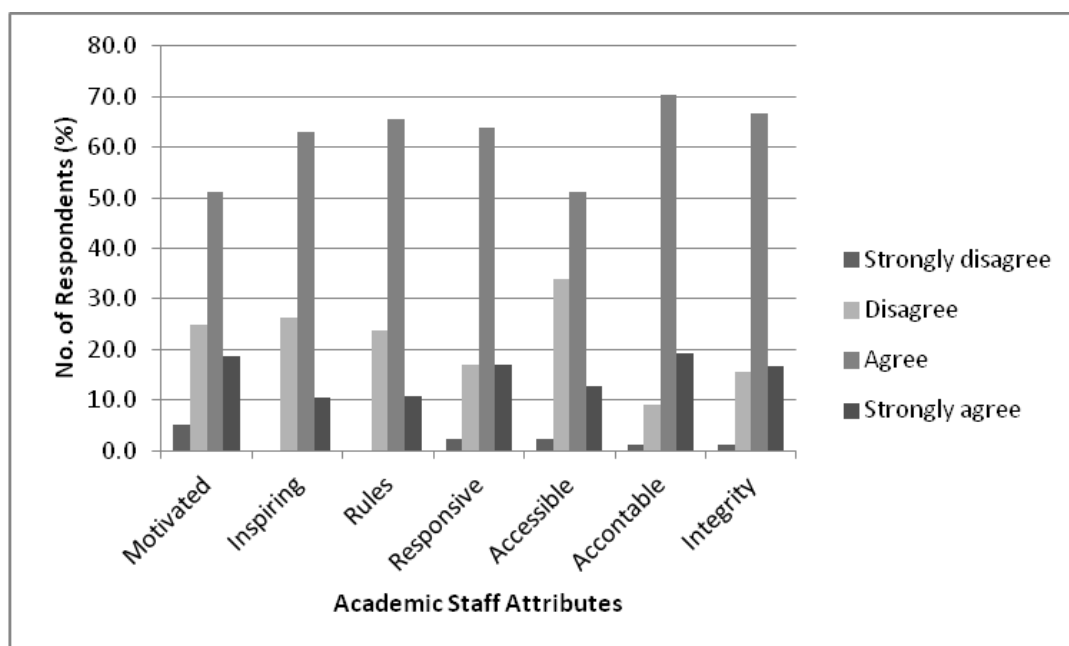


Figure 4: Opinion of lecturers' levels of motivation and professionalism in delivery of quality undergraduate curricula in CAVS

The teaching facilities in CAVS were stated as: adequate lecture rooms (100%), somewhat inadequately equipped and staffed laboratories (53.4%) and libraries (45%). However, many respondents knew little about teleconferencing (8.7%) and voice over internet protocols (VOIP) apps (eg skype®, webex®, whatsapp®) (2.3%) as teaching tools (Fig. 5).

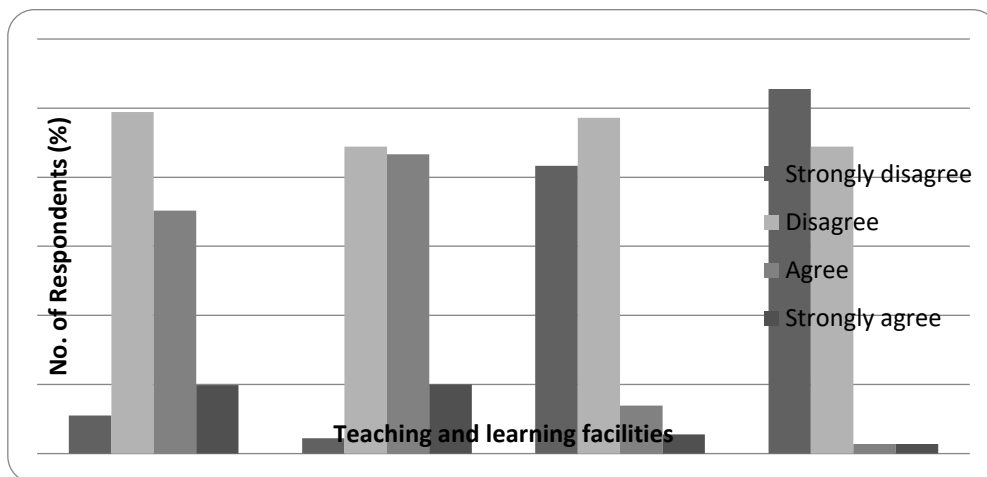


Figure 5: Lecturers' opinion on adequacy of facilities for teaching and learning in CAVS

There was consensus on knowledge (78.5%) under student management and teaching rules and regulations, but rules reference material was poorly circulated (38%). Further, vast majority of staff (93.3%) agreed on need for formal mentorship programs, which had remained largely informal.

4. Discussion

The data in this survey represented balanced views from academic staff in the university having been derived from the two faculties in the college with wide ranging years of experience in university teaching. Incidentally, majority of the respondents were males, a gender disparity that has been reported in other Kenyan universities (Nyaigotti-Chacha, 2004; Kabura & Embeywa, 2014) and does not only affect universities, but also positions in national leadership. The sample truly presented the gender proportions in the lecturer populations of the two reference faculties despite effort to bias interviews in favor of female respondents. This gender disparity is a manifestation of tradition, culture and history. However, it does not reflect reality of feelings among men, women, institution or national acceptance. The University of Nairobi's, Gender main-streaming Policy (University of Nairobi, 2015) and the Constitution of Kenya 2010 (Kenya law reports, 2010) unequivocally state for the goal of equal gender representation among staff and students, and in all public institutions. Indeed, gender inclusivity at all levels is a key object at the College of Agriculture and Veterinary Sciences that is progressively being pursued as openings and qualified female applicants become available.

The curricula development process in CAVS follows world class university standards as provided for in literature (Biggs, 2003). However, some respondents were inadequately informed on the practice. It is possible that administrative effort on participation and the collegial feeling were inadequate and resulted in curricula development inexperience and information on the regularity of review. Likewise, curriculum implementation, by lecturers possessing inadequate pedagogical skills could not properly align content taught to such details in the curricula such as learning outcomes, teaching and learning activities and assessment methods. Consequently, efforts during the interviews to assess the respondent perceptions on graduate competencies, knowledge and skills demonstrated responses at variance with those reported

elsewhere as inadequate to meet the labor market demands (Nganga, 2014; Onyango *et al.*, 2018). This discrepancy requires highlighting, to receive appreciation by university managers and to galvanize administrative action to remedy. The PREPARE-BSc team participated actively in subsequent curricula review cycles in order to emphasize this need. Although stakeholders were involved in curricula development, their composition was sometimes limited by funds available. The anticipated transformations for staff to modify graduate competencies through contents and delivery methods; require widespread buy-in, changed mindsets, different administrative strategies than those currently obtained (Fredy *et al.*, 2009). Some of the materials used by the team, is occasionally used in a piece-meal mannered trainings for selected college participants (University of Nairobi, 2018). Although the tools worked to motivate change, they do need massive administrative support to produce significant change.

The tools and methods espoused by the team targeted change from lecture-centred teaching methods towards learner-centred approaches, widely believed to proffer better learner competencies (Spencer & Jordan, 1999). Lecturing methods favored by a large proportion of respondents attempted to transfer theoretical and abstract contextual knowledge, but failed to emphasize on experiential learning methods comprising teaching laboratory work and action learning. These methods are easy, inexpensive and repeatable because they require recycling of the same material year after year, but they fail to address changes of learner characteristics and needs (Fry *et al.*, 2009). On the other hand, experiential ones require careful planning, higher staff:student ratio, can be expensive and fall out of favor with cash-strapped university managers. Nevertheless, the approaches not only diversify student learning styles, but also give the students opportunities to acquire new knowledge and put into practice what they have learnt (Felder & Brent, 2005). Unfortunately, work-based/ placement learning which offer students opportunities to face real-life situations and put into perspective their employability and career development plans (Ligami, 2016; Onyango *et al.*, 2018) were poorly appreciated and applied by some academic staff. This could be attributed to the difficulties of their proper implementation in an environment of poor university - industry linkages and low financing for the exercise. While most respondents did not think that students could, in addition to learning practical skills, contribute significantly to industrial efficiency and effectiveness and product diversification, they could not put in sufficient effort to sell the students to the industry or even to properly orient the internships. For instance use of modern application in traditional practices can enhance productivity. However, as already seen, lecturers in CAVS, although rapidly catching-up on use of modern learning technologies, e-learning and social media, huge gaps were observed on their ability to facilitate their use in industry. Further, while students were constantly engaged in one form of social media or another, few respondents participated in similar groups with students. Such approaches are known to bring fun into the learning and trigger students' interest (Turer & Rooijen, 2016). Motivated lecturers could make and share youtubes with students and also encourage students to make fun based videos for competitive comparisons with each other. In these, they could have fun while learning. Further, students groups could be linked globally through video tele-conferencing, enabling global exchange of experiences if only viable partnerships existed. Indeed, such means of communications could enhance attainment of internships to the global level as students and industry leaders could discuss challenges and potential solutions (Dimitrios,

Labros, Nikolaos, Maria & Athanasios, 2013). However, respondents were never exposed to these possibilities.

Lectures and summative knowledge assessment over competence /skill building and formative continuous demonstration and evaluation of skills were emphasized in study area. The former were administrative instruments for driving study process from year to year and an important decision making tool on which student progressed to graduation (Dimitrios *et al.*, 2013). Such assessment methods focus on grading of students and are means of universities demonstrating the quality of their graduates. Students too were accorded opportunity to give summative lecturer's performance on course evaluation at the end of the teaching. However, the benefit of this tool to the staff concerned or to the students was poorly understood by the respondents. This lack of interactive assessment and feedback purposely planned by the lecturers and actively carried out during the class time could comprise a paradigm shift in learning approaches. Motivating question-answer sessions during lectures, or engaging students on topical issues using electronic platforms, could motivate lecturers to monitor student learning progress and thinking process as well as provide constructive, relevant and timely feedback (Fry *et al.*, 2009). Indeed the latter should be the goal of university education.

The University of Nairobi, and indeed most other universities in developing countries, is continuously challenged to provide enabling learning environment. These include: sufficiently motivated staff; classrooms; laboratory and field facilities; open discussion places; standard operating procedures for learning and assessment; among others. This is indeed a never ending race, for laboratories and library spaces and facilities are ever insufficient for ever growing numbers of students (Nyangau, 2014; Kaburu & Embeywa, 2014). This massification has made it difficult to create appropriate case studies for learning and has resulted in lecturers falling back onto the easy lecture and summative assessment methods. Therefore, mindset transformations and training to use electronic platforms and related technologies to manage large classes are needed. Such changes can create valuable improvements in graduate quality given that respondents demonstrated massive commitment and possessed passion not only for their work, but also to the graduate quality. It could contribute to high motivation, build lecturers' self-efficacy, support formal and informal student mentorship programs, and enhance completion rates and acquisition of employability skills (Fry *et al.*, 2009).

6. Conclusion

The survey revealed that gaps existed in agricultural graduate training curricula especially alignment of content to teaching, learning and assessment activities; competencies required in the agriculture industry; and modernization of teaching methods including use of evolving digital platforms. It was also clearly shown that, formal lecturer - lecturer and lecturer - student mentorship programs needed to be established. These changes should be in tandem with improved teaching and learning environment and would be recreated in line with upgraded curricula demands to meet the knowledge, skills and competencies needed at the job market.

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Center Rondon project and university extension: sharing and knowledge production

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Rondon Project

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Abstract

This work explores the experience of team participation the University of Cruz Alta Rio Grande do Sul, Rondon Project. With goal to integrate the student to reality Brazil, and develop political, economic, and health care activities education for the poor, in January 2012, teachers and students visited the city of Aguiarnópolis, state of Tocantins in Brazil. The project is the intellectual effort of research and

understanding of the process history, involving the saga of Brazilian Cândido Mariano Rondon and his legacy to the formation of anthropologists. This study proposes a reflection on Rondon Project while the university democratization of space public, considering it essential to approach institution with society. The Rondon Project is an extension activity that aims to consolidate the sense of social responsibility in university, knowledge on different Brazilian realities and production local collective projects. It is intended, finally, contribute through this study to highlight the importance of alliance between scientific knowledge and empirical in everyone's life citizens, and the contribution of the Rondon Project to provide this exchange of knowledge between students and underserved communities.

Keywords: *university extension; Rondon Project; integration; culture; Marechal Rondon;*

1. Introduction

Sustainable development of an emerging country is ruled by five dimensions of sustainability, social, environmental, economic, cultural and political -organization. Education in this context is crucial, being the most effective means for a country to develop socially and economically. However, that education is indeed a mechanism of social transformation, there must be a concern for universities to prepare students not only for the labor market, but prepares them for citizenship, which is stimulated by the practice of extension university (Ferreira, 2009).

In Brazil, Rondon Project is currently one of the most comprehensive projects of university extension programs in the country, fulfilling an important role in improving the quality of education, reflecting the best academic background, as a university extension project, extremely necessary for academic and student citizen. The Rondon Project promotes the socialization of regional experiences, encouraging the creation of innovative projects in the most deprived communities throughout Brazil. Also, it makes the university and the university community to exercise their social commitment (Castilho and Castilho, 2010; Brazil, 2008).

The project coordinated by the Ministry of Defense since 1967, is a foray into project and aims to value the culture of municipalities in various regions of the country, providing greater integration between the Brazilian people, with a view to providing a multicultural learning to university students, from all regions, which, through solidarity, have citizenship in its full sense. With dedication, provide services and carry information through college in small towns, lacking resources and with many socio-economic needs, on important issues today, such as health, education and human rights.

Discuss the role of the university in the current context of change driven by public policy, globalization and computerization of knowledge from a context in which education developed by it suffers from the marks of transformations printed by the globalization process is extremely important, since higher education has shown great growth in recent years, greatly influencing the characterization of new professional and cultural, social, intellectual and political youth (Santos, 2008)

This work is the result of reflections and reports obtained mainly from the experience gained through Operation Babaçu, Rondon Project in Aguiarnópolis (Figure 2), Tocantins state located in northern Brazil, held for two weeks in January 2012 (Figure 1). Retrieved also experience carried out in the northwestern

region of Rio Grande do Sul state, through the core of the Rondon Project at the University of Cruz Alta.



Figure 1. Brazilian students of all participating states of operation Baba u 2012.



Figure 2. Landscapes recorded during Baba u Operation Rondon Project in 2012 the city of Aguiarnópolis - TO.

The Rondon Project in the municipality of Aguiarnópolis (TO) was performed by two academic teams composed of twelve students and four coordinators teachers from two different universities, one B joint team from the University of Cruz Alta and the whole team the Universidade Estadual Paulista "Júlio de

Mesquita Filho".

1.1 Rondon Project and University Extension

The university extension allows interaction between the student and the community in which it operates. It is through the extent that the University takes knowledge and / or assistance to the community, and it receives information about the values and culture of it.

The scientific, cultural and educational process articulates teaching and research, and facilitates the relationship between the university and society. The academic community is in society the opportunity to intervene professionally in the light of the theoretical framework that will guide the methodological procedures and technical resources that will best suit each situation.

The academic practice extends to beyond the classroom. Becomes academic project-political, providing services and developing teaching and research activities. The university reaches then a wider audience, and gives him easier access to knowledge and techniques necessary to improve the quality of life. The extension integrates and consolidates the teaching and research activities with the demands of the population. Enables the formation of professional and citizen qualification in the society. Through the privileged space of knowledge production, permanently seeking to overcome social inequalities.

The educational institution must contribute to the critical discussion about the reality of society. According to Paulo Freire, there is only education within human societies, and every man in any society or civilization, has education. The author believes in the political emergence of the popular classes, and makes reflection on the culture and the popular movement. Still according to him, there is elite that dominates the culture, and that only accepts the formal and erudite.

It is through the exchange of information that occurs understanding among men. Paulo Freire proposes the democratization of culture, so that nobody is excluded from national life. This is where his ideas on education are similar to theoretical principles that guide the Rondon Project, since value not only school education, but also popular culture: For Roque anthropologist Barros Laraia, who, in the 70s, participated in the Rondon as coordinator of the Advanced Campus of the University of Brasilia (UNB) in Araguaia (MT), the cultural diversity between different people is explained by the inequality existing stages in the evolution process. The transformations of society derive from the relationship between groups and spread their cultural elements: Man is the result of the cultural environment in which it was socialized.

Empirical knowledge is tradition in the city of Aguiarnópolis. Indigenous and slave origin, the inhabitants preserve customs, folklore, beliefs, festivals, crafts and the principles of the first peoples of the region.

1.1.1 Characterization of the municipality of Aguiarnópolis

The municipality of Aguiarnópolis was founded in 1994 on the banks of the Tocantins River, a straight line distance of about 760 km from São Luís, Maranhão. stood out over almost the entire twentieth century, the production of Babaçu poop (Figure 3). Its estimated population of 3449 inhabitants.

The state is located in a transition zone of the semi-arid climates of the Northeast to the equatorial humid Amazon, which is reflected in the plant formations that transact the Savannah (Cerrado) in the south to the seasonal forests in central and eastern part, and the rain forest in the northwest of the state. This transitional

location contributes to the generation of unique environmental and socioeconomic conditions, currently undergoing transformation due to the late development implemented in the region and that is creating environmental and social impacts. Temperatures across the state are high, with higher annual average to 24 ° C. The rainy season is concentrated from December to May, reaching the highest values around the month of March, averaging around 290.4 mm.

Although most of the population still withdraws its support of primary activities, mainly agriculture and animal husbandry, there is a state of industrialization attempt. Trade is the main economic activity of the state, which provides commodities and imports manufactured goods. Industrialized imported products reach high prices due to transport and tax costs because the Tocantins is far from industrial centers in Brazil and the most used means of transport is road, large costs.

Most farmers still use farm system of Indian heritage, using techniques, resources and rudimentary tools such as earth rotation, human energy and animal, hoes, sickles, machetes, ax, hoe, etc., so that the use soil and used techniques provide low yield of products by acreages, which end up being intended mainly to family maintenance.

Livestock farming is practiced more intensely, occupying large areas, committing to the native forest. Although it is present in hundreds of cities in the state actually focuses on a few municipalities, the West's main geographical area larger herd (Mesquita, 2008). Herds (cattle, pigs, goats, sheep, buffaloes and birds) are set loose, grazing naturally without technical care, with low productivity. Cattle rising is the main activity carried out, the most important herd economically. Cattle are raised for the entire rural population, for almost in its entirety to the court. The birds, led by chicken is a flock that plays an important role in feeding the urban low-income worker, as the costs have provided lower prices for other sources. The agriculture industry is small and focused on the local market, is related to meat and milk (Mesquita, 2008). Although increasingly rare, hunting is still practiced for the food supplement of rural workers, especially in areas where there are no major population concentrations. Are targets species of mammals such as armadillo, paca, agouti, capybara, pork-eating fox and deer as well as birds such as nambu and siricora, however, the big catches are jaegers and mammals both for commercial purposes.

In the extraction, it has been out of the Babaçu coconut, which is extracted by the small farmer quite rudimentary, especially for the female population, where the income is earned and exchanged for consumption of genres in greengrocers. The major focus of Babaçu is in the valleys of the main rivers Maraão and transition forest.

1.1.2 Silvopastoral System in the municipality of Aguiarnópolis, Tocantins: a proposal for livestock production associated with maintenance of biodiversity

The silvopastoral systems are associations of pasture with trees and herbivorous animals, being a viable option to promote the sustainability of animal production systems on pasture (Castro and Paciullo, 2006). They have great potential as economic and environmental benefits to producers and to society, as well as increase the production per unit area, improve productivity through the integrated management of natural resources, enable reduction of erosion, improve conservation bodies water, increase carbon capture and

sequestration, provide greater convenience to animals to animals increasing biodiversity, and reduce the pressure on the remaining natural vegetation (Duleba, 2009).

Thus the silvopastoral systems are presented as multifunctional systems. The objective of this study was to present a viable and environmentally friendly alternative to promote rural development and increase income, and preserving biodiversity in Aguiarnópolis municipality properties. The activity was developed in rural settlements Cocos and Vitoria in the municipality of Aguiarnópolis, TO, in January 2012, through the Rondon Project organized by the Ministry of Defence with the support of City Hall location and staff at the University of Cruz Alta. The target audience was small farmers, directly linked with agricultural and livestock activities, whose main source of income is the milk production, the production of fruit pulps such as acerola, cupuaçu, guava, as well as the provision of domestic services the local farmers. This work was performed using a previously elaborated plan of activities based on a diagnosis made in the precursor trip. Courses and lectures were given to producers on the management of silvopastoral system, where the theoretical foundation was based on bibliographic references, seeking compliance with specific characteristics to the north of the country combined with other techniques. The interaction between the participants allowed many doubts were cleared up and the discussion of various topics and peculiar situations in the systems of pastures and native trees present in the region, especially the native palm, Babaçu. This palm tree very present in Aguiarnópolis fauna, considered one of the symbols of the region is protected by law, which generated considerable debate in the workshops among farmers who reported the difficulty of exploring these areas with other crops.

The implementation of silvopastoral system taking advantage of the presence of Babaçu (Figure 3), came to the producers as a solution to protect the flock from extreme weather, get environmental services and promote the diversification of craft products obtained from the Babaçu coconut. He rose to controversy if Babaçu was appropriate for the silvopastoral system, because according to residents of the settlements it is a kind of unwieldy, it releases a lot of straw contained in the branches, making the pasture cleaning, but were approached some techniques that can benefit the soil, nutrition part which may contribute to the improvement of pasture quality.



Figure 3. Baba u: Plant extraction, fruit and use in fruit crafts.

All participants were receptive and interacted with the theme presented, where the main objective was to improve and increase the production per unit area, highlighting the multiple benefits added to the enrichment of soil and pasture, animal welfare which reflects in increased productivity, and also increases the scenic beauty of rural property. To conclude the debate, the Agriculture Program Low Carbon (ABC) was presented, created in 2010 by the Federal Government, which provides benefits and credits for farmers who want to adopt sustainable farming techniques. Whose goal is to encourage farmers to practice sustainable agriculture, ie to ensure the country's food security without harming the environment. There was a positive impact generated by the topic covered on the silvopastoral system, showing that the rural population is seeking sustainable alternatives to increase crop production per unit area, generating improved productivity and profitability without interfering negatively in the richness of the cerrado fauna of nature.

The interests of producers for knowledge of government programs to encourage resources to enhance sustainability in agricultural production demonstrate the receptivity paradigm shifts and increase the maintenance of local biodiversity.

2. Encouraging Associations as a form of local development through rondon project

The association is a strategy for small businesses and groups so that they can enter and compete in the market with multinational companies that have developed skills in highly competitive environments. Thus, the development of the communities the association is of fundamental importance. It is a form that can be

adopted to compete with large chains, from benefits obtained from all areas involved in the acquisition, production, dissemination and distribution of products (Lima and Gomes, 2005).

As the Organization of Brazilian Cooperatives (1998) the association is in a civil non-profit society, where several individuals are organized democratically in defense of their interests. The importance of the association is the union of small groups of people who have common goals in a legally established entity, maintaining, however, the independence and individuality of each participant. Thus, the formation of a network allows the execution of joint actions, facilitates the resolution of common problems and creates new opportunities.

The collective work enhances the generation of income in the same way that sensitizes participants about the importance of cooperative action in order to reduce individual weaknesses and create new opportunities, promoting local development.

During Operation Babaçu - occurred between January 20 to February 5, 2012 - Rondon Project, rondonistas team at the University of Cruz Alta has developed in the municipality of Aguiarnópolis (TO), the workshop "Associations - the power of cooperation." The objective of the activity was to demonstrate the importance of associations as a way to boost economic development and income generation, and to encourage the founding of new associations and stress the importance that they can play in a small town.

The Rondon Project, an initiative coordinated by the Ministry of Defense always happens in the holiday period of Brazilian higher education institutions. Everything starts from a preliminary contact the Ministry with the municipalities of the regions with the lowest human development index. The cooperation of municipalities is essential for carrying out the project and it was with this support that the municipality of Aguiarnópolis received rondonistas team Operation Babaçu. Among the activities, we highlight here the workshop already mentioned above and which was developed in two days. During the activity were used as strategies, dynamic, videos, teaching methods, different group activities and individual and expository speech. The positioning circle was also an important method for encouraging the participation of all. The activity of the target audience would be possible associations in the city, people who work individually, but with low incomes and the general public with an interest in the subject, ie, farmers, waste pickers, small business, etc. The ten (10) workshop participants showed great interest in creating a new association in the city for the collection of recyclable materials, especially PET bottles, for production of ottomans, sofas and stools. The existing association in the municipality worked exclusively with crafts produced from Babaçu coconut.

The first exercise conducted was the aircraft factory. At that moment it was presented a plane folding model and participants should make the greatest possible number of planes and shaped more like the model. They could work together to achieve the established objective, so numerical results would be better than the individual work. It was found that each participant worked individually without teamwork and the result was a low number of paper airplanes, and none was made by model. After the dynamic a video that showed the importance of working together and how to reach a common goal with the cooperation was presented. Although it used the SWOT method: which helps to identify the Strengths; Weaknesses; Opportunities; Threats in creating a business. The method is also called SWOT, which in English is strength, weakness, opportunities and Threats. With this method, we identify the aspects that could collaborate, add, and be

threats and / or negative points regarding the market performance for the association. This method has worked in pairs and then shared with the whole group. All participated, exchanged ideas and created together the Fortresses, Weaknesses, Opportunities and Threats.

On the second day were defined jointly Mission, Vision, Values and the membership action plan and has been made the analysis of a status proposal for the association. We work in a circle format and all gave suggestions to reach a consensus view. Each participant had a sheet where you wrote the suggestions for further typing. Thus, a document was created which would be a statute of principle, which could be used for the new association.

Through participation in this workshop people have awakened the desire to create more associations in the city of Aguiarnópolis because there was only one entity with this profile in the city, which is well entrenched and even markets its products throughout Brazil and abroad. Participants could also learn how to create a business that can generate jobs and income while working with the environment, form an association, create a statute and mainly work as a team to achieve satisfactory results. The experience made possible by the completion of the association workshop not given us the assurance that the proposal would be effectively developed, however, a first step in this direction was given by the group of participants, especially by the arrangement shown by them during the meetings. Finally, while students, we had the opportunity to share some knowledge with that group that could potentially benefit the community and that group of people in particular. The exchange of knowledge is essential for the formation of each individual, not only on the technical and professional skills, but also humanistic. This finding only strengthens the relevance led by the Rondon Project.

3. Conclusion

The Rondon Project is an action of the federal government that promotes universalization with the purpose of improving academic development, promoting socialization of experiences, interaction with the community and encouraging innovative projects in the social sphere.

In the present work, concludes creation of community associations can boost economic development and income generation, whereas the appreciation cultural and environmental diversities, emphasizing group work, with the aim of improving the quality of life of this population. This mode, strengthening local biodiversity through development.

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Mapping of the retrogradation and coastal vulnerability of the seashore at Barra de São Miguel County, Brazil

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Abstract

It is necessary to expand knowledge regarding physical environment in order to establish rational guidelines for coastal areas use, thus, this research aimed to determine retrogradation rates and vulnerability of the seashore at Barra de São Miguel county to RSL rise, as well as to suggest building zone limits. Therefore, in loco environmental observations were obtained between 2016 and 2017. In order to categorize vulnerability level, the coast was divided into section A (A_1 , A_2 e A_3) and section B. Results show that approximately 57% of the coast (Section A) is threatened, presenting high vulnerability level. In contrast, section B presented low erosion vulnerability. Retrogradation indicated that even in the optimistic scenario, retreats will be high, reaching all buildings in the section A. Section B, despite high environmental preservation level, would still exhibit retreats of 15.1m. Coastal building zone limit (CBZL) demonstrated that previous results adoption would be enough to absorb future impacts generated by RSL rise. Thus, it is valid to affirm that results obtained are important to comprehend coastal environment and could be used as a guiding source to monitoring and management of the region.

Keywords: coastal building zone limit, coastal erosion, coastal vulnerability, coastal management

1. Introduction

In the last years, there was an expressive increase in elaboration and implantation of spatial development plans, directed to the management of coastal counties. The reason for it is in the fact that, among environmental units, the coastal zone is the most likely for socio-economic activities implantation that disturb natural environment, affecting coastal and marine ecosystems balance (ASSIS, 2007).

In order to preserve environmentally protected spaces, considering its importance and fragility, it is common to adopt strategies to evaluate the territory by means of its zoning, pointed by Silva and Santos (2004) as the “identification and delimitation of environmental units within a specific physical space, concerning its vocation and fragilities, successes and conflicts”. However, it is a consensus that zonings are executed under purely qualitative criteria, according to subjectively structured models with a demand for methodological proposals that identify zones from the selection of mappable environmental attributes (ASSIS, 2007).

Authors as Bruun (1962), Schwartz (1967), Dean (1991), Pilkey (1993), Manso *et al.* (1995), Gruber (2002) and Manso (2012) recognize the importance that interaction between shallow shelves and beach environment represent to the knowledge and management of coastal zones, because they are essential to projects and studies involving the coastal region, such as issues related to progradation and retrogradation of beaches; artificial beach feeding projects or exploration of submerged deposits, preventing from considerable damages on the surrounding coastal environments.

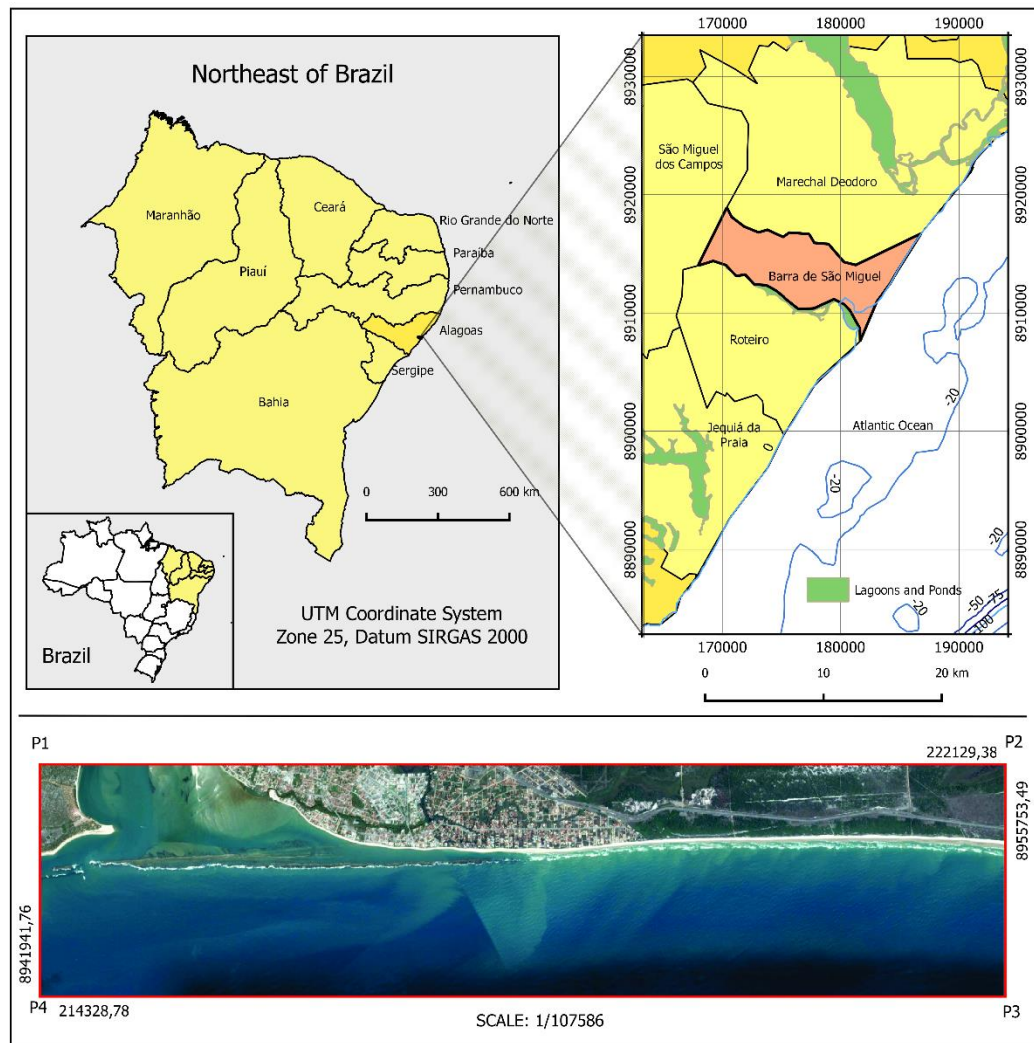
Besides these factors, prediction of sea level elevation is a variable that should be considered in the prognosis of coastal line variation due to erosive processes intensified by the increase of glaciers melting and historical trend of climatic temperature elevation (MUEHE, 2004).

According to Wong *et al.* (2014), the *Intergovernmental Panel of Climate Change* (IPCC, 2013) estimated a pessimist scenario for coastal regions with sea level rise, indicating elevation over 1 meter until 2100. According to this prediction, absorption zones of this impact must be established in order to help coastal management, even if this scenario might never become reality, as it is an estimate.

In this context, due to the need to increased knowledge about the physical environment to establish rational guidelines to use coastal areas, this study aimed: (i) define coastal retrogradation levels (erosive risk zones); (ii) categorize coastal vulnerability level to marine erosion; and (iii) define coastal building zone limit for the protection and maintenance of landscape esthetics.

2. STUDY AREA

The study area comprehend the coast of Barra de São Miguel county (Figure 1), located in the south of the state of Alagoas. The area comprises approximately 10 km of shoreline and surrounding shallow continental shelf, delimited by the surrounding rectangle through plane UTM coordinates: N = 8908288m



E = 180428m; and N = 8916114m, E = 187956m, located in the time zone 25, Datum SIRGAS 2000.

Figure 1 – Map of location of the study area. Source: Author.

According to KÖPPEN classification, the coast is located in a region of type AS' climate, presenting rain during the winter, dry summer and temperatures from 20 to 25°C (ARAÚJO *et al.*, 2006).

Regionally, the county is located on Sergipe-Alagoas Sedimentary Basin which is one of the sedimentary basins along the Brazilian coast formed during the opening of the South Atlantic Sea in the end of Jurassic and Cretaceous periods (SANTOS, 2004).

The current stage of depositional evolution of Alagoas Sub-basin is characterized by the variation of sea level and erosive agents, which enable accumulation of marine, fluvial, eolian and fluvial-lagoon sediments that compound the Quaternary coastal plain (SANTOS, 2004).

Regarding width of the continental shelf of Sergipe-Alagoas Basin, it varies from a maximum of 42 km in front of Maceió, to a minimum of 18 km in the southern region, presenting a flat profile since the beach zone until the edge of the shelf, where declivity sharply accentuates. The wide and flat feature is the result from erosive and depositional activities, intimately linked to various marine regressions and transgressions associated to periods of global glaciation and deglaciation (COUTINHO, 1976).

From a geomorphological view, two well-characterized units are defined within the study area: Coastal Trails and Coastal Plains, located within the typical modeled of dissection and accumulation, respectively. According to Santos (2004), Coastal Trails represent the most characteristic geomorphological unit of the coast of Alagoas, composed by the Barreiras Formation. This morphology originates fossil cliffs, colluvial ramps, dissected tabuliform interfluvies, colluvial-alluvial terraces, river valley slopes, and structural estuary slopes.

The Coastal Plain occupies approximately 9.5 km within the study area, entering towards inland for 2.5 km in direction to the fluvial-lagoon sediments surrounding Roteiro Lagoon-Estuarine System, and 1.8 km in the north/east direction of the inter-municipal boundary between Barra de São Miguel and Marechal Deodoro.

Regarding sedimentary balance along the coast, it is characterized by an erosive trend in almost the entire extension, due to the presence of active cliffs of the Barreiras Formation and Mesozoic rocks of Alagoas Basin; nearly absence of plains and Pleistocene terraces; frequent presence of alignments of beachrocks, characterizing coastal retrogradation; and the occurrence of dune-fields, in which sediments from the inner continental shelf are no longer available for coastal progradation (DOMINGUEZ, 1995).

The great morphodynamic diversity of the observed beaches is the result of interaction between various geological and climate elements on the coast, presenting different erosive (retrogradation) and/or depositional (progradation) behaviors in different regions (ARAÚJO *et al.*, 2006).

Anthropogenic interventions and high level of occupation of the coast are responsible for environmental problems related to marine erosion affecting the region. However, marine erosion is also noticed at more urbanized regions within the coast of Alagoas, from the border with the state of Pernambuco until Barra de São Miguel County (ARAÚJO *et al.*, 2006).

Thus, the lack of historical information about Relative Sea Level (RSL) in the study area, as well as in the state of Alagoas, reflects the great coastal vulnerability at the moment, as it is not even possible to guarantee if the erosive process observed in some parts of the coast is a local, regional or global phenomenon.

3. METHODOLOGICAL PROCEDURES

3.1 Coastal Retrogradation

Establishment of the coastal retreat or coastal retrogradation (erosive risk zone) is related to the quantification of the shoreline retreat, associated to the prognosis of average sea level rise, estimated by the *Intergovernmental Panel of Climate Change* (IPCC, 2013) in about 48 cm to 1 m until 2100 (Wong *et al.*, 2014), as well as its modeling agents, such as wind, waves, granulometric composition and ocean currents.

Retreats (R) throughout the coast in the study area were defined by the equation proposed by Bruun Rule (1962), idealized for sandy beaches (Equation 1). Thus, a survey of temporal data related to sedimentology, bathymetry, oceanography, topography and climate was performed during 2017 and 2018, with observations distributed along the four annual climate seasons.

$$R = \frac{slG}{H} \quad (1.0)$$

So that: Active profile length “ l ” was obtained measuring the distance between the maximum active profile elevation (coastline altitude “ h ” and depth of closure “ d_1 ”); “ s ” is the sea level rise in meters; “ G ” represents the proportion of erosive material in the active profile, usually equals to 1; and height of the active profile “ H ” was defined through the equation 2:

$$H = h + (1,75 \times d_1) \quad (2.0)$$

Figure 2 demonstrates that a beach-profile translation for a distance “ s ”, due to RSL rise “ a ” would cause coastal retrogradation and sediments deposition along the shelf profile equivalent in thickness to the RSL rise “ a ”, in order to obtain a new profile balance (Figure 2).

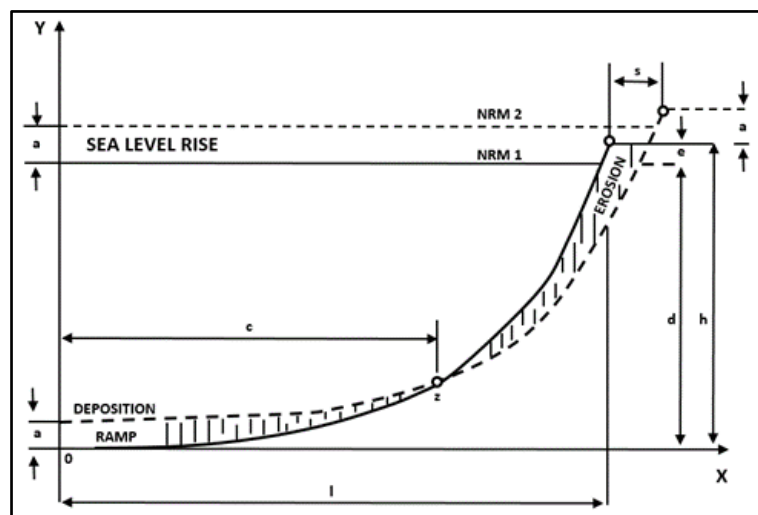


Figure 2 – Bruun Rule: beach translation “ s ” imposed by a RSL rise “ a ”, resulting in sediments deposition throughout the profile, with thickness “ a ” to reach a new balance. Where “ d ” is the depth of the moment RSL1, and “ l ” is the distance from the profile to the beach. Source: Adapted from Bruun (1954).

According to Nicholls *et al.* (1995), the result of equation 2 represents the sum of the height of the active onshore feature (h), represented by the top of the coastal or beach ridge, or foredune, with profile closure depth for a period of 100 years ($d_{1,100}$) (Equation 3).

$$d_{1,100} = 1,75 \times d_1 \quad (3.0)$$

The value of d_1 was obtained through Hallermeier equations (1981) (Equation 4). It is characterized from extremely significant wave heights conditions on the coastal zone, and defines the limit of the profile depth, where intense sediments transport and extreme changes in the bottom morphology still occur.

$$d_1 = 2 \bar{H}_s + 11 \sigma \quad (4.0)$$

In which: “ H_s ” is the annual significant mean wave height (m); and “ σ ” represents annual standard deviation of significant waves.

In order to obtain diagnosis of temporal behavior of the depth of closure (d_1), calculation was made considering data for each meteorological season and data compiled to the annual period.

Thus, definition of coastal retrogradation (R), based on potential risk evaluation using limits defined by the depth of closure (d_1), allowed deduction of regions within the coastal zone propitious to coastal erosion, defined by the retrogradation line predicted according to the effect of sea level rise.

3.2 Coastal Vulnerability

Physical vulnerability level reveals the fragility, resistance and susceptibility of an environment to dangers and spatial distribution of human occupation. Coastal vulnerability concept is defined as the natural fragility state of a specific coast to erosive events in short or long time scales (LINS-DE-BARROS, 2005b). Effects of different types of coastal features to a sea level rise (Table 1) depend on geomorphological and lithological features in the region, and may vary from nothing to erosion and floods according to the typology presented by Nicholls *et al.* (1995), which requires a specific analysis of coastal compartmentalization, considering these variables (ASSIS, 2007).

Table 1: Response of different coastal features types to a sea level rise.

Type of Coast	Response
Rocky coast (high)	Absense of retrogradation
Rocky coast (low)	Absense of retrogradation
Erosive slopes	Erosion
Sandy beaches	Erosion
Rocky beaches	Erosion
Muddy coast	Erosion or flood
Low slopes	Flood
Swampy coast	Flood
Mangrove	Flood
Coral atoll	Flood

Source: Nicholls *et al.* (1995).

In order to categorize physical vulnerability level of the coast to marine erosion, classification suggested by Dal Cin & Simeoni (1994) was applied to the proposal defined by Nicholls *et al.* (1995), establishing three vulnerability levels:

- Low: well-developed beach, without containment buildings;
- Moderate: fragile stability, with fixation buildings in the post-beach area; and
- High: reduced beach, without post-beach area, strong presence of coastal protection buildings and disorderly occupation.

3.3 Coastal building zone limit

Considering the lack of local legislation to define the coastal building zone limit (CBZL), this study considered guidelines established by the Law 7.661/88 (Brazil's National Coastal Management Plan) and the proposal defined by Muehe (2001), from which is possible to establish a minimum zone for protection and esthetic view maintenance, according to the following criteria (Figure 3):

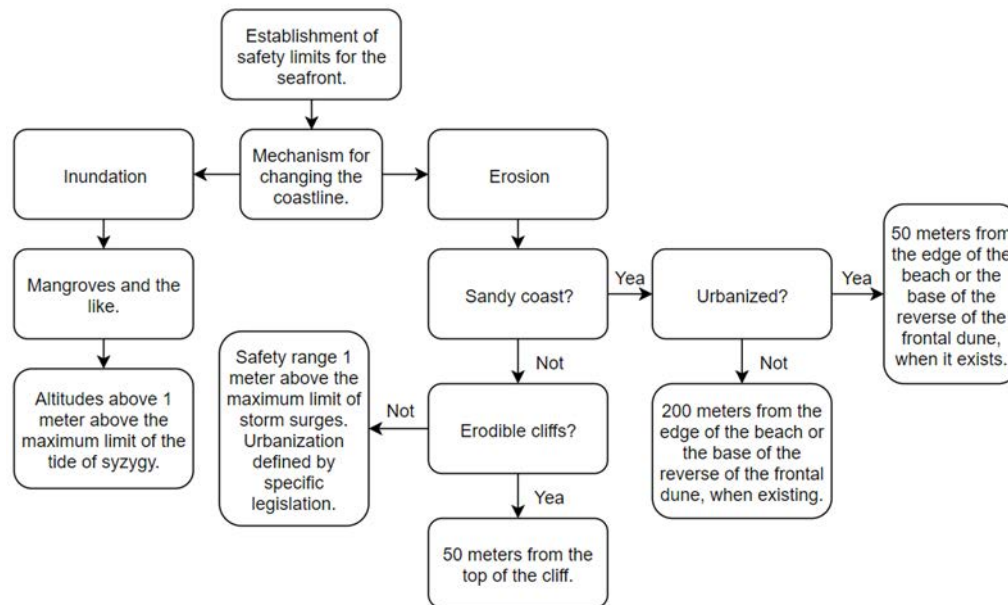


Figure 3 – Coastal building zone limit according to the coastal morphological features.

Source: Adapted from Muehe (2001).

According to Muehe (2001), reduction of minimum limits may occur when there is a progradational trend of the coastline, expressed in annual rates, or if the place is located in sheltered areas, since technically justified, without prejudice to state or municipal competence to establish more restrictive measures.

Lastly, in order to accomplish interpretation and cartographic representation of vulnerability levels of the study area, the coastline was subdivided into two sections and four subsections, according to [Anonymous, 2018], considering different coastline altitudes, active profile width variation, geology, geomorphology and anthropic occupation

4. RESULTS AND DISCUSSION

In order to organize information regarding the impact level of coastal retrogradation, vulnerability and coastal building zone limit over the study area, results were presented and described by subsections, as follow:

4.1 Subsection A₁

It is located near São Miguel and Niquim rivermouths, limited by plane UTM coordinates (8.910.176 mN, 181.296 mE) and (8.911.139, 183.198 mE), Datum SIRGAS 2000, with extension of approximately 2.55 km. Considering sea level rise scenario (S₁) of 0.48 m, estimated as the most likely scenario, this subsection indicated retrogradation (R₁) of 36.88 m. Compared to a pessimist overview (S₂ = 1 m), retrogradation (R₂)

would be of 76.88 m. Even in an optimistic scenario, retreats extension already reached existing buildings in the post-beach area (Figure 4).

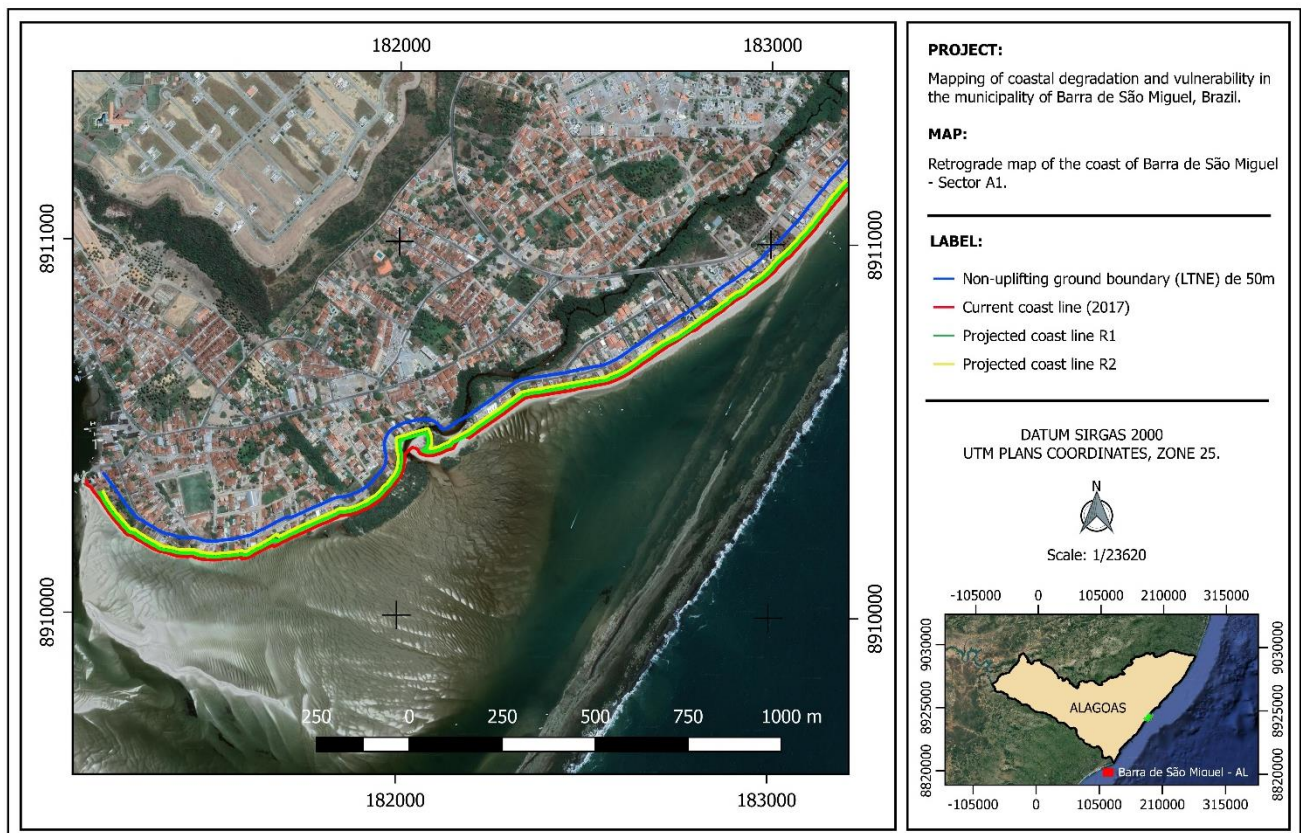


Figure 4 – Map of retrogradation of Barra de São Miguel coast – Sub-section A₁. Source: Author.

Presenting a coastal feature classified as sandy beach, the region will exhibit erosive process in most its extension, except for low mangrove areas that will flood. Regarding vulnerability, we can classify as high due to reduced width of the beach, high waterproofing coastal ridges levels through disorderly urbanization, and post-beach protection buildings (Figure 5).



Figure 5 – High vulnerability area: concrete-faced rockfill beach dams for waves overtopping; High post-beach urbanization; and absence of beach during high tide. Source: Author.

Delimitation of a coastal building zone limit (CBZL), in other words, a minimum protection and landscape esthetic maintenance zone, was established from distances between high water line towards the continent, indicating that the subsection is inserted in a region characterized by urbanized seafront, lagoons and coastal lagoons, and estuaries, thus, a coastal building zone limit of 50 m must be established from the beach border or from the base of the back of the foredune, when existent, towards the continent; and in the flood areas, through a contour line located at least 1 m above the area limit currently reached by syzygy's high-tide.

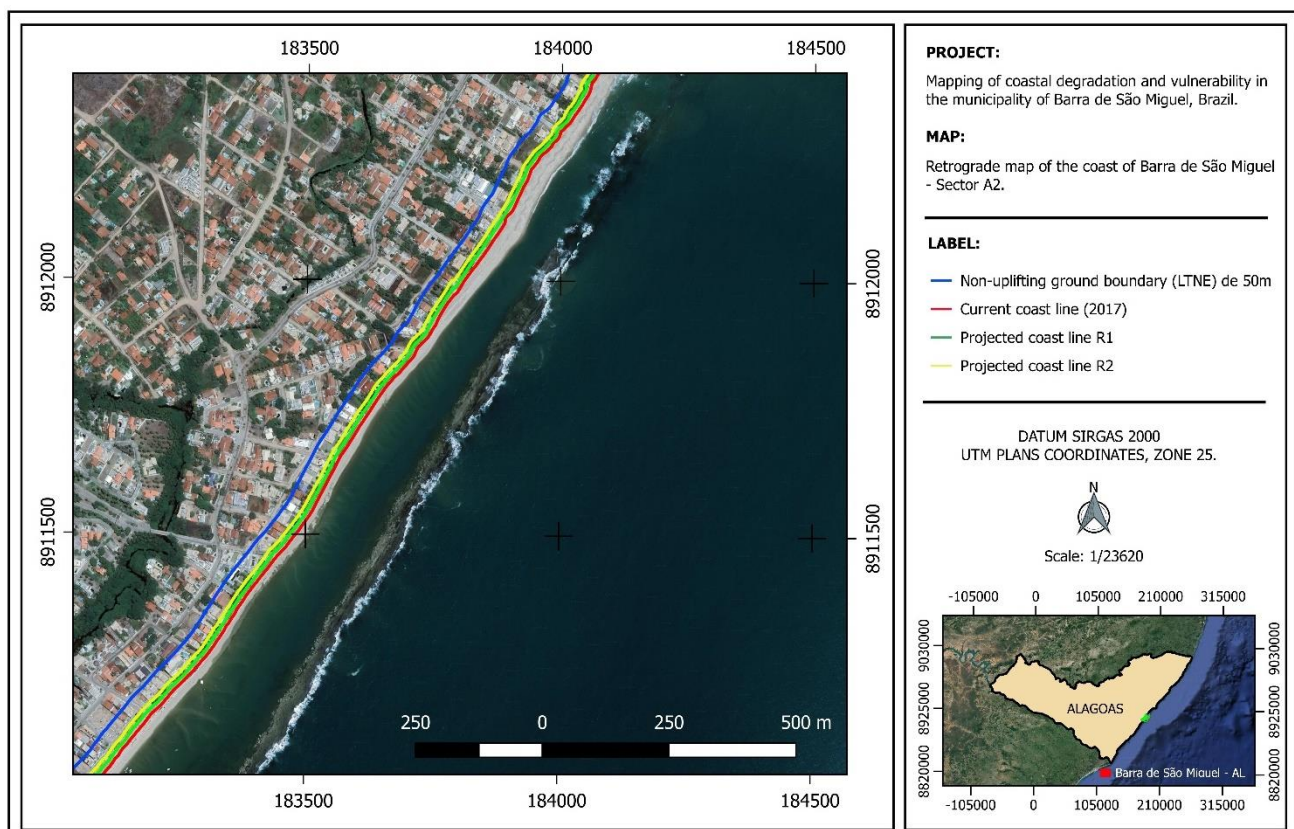
By relating the optimistic scenario of retrogradation (R_1) to the coastal building zone limit, 74.46% of the building region will be impacted by the sea level rise, demonstrating coherence of legislation in demanding delimitation of coastal protection areas.

However, considering a pessimist scenario of retrogradation (R_2), the value stipulated by law (coastal building zone limit of 50 m) would not be enough to guarantee beach and post-beach preservation, because the affected area would overcome the building limit in approximately 26.88 m inside the continent.

4.2 Subsection A_2

It is limited by plane UTM coordinates (8.911.139 mN, 183.198 mE) and (8.912.353 mN, 184.056 mE), DATUM SIRGAS 2000, with approximate extension of 1.5 km.

Considering sea level rise scenario (S_1 e S_2), estimated, respectively, as more optimistic and more pessimist, A_2 indicated retrogradation R_1 of 8.5 m and R_2 of 17.73 m. Retreats extension, even in the most likely scenario (optimistic), already reached existing buildings in the post-beach region (Figure 6), although, with



less amplitude compared to the effects of sea level rise over subsection A_1 .

Figure 6 – Map of retrogradation of Barra de São Miguel coast – Subsection A₂. Source: Author.

According to Nicholls et al. (1995), this coast piece will present erosive process in most its extension, except for the lower areas of mangrove located throughout Niquim River, which will suffer flood.

Regarding vulnerability, we can classify it as high (predominant) to low vulnerability (in more preserved regions), due to waterproofing level of post-beach area through disorderly urbanization, well-developed



beach and installation of coast ridge containment buildings (Figures 7 and 8).

Figure 7 – Area of High Vulnerability: Containment of the coast ridge by building beach dams; High post-beach urbanization; and Well-developed beach.



Figure 8 – Area of Low Vulnerability: Preserved coast ridges and fixed by restinga vegetation; Moderate post-beach urbanization; and Well-developed beach.

Similarly to subsection A₁, this subsection is inserted in a region characterized by an urbanized beachfront and flood-prone areas, so that the following measures should be applied, respectively, coastal building zone limit of 50 m from the beach border or from the base of the back of the foredune, when existent, towards the continent; and in flood-prone areas, by a contour line located to a quota of at least 1 m above the limit area currently reached by syzygy's high tide.

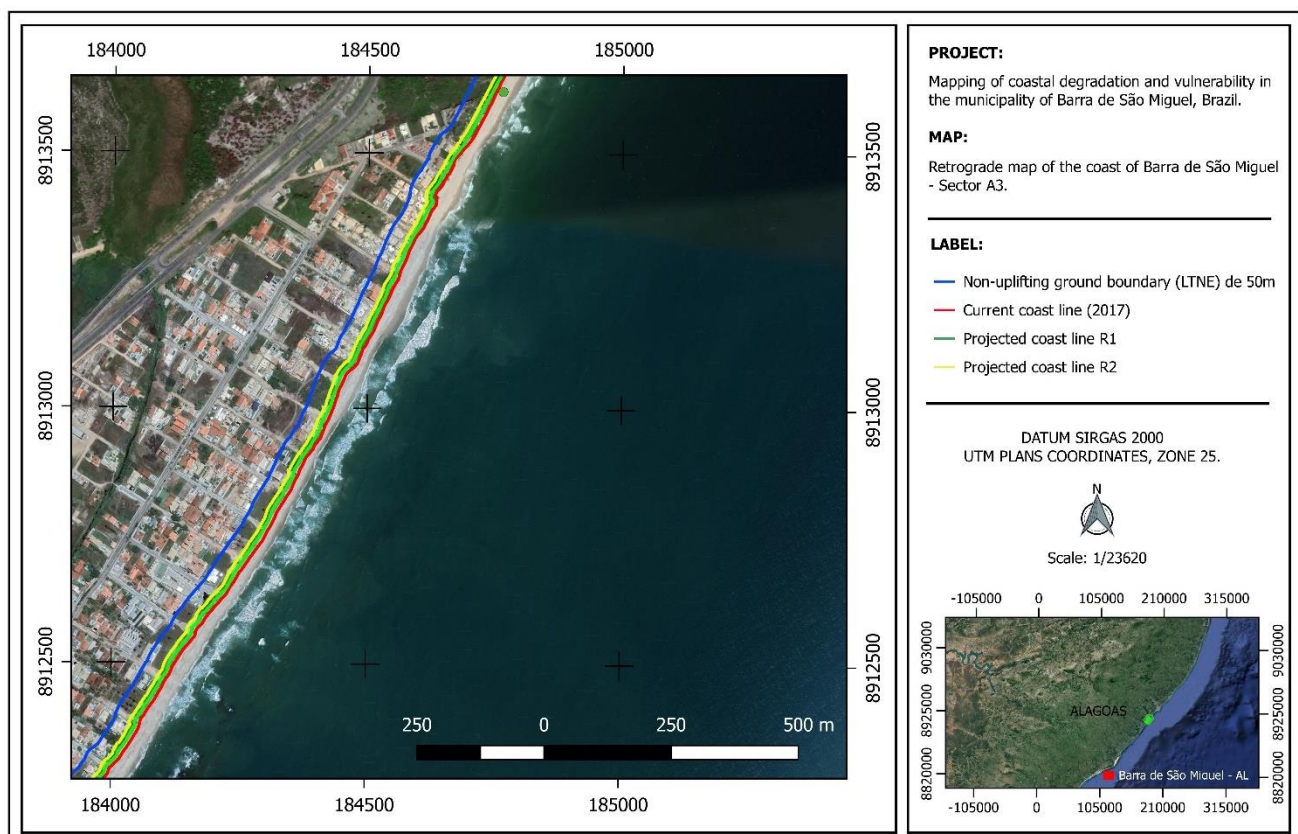
Associating the optimistic scenario of retrogradation (R_1) to the coastal building limit zone, 16.75% of the building region will be impacted by the sea level rise, corroborating with legislation regarding coastal protection areas delimitation.

4.3 Subsection A_3

It is limited by plane UTM coordinates (8.912.353 mN, 184.056 mE) and (8.913.621 mN, 184.763 mE), DATUM SIRGAS 2000, with approximate extension of 1.5 km.

Prospect of sea level rise (S_1 and S_2) indicate retrogradation R_1 of 11.47 m and R_2 of 23.91m. Evaluating retreats extension, even in the optimistic scenario (S_1), there would be impacts on the buildings of the post-beach region (Figure 9), with flooding in the lower inland areas of mangrove.

Different from subsections A_1 and A_2 , low anthropic occupation level was verified within this part of the coast, specifically within the post-beach zone, which represents a reduction of the destructive process of



the restinga vegetation, dunes destruction and waterproofing of Holocene marine terraces.

Figure 9 – Map of retrogradation of Barra de São Miguel coast – Subsection A_3 . Source: Author.

Regarding vulnerability, it is classified as low (predominant) to high vulnerability, due to waterproofing level of the post-beach area by disorderly urbanization, reduced beach and post-beach containment buildings (Figure 10 [a] and [b]).

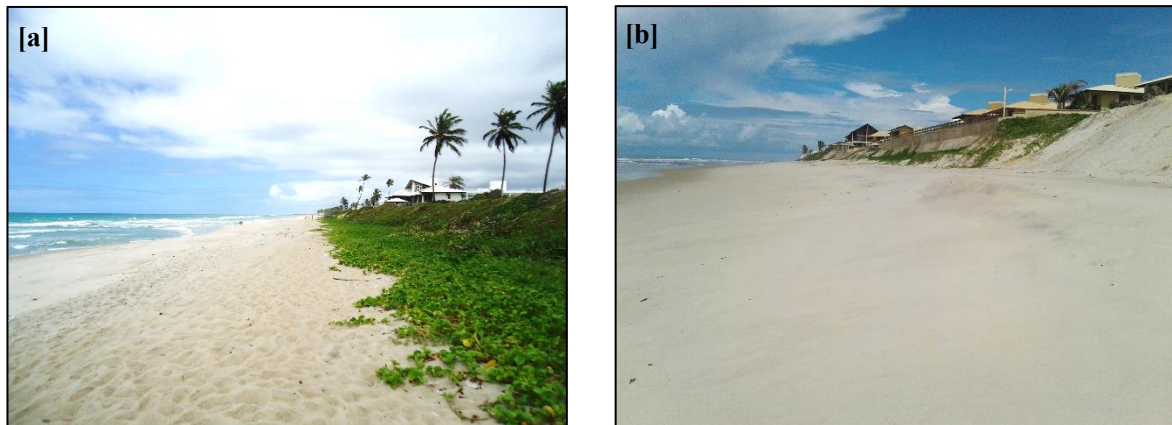


Figure 10 – [a] Area of Low Vulnerability: Preserved coast ridges and fixed by restinga vegetation; Low post-beach urbanization; Well-developed beach. [b] Area of High Vulnerability: Occupied coast ridges and fixed by beach dams; Moderate post-beach urbanization; and Well-developed beach. Source: Author. Located in a region characterized by an urbanized seafront and flood-prone areas, coastal building zone limit should be established 50 m from the beach border or from the base of the back of the foredune, when existent, by a contour line located from a quota of at least 1 m above the limit area currently reached by the syzygy's high tide.

Regarding coastal regions delimited by the coastal building zone limit, it was possible to verify, when associating this to the retrogradation scenario R_1 , that 22.98% of the building zone will be impacted by the sea level rise.

4.4 Section B

It is spatially limited by plane UTM coordinates (8.913.621 mN, 184.763 mE) and (8.916.590 mN, 186.626 mE), with approximate extension of 3.5 km.

Considering sea level rise scenarios (S_1 and S_2), prospects indicate retrogradation R_1 of 15.1 m and R_2 of 31.45 m. Evaluating extension of retreats, buildings would not be impacted in both scenarios, due to the absence of significant anthropic disturbances within this coast piece (Figure 11).

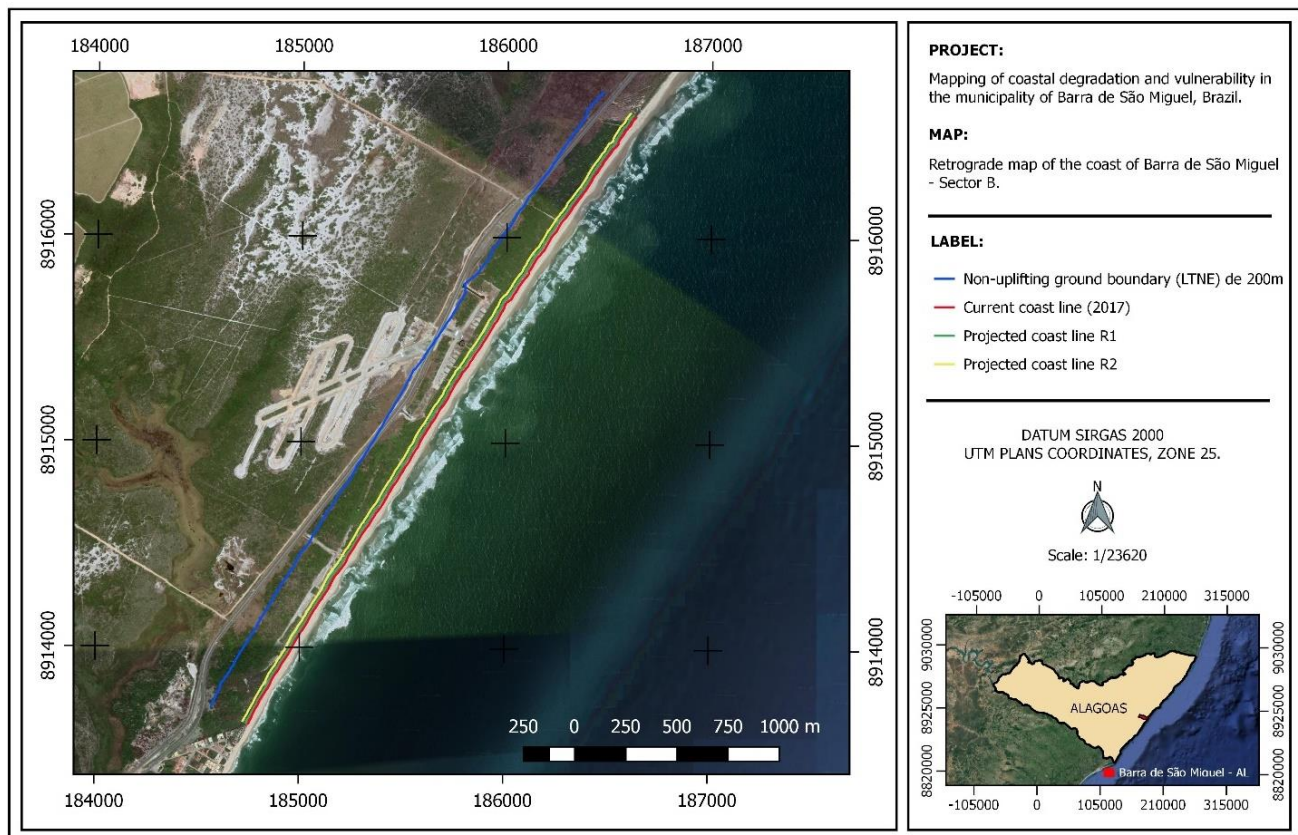


Figure 11 – Map of retrogradation of Barra de São Miguel coast – Section B. Source: Author.

This subsection is located in a region characterized by non-urbanized seafront, thus, coastal building zone limit of 200 m should be established from the beach border or the base of the back of the foredune, when existent, towards the continent.

Thus, evaluating retrogradation R_1 impact over the area defined by the coastal building zone limit, it was possible to verify that 7.46% of the building region will be impacted by the sea level rise.

This section is classified as low vulnerability area, due to the presence of well-developed beach compartmentalization and with all sub-environments (post-beach, beach and fore-beach) preserved (Figure 12 [a] and [b]).



Figure 12: [a] Area with Low Vulnerability: Coastal ridges fixed by restinga vegetation; and well-developed beach. [b] Absence of post-beach urbanization; Preserved Holocene marine terrace and fixed by restinga vegetation. Source: Author.

Lastly, considering optimistic retreats (R_1) defined by Brunn Law (1992); the response of different types of coastal features to a sea level rise (Nicholls *et al.*, 1995); and definition of coastal building zone limit (Muehe, 2001), it was possible to establish a synthesis of retrogradation for sections A and B, observed on table 2:

Table 2 - Projection of retrogradation and vulnerability for sections A and B.

Section	Sub Section	Retreat of Coast Line (RCL)		Coastal Building Zone Limit (CBZL)		¹ Impact Level (%)	² Predominant Risk Factor to Erosion
		Optimistic Extension (m)	Area (m ²)	Extension (m)	Area (m ²)		
A	A ₁	36.88	91,645.73	50	123,078.70	74.46	3
	A ₂	8.50	12,618.36	50	75,330.70	16.75	3
	A ₃	11.47	16,865.27	50	73,383.11	22.98	1
B	-	15.10	53,446.49	200	716,564.53	7.46	1

¹Representative value of impact level over the area delimited by the coastal building zone limit, considering retrogradation established by the optimistic scenario of the SLR, ²Erosion risk (Dal Cin & Simeoni, 1994): 1 – Low vulnerability, 2 – Moderate Vulnerability and 3 – High vulnerability.

5. FINAL CONSIDERATIONS

Regarding categorization of the vulnerability level of the coast to marine erosion, it is possible to conclude that approximately 57% of the coast in the study area (section A) is threatened by the RSL rise, presenting high vulnerability rate. In contrast, section B, due to the presence of well-developed beach, without containment buildings, absence of anthropic occupation and preserved restinga vegetation, it was diagnosed with low vulnerability potential to erosion.

It was also verified that retrogradation prognosis of the coastline, based on scenarios predicted by the IPCC, indicated that even in an optimistic scenario, retreats (R_1) over the coast of the study area are increased, reaching all buildings in the section A, from 8.5 m inland subsection A₂; 11.47 m inland sub-section A₃; and until 36.88 m inland sub-section A₁. Section B, despite presenting high environmental preservation level, would exhibit retreat of 15.1 m.

Determination of the coastal building zone limit, in other words, a minimum zone for the protection and esthetic maintenance of the landscape, established from distances between the current high tide line towards the continent, demonstrated that previous adoption of coastal building zone limit results throughout the sections would be enough to absorb future impacts originated from sea level rise over the coast in the study

area. Thus, a fundamental aspect for coastal building zone limit fixation beyond the optimistic scenario of retrogradation is the definition of the evolutionary trend of the coast, both on a geological time scale (hundreds to thousands of years) and on the time scale of the current process (years and decades).

Regarding the perception of coastal erosion throughout the beaches, it was concluded that urbanized regions presented erosive processes in almost its entire extension, due to the intense waterproofing of the post-beach through the construction of summer houses, beach dams and bagwall-like structures, besides, the absence of beaches nearby São Miguel and Niquim rivers mouths. Thus, it can be concluded that the combination of these factors intensified the erosive process in the region, although, it is not more visible due to permanent anthropic actuation in order to contain sea rise.

Thus, it is valid to affirm that results obtained by this study are important to comprehend coastal environment of Barra de São Miguel County, and it can be used as a guiding source in coastal monitoring and management of the region. Observations should be expanded through complementary studies within time spaces of years and decades, in order to obtain spatial/temporary morphodynamic parameters to define evolutionary trends of the county.

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TECHNOLOGY IN TEACHING AND LEARNING

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Abstract

Christian Louis Lange once said, "Technology is a useful servant but a dangerous master." The effective use of technology in education has changed the face of education and it has created more educational opportunities. Both teachers and students have benefited from various educational technologies, teachers have learned how to integrate technology in their classrooms and students are getting more interested in learning with technology. The use of technology in education has removed educational boundaries, both students and teachers can collaborate in real time using advanced educational technologies. However, we need to make sure that technology is used by teachers only to facilitate the learning process, not to replace the teachers but extensive use of technology acts as an impediment to the systemized teaching- learning process. Recent advancements in educational technologies have yielded positive results in our education sector. New educational technology supports both the teaching and learning processes. Technology has digitized classrooms through digital learning tools like, computers, iPads, smart phones, smart digital white boards. It has expanded course offerings, and has increased student's engagement and motivation towards learning.

This paper deals with the problems faced by teachers while teaching English in the traditional methods. It propounds five new language games to teach syntax structures to the learners by incorporating technology.

Keywords: impediment, integrate, syntax structures

Introduction

With the proliferation of English around the world, English is used as a second language in a country like India wherein for some people, it is the first language. It enjoys huge prominence in the country. As the number of English learners is escalating, different teaching methods have been implemented to test the effectiveness of the teaching process. Use of authentic materials in the form of films, radio, TV has been there for a long time. It is true that these technologies have proved successful in replacing the traditional teaching. The new era assigns new challenges and duties on the modern teacher. The tradition of English teaching has been drastically changed with the remarkable entry of technology. Technology provides many options, making the teaching process interesting and productive.

The traditional method of teaching did not emphasize on focused learning, critical thinking or interactivity. It obviated the learners from learning the things they are interested in. The teacher is the only source of information. Students do not make the effort to learn new things themselves. Lack of parents'

involvement can be a problem, which is part of traditional school system. This makes parents and students distant from each other as a family. In traditional classroom, teacher and books are the only source of information, which can be limited as compared to online learning in which online information is limitless. Sometimes, traditional system of teaching can make learning a boring activity, which makes learning tiresome and seems like a burden. Moreover, learners have different learning capacities, which a single teacher cannot address in a class. It hinders his learning capability due to lack of teacher's individual attention. Technology helps in overcoming these problems.

George Couros once said, "Technology will not replace great teachers but technology in the hands of great teachers can be transformational." Technology is one of the most significant drivers of both social and linguistic change. Graddol: (1997:16) states that "technology lies at the heart of the globalization process; affecting education work and culture." The use of English language has increased rapidly after 1960. At present the role and status of English is that it is the language of social context, political, sociocultural, business, education, industries, media, library, communication across borders, and key subject in curriculum and language of imparting education. It is also a crucial determinant for university entrance and processing well paid jobs in the commercial sector. Since there are more and more English learners in India, different teaching methods have been implemented to test the effectiveness of the teaching process. One method involves multimedia in ELT in order to create English contexts. This helps students to get involved and learn according to their interests, It has been tested effectively and is widely accepted for teaching English in modern world. Technology is utilized for the upliftment of modern styles.

We are living in a time with unprecedented opportunities to communicate with others in authentic and compelling linguistically and culturally contextualized domains. Technology has always been an integral part of our lives. Technology has a reciprocal relationship with teaching. The invention of new technologies helps learners understand the course content and achieve good results in the classroom. At present, technology surrounds humanity, the new generation is growing up with technology and are living with it. Computer technologies have changed the way people get information, and communicate with people around the world. For this reason, schools and educational institutions need to be aware of technological equipments. Instructors at the schools and institutions need to improve their technological skills to be able to grasp the students' attention and interests (Akyol, 2010). Now teachers are utilizing technology to improve and enhance the comprehension of the course content (Hicks, Reid, & George, 2001). Utilizing various kinds of technological equipments gives ESL learners the sense of freedom, motivation, and encouragement they need for learning process (Genc- Ilter, 2009). It also makes the lesson more efficient (Akyol, 2010). According to Lee Wang, incorporating technology in ESL classrooms has many advantages; it improves the learners' language skills like: listening, speaking, reading and writing skills. English-language learners use computers, and software programs to enhance their fluency, and improve their language skills. They use the Internet to search for information and read technology texts (Wang, 2005).

Language teaching is an area in which the utilization in technology has been motivated. While technology plays an important role in supporting and enhancing language learning, the effectiveness of any technological tool depends on the knowledge and expertise of the qualified language teacher who manages

and facilitates the language learning environment. In some cases, however, school and university administrators have permitted technology to drive the language curriculum and have even used it to replace certified language teachers. Technological devices are being used in language classes (Traore & Kyei-Blankson, 2011).

Using technology, as a teaching strategy for learning a second language in ESL classrooms, has become popular today. It supports the learning process among ESL learners and can be utilized in various forms to improve comprehension skills in their course contents (Hicks, Reid, & George, 2001). ESL learners themselves see it as pivotal source for advancing their second language proficiency (Neuman & Koskinen, 1992).

Technology has an effective relation with English language education (Singhal, 1997). Throughout the last century, English language laboratories had been used in various institutions. These laboratories consisted of several small cabinets; each cabinet had a cassette deck, a microphone and a headphone. Teachers used an efficacious control panel to observe their students' interactions. The foremost advantage of this technology was that the spoken function of students helped them learn the second language faster. Through exercising more practical drill problems, the language skills of the learners were enhanced (Nomass, 2013). Also these laboratories were a good step in creating a connection between technology and language education (Singhal, 1997). With the invention of new technologies, the incorporation of visual materials in language classrooms has become common (Vanderplank, 2010).

Technology facilitates active engagement with the learning material. It makes the learning process interactive, and students learn by engaging, researching, and receiving feedback. This makes learners passionate about what they are learning. For example, they may study geography using interactive software such as Google Maps or Google Earth.

By using the Internet, students can research real issues happening at that moment that are related to the classroom curriculum. This helps students understand that the lesson being taught refers to real problems and real people. Simulation software helps to bring to the classroom real activities that would be impossible to see without technology. By using specific simulation tools, students can see planetary movements, how a tornado develops, or how dinosaurs lived.

By using the Internet or software tools, students can create online groups. Technology can create virtual communities that connect them in real time with learners and teachers anywhere around the world. They can receive feedback from their teachers and share questions and concerns about their lessons. By listening to and reading about others' opinions and feedback, students refine their thinking, reaching higher levels of comprehension and deeper understanding. Online communities also present the opportunity for students to interact with others around the world. Technology-focused activities mostly require critical-thinking and problem-solving skills.

During the last decade, learning languages has become more important. Learning a new language not only develops individual intelligence, but also it facilitates the learner's entry into another culture and prepares them with the essential skills to succeed and change their behaviour in a rapidly changing world (Chan & Herrero, 2010). Visualization helps in improving memory, restoring health, reducing stress, increasing relaxation and motivation, improving sport performances, etc. Visualization helps in

motivating the individuals, it provides mental practice that can also be cost-effective and safer. Visualization is a powerful way to strengthen techniques, such as association and scripting.

Draper (2012) has described visualization as a foremost prerequisite for a good reader. Helping students gain visualization skills is an essential way to advance greater understanding while reading. It allows learners to be more engaged in their reading and they use their images to draw conclusions, create interpretations of the text, and recall details and elements from the text (Keene & Simmerman, 1997). Expert readers impulsively and purposefully create mental images in their minds at the time of reading, and after they have completed the task of reading. The images are stored in readers' encyclopedic knowledge. The readers use images to put in detail the things they read. The images provide depth and dimension to the reading process, engaging the reader more deeply, and making the text more memorable. Expert readers use images to draw conclusions, to create different and unique interpretations of the text, to remember the essential elements of the text, and to remember a text after it has been read. English instructors to be more imaginative and motivated using movies in EFL classrooms (Ismaili, 2012). Therefore, teachers believed that using movies in EFL classroom can increase the interaction among learners; they improve learners' speaking skill and offer learners more opportunities to use English (Ismaili, 2012). Videos that are related to the content of the curriculum can be used in EFL classrooms, to bring a realistic phase of what is being taught in the class. (Furmanovsky, 1997).

Literature Review:

1. Factors Contributing to the Level of Acceptance of Technology in Affluent Private Schools

The research paper titled 'Factors Contributing to the Level of Acceptance of Technology in Affluent Private Schools' by Margaretha Gertruida Johanna Maré & Maryke Anneke Mihai aims to explore factors that influence the technology acceptance of teachers who are employed at a school where there is wide access to different types of technology. The researchers aimed to identify distinct aspects that deter the use of the available technology, while also establishing the motivating factors in the target school. Semi-structured interviews were conducted with five divergent volunteers. The transcribed interviews were analyzed qualitatively using Atlas to assist in identifying emerging patterns. Through the analyses it became evident that although teachers are presented with technology and recognize the usefulness thereof, flaws in support from the institution are increasingly deterring even teachers with a high technology acceptance from using available technology. The researcher recommended that members of management should set clear implementation goals to staff members, while dedicating themselves to prioritizing issues such as infrastructure, maintenance of hardware, and effective training opportunities.

2. An Exploratory Study of Minority Students' Technology Usage and Perceptions of Technology: Non-traditional Adult Students in Technology-Based Environments

The research article titled; "An Exploratory Study of Minority Students' Technology Usage and Perceptions of Technology: Non-traditional Adult Students in Technology-Based Environments" by Yu-Chun Kuo from Rowan University examines non-traditional, African-American adult students' use of technology and their perceptions towards this in technology-based environments. Technology perceptions

included computer self-efficacy, Internet self-efficacy, user attitude, and computer anxiety. The effects of student characteristics on these factors and the relationships between these factors were examined throughout this study. Participants included minority students who participated in face-to-face or online undergraduate courses offered in continuing education. A quantitative approach was undertaken to analyze the collected data. Results indicated that non-traditional minority students utilized basic software tools more frequently than the advanced ones, suggesting that many of them may lack the knowledge or skills for advanced technologies. Age, hours spent online, and previous online course experiences influenced students' technology perceptions. Gender did not have an impact on technology perceptions. Internet self-efficacy was affected by most of the student characteristics variables. Computer self-efficacy was found to be a good predictor for both user attitude and computer anxiety.

3. Technology: The Positive and Negative Effects on Student Achievement

The research paper titled; 'Technology: The Positive and Negative Effects on Student Achievement' by Jennifer Lyn Flanagan from The College at Brockport, aimed at identifying the positive and negative effects of technology on student achievement. One eighth of nineteen students from an urban middle school was taught a unit on Solving Systems of Equations by Graphing. The unit was implemented with and without the use of the graphing calculator. Students were first introduced to the unit through the use of pencils and graph paper. All the graphing was done by hand and students had to determine the solutions of the systems of equations by proper graphing techniques. The students were then tested at the end of the unit. Students were then given the same unit but were now able to use the graphing calculator as a means to enhance their learning of Solving Systems of Equations through graphing. Students were then tested again but this time they were able to use the graphing calculator during the test. Student achievement for the unit had risen and grades on the assessments had increased due to the presence of technology. Student engagement and interest had also increased due to the presence of technology.

4. A Study of the Effects of Digital Learning on Learning Motivation and Learning Outcome

The research article titled; 'A Study of the Effects of Digital Learning on Learning Motivation and Learning Outcome' by Ming-Hung Lin, Huang-Cheng Chen and Kuang-Sheng Liu stated that digital learning presents better positive effects on learning motivation than traditional teaching does. It showed better positive effects on learning outcome than traditional teaching does. Learning motivation revealed significantly positive effects on learning effect in learning outcome. In this study, students were tested and proceeded questionnaire survey to understand the opinions about digital learning. To effectively achieve the research objectives and test the research hypotheses, quasi-experimental research is applied in this study. Total 116 students in 4 classes were selected as the research subjects for the instructional research. It is important to combine with current teaching trend and utilize the advantages of digital learning to develop practicable teaching strategies for the teaching effectiveness.

5. Enriching Classrooms with Technology in the Basic Schools

The research article titled; “Enriching Classrooms with Technology in the Basic Schools” by Karzan Wakil, Nsar Qaisar and Chra Mohammed aimed at analysing the role of technology in the classroom for a learning process. The researchers proposed two classes- one of them enriched with technology another one without technology, after teaching the same subject for both students a test was conducted. The result showed that average of students GPA in classroom technology is 83.3%, but in the classroom without technology decrease to 60.4%, the result showed the learning increased 22.9% by using technology. Besides all students enjoyed in classroom technology and most of them learned more material with technology. The result of the paper showed that the classroom technology is more efficient to learn basic school students.

Methodology

- A. Purpose and Significance of the Study:* Teaching sentence structure is not usually seen as an enjoyable learning concept. Writing is a complex system of communication, which means learning how to write can pose difficulties. Very few studies have been conducted to teach sentence structure to learners. Studies have been conducted on the use of technology to teach vocabulary, pronunciation, contextual clues and grammar to the learners. However research studies have not focused enough on the use of technology in teaching sentence structure to the learners. The research paper aims to identify the different technological strategies that can be incorporated into the teaching method of teaching sentence structure to the learners. It aims to answer the following research question:

Does technology play a significant role in teaching sentence structures to the learners?

B. Participants: The participants would be taken from two ICSE and two CBSE board schools. The study would focus on students from class VI and class IX. Ten students would be taken from each class. So a total of forty students would be taken from ICSE schools and a total of forty students would be taken from CBSE schools. Altogether, a sample size of eighty students would be taken.

C. Instrumentations: Five language games will be prepared by the researcher which will help in the teaching of sentence structures to the learners. The language games will be carefully designed and introduced to the learners. The language games are Master Coordinator, Clause Box, Synonym Cocktail, Homonym Trivia and Preposition Paddle.

In the game Master Coordinator, the learners are divided into several groups. The teacher distributes several tabs among the learners. Each tab has a picture of a dice with coordinating conjunctions written on the different faces of the dices. The teacher then gives each group of students, a dice. Each group of students rolls the dice and each member of the group gets a conjunction. The student then has to make a sentence with the conjunction given and pass the dice to the next member in the group.

In the game Clause Box, the learners are divided into several groups. Each group of learners is shown a slide with two clauses written on it- a principle clause and a subordinating clause. The learners would arrange the clauses in a manner that the sentences are framed correctly. Each group would then be asked

to come in front of the class, and write the sentences on the board. The group would ask the class to identify the principle and subordinate clause from the sentence and frame sentences on their own.

In the game Synonym Cocktail, the teacher prepares a technical game where the learners are divided into several groups. Each group of learners is shown a group of sentences with blanks in them on the screen. Each sentence is accompanied by a cluster of synonyms and antonyms. The learners in each group have to identify the appropriate synonym and antonym to fill the blanks in the same sentence. Each group will be only two chances to identify the correct synonym and correct antonym. If the learner selects the wrong words, there screen immediately buzzes, and the learner is alerted. The learner then gets a second chance. Then the group needs to prepare a sentence with the synonym given.

In the game Homonym Trivia, the teacher prepares a technical game where the learners are divided into several groups. Each group of learners is shown a sentence on the screen with only three homonyms as options accompanying them. If the learner chooses a wrong homonym, there is immediately a buzzing sound. The learners get only another chance to identify the correct homonym. The learner has to then construct a sentence with the homonym given.

In the game Preposition Paddle, the teacher prepares a technical game where the learners are divided into several groups. Each group of learners is shown a sentence on the screen with a blank in it. Each blank is accompanied by a number of prepositions. The learners are shown the sentences and they need to identify the correct prepositions. Once they identify the wrong preposition, a buzzing sound comes from the screen. After that the learner gets two more chances to identify the correct preposition. The learner then makes a sentence with the preposition.

Procedure:

At first, the selected students were randomly divided into control group and experimental group. The Control group was taught sentence structures from the book by teaching them the rules of sentence structuring. The Experimental group was taught sentence structures using language games with technology. It was observed that learners who were taught sentence structures using language games with technology surpassed the other group with their performance and were able to retain the structures learnt for a longer period of time.

Hypothesis

The hypothesis is that learners who are taught a foreign language using language games learn the language better and is capable of using it effectively than those students who are taught using traditional conventional methods.

Discussion

The rapidly advancing age of technology has made it possible to overcome many different challenges in our world today. The positive influence of technology when learning English is valuable and can maximize the overall experience. As technology becomes a major part in today's world, students can have more freedom and support to fully absorb the material. More students are choosing to learn English online

because of the increased efficiency with lower costs. Technology and learning English go hand in hand and here are some reasons why more prefer online lessons.

The biggest reason for incorporating technology into education is the overall changes in global communication. Technology opens doors to many more opportunities by linking the world together. A pivotal aspect of learning English is to how to communicate with others in a social setting. Learners now have a virtual community of learners to discuss topics with, seek advice, or gain leadership skills by helping others. Interactive whiteboards for instance, are a simple but invaluable way for English learners to access helpful resources or lessons. Instructors may include previous topics that are extremely important to progress to the next level. Another benefit of mixing technology and learning English is that it reinforces the interest of the learners. A traditional classroom setting is often not conducive to learning because the strategies of rote learning do not challenge or interest students. But technology has completely changed the milieu of learning and makes it easier for English learners to focus because the content can be presented in a number of ways. Lessons that include computer-based instruction, visual aids, and technologically advanced materials help students achieve more knowledge in less time.

Traditional learning in a classroom is extremely limited and can only be ongoing as long as students are present. However, technology and learning English has allowed students to use mobile phones or laptops for example, to access require information anytime they need. This not only helps students to absorb the material but also offers valuable practice on the proper ways to use tools of technology. Learners prefer to blend technology and learning English because of the valuable skills acquired throughout the lessons. Computer software and online tools help learners absorb the material much more easily and also hone language skills that are useful. Technology is most successful in maintaining the interest of students while engaging them in the lesson. It helps to emphasize the essential building blocks of language learning including vocabulary, comprehension, phonics, and overall fluency.

The use of technology has become an important part of the learning process in and out of the class. Every language class usually uses some form of technology. Technology has been used to both help and improve language learning. Technology enables teachers to adapt classroom activities, thus enhancing the language learning process. Technology continues to grow in importance as a tool to help teachers facilitate language learning for their learners.

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Complementarity Analysis Islamic Banks / Microfinance Institutions in Senegal

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Summary

The purpose of this article is to assess the use of the complementary relationship between the Islamic Bank of Senegal and microfinance institutions in the SME financing process. Currently in Senegal, the constraints on the financing of SMEs are intensifying more and more and continue to limit state policies in the process of promoting sustained economic growth for lack of funding model that responds effectively to investment needs of the latter. In this perspective of marginalization of SMEs by traditional financial intermediaries' especially traditional banks, the importance of using Islamic Bank / MFI complementarity could be a solution to such a situation of under-financing of SMEs. This new funding model can have a downward impact on transaction costs, reduce risk management and increase the medium- and long-term volume of credit available to SMEs. It would thus promote the financial and social inclusion of Senegalese SMEs. This new funding model can have a downward impact on transaction costs, reduce risk management and increase the medium- and long-term volume of credit available to SMEs. It would thus promote the financial and social inclusion of Senegalese SMEs.

Key words: Complementarity, Islamic banking of Senegal, microfinance institutions, SMEs, inclusive and social finance

J.E.L classification : G21, G14, O17

Introduction:

In the financial system of Senegal, MFIs contribute to the economic growth and social development of vulnerable microentrepreneurs, in the sense that they contribute to raising the level of employment and increasing incomes.

In addition, many MFIs have real financing needs to meet the difficulties associated with medium and long-term credit applications. To obtain significant resources, MFIs have two possibilities: on the one hand, they can be self-financing, and on the other hand, they can establish external refinancing relationships with other financial structures including banks.

If the MFI merely builds refinancing relationships with banks such as Islamic ones, it is bound in its activities to respect the laws and norms of the Islamic law and to be in conformity with the Islamic ethics in the more general sense and with the provisions of *Shari'a* governing Islamic finance.

Indeed, Peillex and Ureche-Rangau (2012) emphasize that the precepts of Islamic finance prohibit clients and investors who manage to obtain funding from Islamic financial institutions certain sectors or types of activities deemed illegal by the Quran or *Shari'a*. In reality, even if the microfinance institution is considered profitable in its activities, if it carries out activities considered in the Moslem law as haram (the breeding or the sale of pigs, the manufacture or the sale of the alcohol, games of chance, interest-bearing loans, the trading of metals, especially gold ...), it can not be refinanced by the Islamic finance structures, for example the Islamic Bank of Senegal.

Complementarity between Islamic Bank of Senegal¹¹ (BIS) and the microfinance sector is currently an important aspect of the financing relationship between financial institutions and SMEs. In sub-Saharan African countries, particularly in Senegal, the issue of under-financing of SMEs is one of the major concerns that block innovation and employability, and hinder the promotion of economic growth.

Indeed, SMEs occupy 99.8% of the economic fabric. Their turnover reached 3450.3 billion FCFA and they employ about 45% of the active population of Senegal in 2016 (ANSD / RGE, 2016). Despite their importance, the activity and expansion of SMEs are experiencing a considerable slowdown due to lack of innovation and external financing.

Islamic banks have sufficient resources (Huet et al, 2014). At present, they are making remarkable progress in Africa. Islamic investments injected into this African continent account for 1.5% of global Islamic investments (The World Economy, 2017). Although the presence of Islamic financial institutions is weak compared to conventional ones, this new funding model is full of hope for a number of investors and especially microentrepreneurs. The intermediation of Islamic banks is characterized by its tools and products related to Islamic ethics and encourages productive investment through the principle of sharing risks, losses and profits (Hamza and Guermazi-Bouassida, 2012).

Islamic banks to ensure a socially responsible financing model are based on the rules of Islamic law (dictated by the Sharia committee) to ensure their credibility and mark their differentiation with conventional banks. This specification of the financing model of Islamic financial institutions is in fact opposed to practices such as speculation, opportunistic behavior, application to interest rates, the cessation of debts and the prohibition of financial transactions to illicit sectors etc.

Despite the proven performance of Islamic banks, that of Senegal has real difficulties to meet the financing needs of Senegalese SMEs.

In this same context, MFIs that have the appropriate mechanisms for financing SMEs (Fall, 2010, 2011, Diagne and Fall, 2009), for their part encounter constraints related to the scarcity of significant resources to grant medium and medium-term financing long terms. Thus, the possibilities of complementarity

¹¹ The Islamic Bank of Senegal is the first and up to now the only Islamic Bank in Senegal that officially offers Islamic finance products and services. It is created on February 22, 1983 following the protocol agreement of 1981 between the former president of the Republic of Senegal Mr. Abdou DIOUF and the Prince Mohamed Fay al Al Saoud, president at the time of the banking group Dar Al Maal Al Islami (DMI).

between the Islamic Bank of Senegal and MFIs could be a solution to such a situation of under-financing SMEs.

The financing needs of Senegalese SMEs are estimated at more than 500 billion FCFA (Diakhaté et al, 2014). This results from the exclusion of the majority of SMEs by Senegal's conventional financial and banking system.

Indeed, according to Mayoukou (1996), SMEs are underfunded. The under-financing of SMEs is aggravated by the fact that the financial system is very precarious in terms of accessibility, efficiency and profitability vis-à-vis the latter. In addition, the financial environment of Senegal is composed in its entirety by banking institutions that are active in financing formal projects and MFIs that conduct semi-formal intermediation to serve the population of modest income. Therefore, it is noted the importance of accompanying the mesoactivity composed in its majority by SMEs. The constraints on the financing of SMEs are intensifying more and more because of the lack of a financing model that effectively meets their investment needs.

Most of the resources collected by MFIs are short-term deposits, which considerably limits their transformation potential (Diagne and Fall 2009, Lelart 2005, Kauffmann 2005, Nsabimana 2004). From this it follows that the banking sector is limited by its approaches and that of microfinance by its weak financing capacities.

Thus, the synergy of actions between the Islamic Bank and the microfinance sector would be profitable for both financial industries and would increase the comparative advantages of each intermediary. This partnership, in addition to its positive impact on SMEs, would have made it possible to broaden financial intermediation. It affects transaction costs, risk management and the volume of credit offered in the medium and long term. This would have an influence on the financing of vulnerable microentrepreneurs long since excluded from the traditional financial system. Likewise, it would promote the financial and social inclusion of SMEs.

This paper is structured as follows: The first section presents the links between traditional banks and microfinance institutions. The second section analyzes the financing of SMEs by the Islamic bank. The third section is dedicated to the financing of SMEs by microfinance institutions. The fourth section studies the complementarity between Islamic banking and microfinance institutions in Senegal. The fifth and final section is devoted to the conclusion.

I. Links banks and microfinance institutions

During this decade, many research studies have found a crucial utility of the complementarity between the banking sector and that of microfinance institutions, in the process of participating in the inclusive finance of mesoactivity (Fall, 2011; Fall, 2009). This coordination emanating from both sectors has, more than ever before, contributed to the financial inclusion of the vulnerable population excluded from the banking system, for lack of material guarantees. This model of efficient financing, has not left behind, the need for financing of SMEs which for years have felt a neglect by financial structures both on the side of conventional banking institutions than on the side of MFIs (Diagne et Fall, 2009). This niche of growth, has experienced a vacuum related to the lack of financial sector appropriate to their criteria for applying

for funding. If the banking sector rhythms with affluent clients (Eber, 2000) and microfinance with micro-entrepreneurs with modest incomes (Rutherford, 2002), it would probably be wise, in a context of growth in microfinance activities which is, however, accompanied by a recurrence of financial crises, highlighting a financing model based on the complementarity between Islamic Bank and MFI. This synergy of actions goes in fact, filling this architectural void of the segment of the mesoactivity composed mostly by SMEs.

1. An institutional vision of complementarity

An empirical example that can demonstrate the complementarity between the banking sector and that of MFIs can be understood in an appropriate framework of analysis with the theory of the firm elaborated by Aoki (1986, 1988). It is apparently argued that the theory of the firm Aoki J can give us an example of a convincing model of coordination between two distinct institutional sectors.

Indeed, Aoki, to elaborate the model, was based on two firms; that which has purely American characteristics noted firm A and that Japanese, noted firm J. Its analysis can perfectly be applied to justify the partnership relationship between the formal banks, whose mission is to finance the rich populations, and the MFIs that have to serve customers excluded from the banking system.

We develop a simplistic analysis that compares the banks, which we consider to be the firm A and those of the microfinance structures that we note here firm J, in order to justify the parameters of complementarity while emphasizing the fact that each financial institution is more active in its intervention community. We will use these terms throughout this sub-section to designate either the banks for firm A and microfinance institutions (MFIs) for firm J.

In this perspective of analysis, Aoki compares American and Japanese methods, in terms of organization of work in workshops, and the relationship of coordination of activities between workshops, in a context of external shocks.

The relationship between firm A and company J will focus on an objective analysis of the information and organization of these companies, (formal banks and MFIs).

At the level of firm A, the information is totally centralized and the control is done in a hierarchical manner, whereas in firm J it is totally decentralized and the control is carried out in a horizontal way.

Indeed, in the banking structure, all tasks are focused on a well-defined model, while in the microfinance sector, tasks are specific and not standardized, because they can change their relationship depending on the environment or the contract with a third party.

Based on the hypothesis of Aoki and the logic that governs the intermediation of banking and microfinance, we can deduce that the intermediation of the bank is based on standard tools, such is not the case, the case for the MFI. The latter conducts a specified financial intermediation based on more flexible tools.

These intermediation tools may change according to the credit agreement with the third party or according to the geographic environment of the customers. It seems appropriate in this context, that the first element of analysis is based on the parallel that we seek to establish.

As we have seen, the bank sets up standard mechanisms that favor centralized coordination, because the tasks are precise and decision-making is easier as in the case of firm A, unlike the MFI, whose This coordination revolves around several decisions and, however, more difficult to define.

This, once again, allows us to say that the MFI community is more volatile than the banking community, since the nature of the contracts is not standardized. In addition, the specialization of tasks is all the more specific in the banking business, which highlights the easy hierarchical management, unlike microfinance institutions (MFIs). For the latter, the concept of learning takes the lead on the notion of specialization, which calls for horizontal coordination.

2. Complementarity at Aoki: a specialization and learning perspective

At this level of analysis, the Aoki study highlights the level of specialization and the learning aspect in firms A (banks) and J (IMF). The service offering schedule in the bank (firm-A) is based more on the specialization, whereas at the same time, in the MFI (firm-J), it focuses more on the learning aspect in the bank within the team. In this respect, it is particularly important to grasp this opposition that is made between the specialization that is done within the bank, and the learning that is done at the level of the MFIs, hence the firms A and J, to make the simplified representation of these intermediation structures.

Indeed, in the firm A d'Aoki (1986, 1988), the specialization of the workers is very crucial. The role of each worker is defined in advance on the basis of a collective agreement. The employee has a very specified but limited knowledge in the bank (Firm-A). This means that the workforce or the know-how inside firm A is not very rotational. This shows us that in case of dismissal or resignation of a member of the staff, the firm A will find without difficulty, on the job market, another agent with all the skills required to manage the same position, d. as much as the tasks to be managed are in reality standardized. It may be remembered that, it is the same aspects that condition the working method of the banking structure, where the specialization of tasks is very advanced, unlike the firm J (IMF), where the specialization is broader and complex. In reality, the mission or role of each employee is not specified and the rotation of workers within firm J (IMF) is more dynamic.

In MFIs, the competence of their employees relies much more on learning than on skills. What makes the agents of the microfinance institutions, is nothing other than their seniority and the experience accumulated in the firm-J (IMF). This experience gives them a big advantage over new recruits or those waiting to get a job in microfinance organizations. In addition, once the employment contract is broken with the employee, the firm J will have all the difficulties to find an agent able to manage exactly the same functions. Such a situation can be found in Senegal, in small microfinance institutions for example: Djolof Mutual Savings and Credit (DJOMEC), Women, Development, Enterprise in Africa (FDEA), FIDES etc.

For large microfinance institutions like CMS, ACEP, UM-PAMECAS and U-IMCEC, their staffs have advanced and relatively specialized training levels.

Thus, it is important to recognize that in poorly developed microfinance institutions, the burden of staff weighs heavily, as staff are always paid from the profit margin of the structure. This margin obtained from the transformation of customer deposits, usually in the short term, requires prudent and valuable management. Salary management of staff whose workforce can be rotated, will participate very well in minimizing the expenses of the firm J (IMF).

Therefore, a fairly specialized and standardized supply of labor will not be adequate for poorly mature MFIs, since an employee is able to combine and perform functions (file editing, accounting, portfolio

management). ...) with an affordable salary cost. This probably justifies the fact that the tasks performed are based on learning within the MFI and not on specialization.

Beyond the learning aspect in the firm J (microfinance), he notes that the relationship with the client is particular and more familiar in the MFI than in the banking structure. One can deduce from this situation that losing an employee in firm J is a source of blockage. Conversely, such a situation would have less fatal consequences in the bank, because the new recruit will have a platform of information related to the management of his portfolio (number of clients, projects in progress, funds granted, level solvency or customer score, outstanding receivables, etc.). This stored information is due to the fact that the clientele of firm A (bank), in the process of applying for a loan, must at least, for a reliability of its project, give a panoply of official files related to the activities, this which is not the responsibility of MFI clients.

3. Complementarity at Aoki: A Horizontal Coordination Lens

After comparing coordination from the perspective of specialization versus learning, author Aoki also observed the impact of organizational structuring of firms from a governance perspective. For the bank, as we have seen, task-based specialization is crucial. This means that the transmission of information to employees depends on their superiors or the general management. Conversely to MFIs (firm J) where information is decentralized and functions less austere. In practice, MFI workers are much more daring in responding to the risks associated with exogenous shocks.

In fact, we can say that in the firm A (bank), the credit relationship with customers is based on formal documents. Such a relationship enables the banker to prevent different types of risk (selection risk, credit risk, etc.), according to the criteria established by supervisors or senior management.

In addition, the bank employee does not have all the freedom to make decisions in a personal way because, in the firm A, such decision-making is centralized. It comes from an order or superior hierarchy, to guide the banker obviously. It should be noted, however, that the bank must operate with prudential rules dictated by the Central Bank: example for the case of UEMOA, it is the BCEAO that dictates the rules.

In addition, it should be noted that the client of the bank who moves away from these decisions, severe sanctions that may even lead to its exclusion, since the banker assumes he knows the reasons for the credit agreement, and that, by negligence, he did not want to respect them. The relationship between firm A and customers is assumed to be homogeneous and stable, which does not reflect the same criteria for the sphere of MFIs (Firm-J).

Thus, in the microfinance sector, the relationship with its customers is very heterogeneous. The clientele of microfinance is unstable because the ideology that drives it is the pursuit of profit at all costs. This vision leads them to engage in activities that are often diversified and risky, as they evolve in most cases in the informal sector. The case of SMEs in sub-Saharan Africa, in this case those of Senegal, can be a relevant illustration.

In this line of idea we can say that: "In contrast, in the microfinance sector, intermediation mechanisms based on trust, physical and cultural proximity, seem to fit with the financial logics in force in most countries. SMEs, which, we recall, have generally taken their sources in the informal world "(Diagne and Fall, 2009).

Starting from these remarks, we can deduce that the firm A, grants credits on the basis of tangible contracts. It can at any time, grasp its type of risk and as a precaution prescribe means of reimbursement or establish sanctions. This is far from the case of the firm J (IMF) which is active in a very unstable environment. In this way, the instability of their intervention environment is due, generally by the character of non-formal activities, but also, the inability of customers or microentrepreneurs, to provide official records and real guarantees, to justify their request credit. For this very reason, it is difficult for firm J to demand standardized standards and decisions, because in the microfinance community, uncertainty is high for lack of customer behavior.

In this wake, Servet (1996) pointed out that: "Sub-Saharan Africa is characterized by a dominant situation, not of risk, but of great uncertainty". Indeed, uncertainty is greater in the microfinance community (firm-J) than in the bank (firm A). This cause is often related to the inability to establish standardized standards. The high level of client uncertainty means that microfinance employees have more information about their portfolios than their line managers.

It is then to say, that in the firm A (bank), the information is available in database which is not the case of the MFIs (firm J). In the latter, the resignation or exclusion of an employee will always have consequences for firm J because his replacement will not have the same levels of information, for the good management of the portfolio.

What we retain in this analysis between the two firms A (bank) and J (IMF), is that, the opportunities for information storage and formalization of the documents of the credit agreement are more important in the firm A than that J. In the latter, employee decision-making and the decentralization of credit information are painless, since loan officers have superior information about their clients compared to their clients leaders.

In such an illustration, it is very remarkable to qualify our remarks, given the trend of the microfinance sector. In Senegal, several microfinance institutions are moving towards the formal sector. However, our analysis based on the logic of Aoki (1986, 1988) gives us a very clear vision in each firm. The organizational structures (banks and MFIs) are each more efficient in their usual environment. The banking environment, which is considered homogeneous and stable, works better with the vertical transmission of information. On the other hand, the microfinance community, which is young and heterogeneous due to the lack of informal clients, works very well with the horizontal transmission of information.

The specificity of the two firms A (Bank) and J (IMF) and their role in the financial sector, give us every reason to say, that it results, a perfect complementarity between the two models of financing, and it is institutional because the existence of each financial structure in its environment justifies, in all rationality, the institutional organization that is in place.

I. Islamic Banks and SME Financing

After learning about the studies, which have focused on the behavior of traditional banks in the aftermath of the 2008 financial crisis, there have been real weaknesses in the traditional banking systems resulting from a governance failure (Mehdi Mili et al. al, 2014).

For this purpose, the financial theory tells us that the bad structuring of the market is the main cause that really and negatively affects the survival of commercial banks, as well as their different financing procedures. This is the result of a finance that is not completely ethical and social. With the effect of the subprime crisis the rules and laws that served as a benchmark for the financial world (Roux, 2012) were upset. So, the question arises acutely, why Islamic finance institutionalized by Islamic Banks and insurance companies, it could not replace the so-called conventional finance in the process of inclusive and sustainable financing of SMEs?

For some, this new finance is more responsible, more social, closer to the real economy and SMEs. Thus, it is clear that Huet et al. (2014), Shaban et al. (2014), Shaban, Duygun, Fry (2016) mentioned, in view of the financing difficulties faced by SMEs, the usefulness of Islamic Banks in meeting the financing needs of this sector. Finally, they argue that such funding is in fact based on a fair sharing of the sharing of the main risks and profits. In the same vein, Serhal (2007) and Nienhaus (2011) advocated the intervention of Islamic banks in the effective resolution of SME financing problems. This is particularly because Islamic banks are more participative and may be an attractive solution for these SMEs, whose investment needs are sometimes too risky for traditional financial institutions.

Thus, if we refer to the Islamic economic theory that aims at the establishment of an economic and social order (Causse-Broquet, 2007), it is strictly forbidden that the classic debt contracts are authorized, because they appeal to interest. Contracts or instruments in Islamic finance therefore make it possible to finance operations for clients and entrepreneurs such as: Murabahah, property (Salam), industrial operations (Istina'a), managing leases (Ijara) or the Moudharaba. The latter is the contract that makes it possible to share profits and risks more equitably.

That said, the argument about the equitable sharing of profit and loss sharing, raises a very difficult angle of debate.

In this posture of idea, Jouaber and Mehri (2011) underline the thesis of asymmetric information, in the absence of choosing the contract Moudharaba (PPP). They explain that the SME that encounters serious difficulties related to anti-selection, moral hazard, or problems related to agency theory, prefers other types of contracts than the Moudharaba (PPP). In addition, based on the principles of profit-and-loss sharing, Khalil, Rickwood, and Murinde (2002) demonstrated agency difficulties. They had given rise to more specific remarks about the problems related to the agency¹² and the Moudharaba contract. For them, the anti-selection that results from the opacity of information upstream between the Islamic financial institution and the SME, can be summarized as (Lack of experience, talent problem, medium or long-term project sustainability, etc.).

Anti-selection and moral hazard constitute, in particular, the elements that perfectly challenge the ideology of sharing profits and losses. Contrary to the vision of the purely PPP contract, Khan (1995) is known to have stated the problem of using PPP contracts, due to the lack of demand factors. Beyond his thesis on the

¹² According to this theory, the company is an organization made up of a set of contracts that characterize it (between the company and the shareholders or the contributors of factors: capital, labor, etc.). The agency theory tries to define the forms of organization and the types of contracts likely to minimize agency costs: monitoring costs, loss of earnings linked to the very existence of the delegation.

evolution of risk aversion of entrepreneurs (SMEs) during their existence, it appears for him, that SMEs are more risk-averse. In fact, he suggests that when SMEs are created, they will be more risk-averse than they will be a few years later.

Thus, Khan allows himself from a reflection, to say that the SMEs who have just started their activities, are supposed to prefer the contract based on the PPP, while, those more experienced in terms of existence and activity, would prefer so-called mark-up contracts. Islamic financial institutions must generally avoid risks, and encourage start-up SMEs, who face high risk aversion, by offering them appropriate contracts for PPP financing. And for mature SMEs (in terms of management experience and seniority) to offer them mark-up contracts. In addition, Amrani (2012) needs to be mentioned alongside, which points to an unwavering commitment to financing models based on profit and loss sharing (PPP).

For the author, mark-up financing, led by Murabaha, was only conceived as a subsidiary solution. Indeed, Amrani deduced from his research that several arguments of Islamic economic theory were advanced to justify this posture.

In summary, the idea of the contract based on the PPP model has always prevailed for some authors who claimed the superiority of PPP contracts, both on conventional financing and other Sharia-compliant¹³ financing.

But, with the evolution of time, the diversity and the complexity of the financing of the entrepreneur to whom, one can not evaluate, in a considerable way its risks, the solutions or the choices of the contracts are diversified.

III. Microfinance institutions and SME financing

Since the emergence of the microfinance sector, the microfinance sector has experienced remarkable growth in its participation in the financing of the vulnerable population layer. The similarity between microfinance and microcredit means that, despite the difference between these two notions, one is used instead of the other. Obviously, we can not understand microcredit without referring to the so-called informal finance that preceded it, but also without referring to microfinance, which continues to show its opportunities (Lelart, 2007).

Given the situation, microfinance institutions are involved in providing financial services and products to a large part of the working population with modest incomes. This contribution of MFIs to various levels and sectors of the Senegalese economy, participate very well in economic growth and in reducing the vulnerability of microentrepreneurs. On the basis of this, the role of microfinance can not simply be summarized as helping the poor.

The reduction of poverty is most often accompanied by initiatives aimed at facilitating the financing of microentrepreneurs, particularly SMEs, or effective policies, for the informal sector. The debate on the efficiency and effectiveness of microfinance financing for SMEs is, from the outset, a limitless concern for

¹³ Expression which designates conformity to the Koranic law.

public decision-makers, private promoters, partners and so on. While much theoretical work has focused on the close relationship between microfinance and financing the poor, there is little work that focuses on the relationship between microfinance and SME finance. It is within this framework that the updated study of this section must be understood.

According to Lefilleur (2008), the theoretical justification for the viability of microfinance structures can be explained by a close relationship between borrowers (SMEs) and lenders (MFIs). In this respect, it is particularly important for him that the reliability of the guarantee methods is based on the solidarity of the group and the interdependence of the different members.

In fact, his studies have also emphasized the specificity of MFIs, which are certainly the few structures able to access and finance the informal sector. The latter is full of a potentially uncompetitive potential market, made up of almost all SMEs (ANSD / ENPME, 2013).

Like all research developed, these first show the main limit of MFIs in the field of intervention of SMEs. This limit, however, linked to a regulation that is often insufficient, lies in their inability to mobilize sufficient resources, which consequently reduces their intervention volumes and confines them to personal loans and micro-enterprises.

In this vein, Jégourel (2008) focuses on differentiating the intervention of microfinance structures in developing and industrialized countries. For him, in developing countries, microfinance tends to reduce poverty and increasingly empower socially excluded individuals through the traditional financial system, while in highly industrialized countries it tends to facilitate a priori, the creation of very small businesses by people in a personal and social situation often difficult, lack of resources and support.

From another angle, Tioumagneng T. (2011), highlights the important role of microfinance in facilitating the financing of SMEs. The author explains that it is because of the presence of MFIs in particular, that SMEs now have more and more interlocutors (in addition to commercial banks), when they are in demand for credits, from financial institutions. In addition, he emphasizes in his remarks, that in view of the evolution of the financial environment especially in Central Africa, commercial banks seem to have lost power vis-à-vis SMEs in their credit relationship.

It follows from his remarks that banks are no longer the only financial structures to offer credit to SMEs. Other intermediaries, such as microfinance institutions, have become effective competitors in this area. SME financing by MFIs has become less constraining than that of traditional banks (Wamba, 2002).

Founanou and Ratsimalahelo (2011) examined at this stage the failure of a significant number of SMEs in sub-Saharan Africa. They deduce from their findings that the failure is due to the weak relationship that exists between banks and SMEs. For their part, they propose that the state should help SMEs to benefit from more sustainable financing conditions from retail banks or microfinance institutions, while offering guarantees that accompany these loans.

Similarly, Sandrine (2012) points out in the context of the WAEMU zone that MFIs have experienced remarkable growth in recent decades. To this end, their mission may be even if, as Sandrine proposes, to overcome the difficulties encountered by development banks, to finally ensure the financing of SMEs.

In addition, as part of the analysis of their main mission to the needs of SMEs, microfinance institutions promote the mobilization of savings in rural and urban areas in order to support the informal sector,

provider of employment. With this in mind, MFIs have been able to serve a significant share of the informal sector despite the reluctance of banks in the area. SMEs in the informal sector have achieved very beneficial financial relations with MFIs. The latter have put in place in their financing process, effective management mechanisms, including the joint guarantee, to circumvent information asymmetry problems.

In summary, it follows that, in the context of UEMOA, MFIs provide remarkable, inclusive and unsustainable funding opportunities to SMEs. The latter are excluded from the traditional financial system, lack of binding regulations from the Central Bank of West African States (BCEAO).

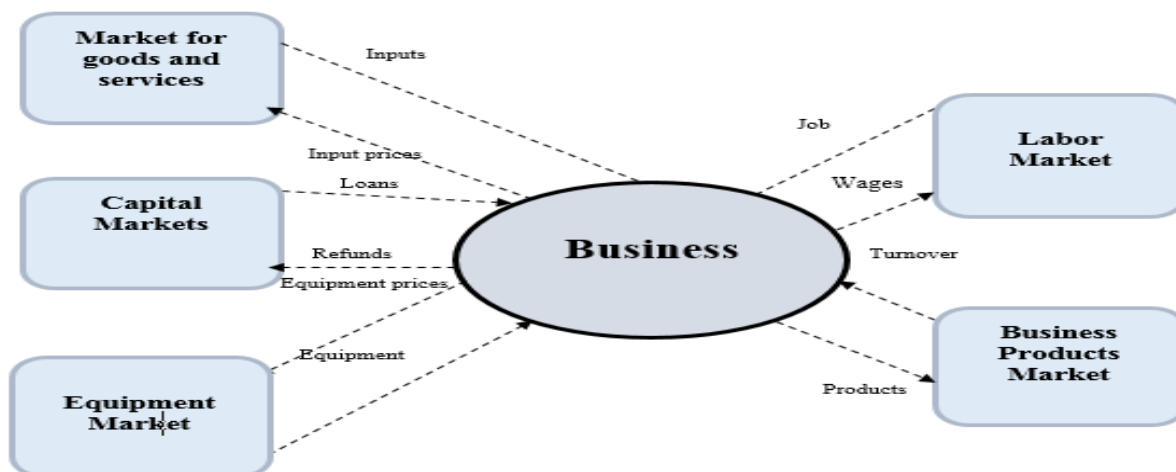
Admittedly, we can say that the studies of these authors, focused less, on the theoretical justification of the relationship of financing of SMEs in the long term.

In a context of severe financial crisis that has further constrained the financing of SMEs in Africa, other financing models that are closer to the reality of sub-Saharan African countries need to be used. To resolve this situation of under-financing SMEs, a new model based on co-financing or complementarity between banking and microfinance structures has been proposed by authors such as Diagne and Fall (2009) with the aim of reducing financing difficulties, that SMEs encounter.

IV. Complementarity Islamic banking and microfinance institutions

In this last apprehension, the understanding and the definition diverge according to the use or the approach by the currents of thought. Indeed, it seems that, in general, complementarity relations exist throughout the process linking all companies to each other, from raw materials (inputs) upstream to the final consumer (outputs), downstream.

Figure 1: Complementary links between the company and the different types of markets



Source: Author.

The analysis of the diagram above, allows us to grasp the idea of the complementarity that exists between the company, as a production structure, compared to the different types of markets that surround it upstream and downstream. In fact, the interest of this scheme is to highlight the various factors necessary for the

production activity, and marketing of the company's products (labor, raw materials, capital, productive equipment, products of the company etc.).

It shows us that the activity of the company, obeys a systemic regulation but also of interconnection with the markets, while being the central nucleus of the economic system. It distributes income by the income effect ($DY = DI / s$) ¹⁴ according to the Keynesian perspective.

In addition, Joel de Rosnay (1975) defines the systemic approach of the enterprise as a set of elements in dynamic interactions organized in order to reach a goal. On this subject, it would no doubt be instructive to define, first of all, the concept of complementarity.

Indeed, the complementarity between Islamic Bank and MFI is at the heart of the debate that arises sharply in the financing of activities of developing countries such as Senegal.

In addition, this current debate on the financing of local activities and those of SMEs, in a specific way, aims to solve the difficulties related to the lack of funding of this layer of Senegalese mesoactivity.

Therefore, we understand that the articulation between the Islamic banking system and MFIs for the financing of SMEs, is based on the one hand on the financial discrimination of commercial banking structures in Senegal in relation to the financial needs of SMEs. And on the other hand the lack of significant resources of MFIs to cope with the demand of microentrepreneurs.

Likewise, it depends on the proven competence of MFIs to efficiently offer financing to non-bankable SMEs, which are mostly in the informal sector ¹⁵ in Senegal. In a similar way the Islamic Bank has developed quite quickly new financial tools more adapted to the needs of SMEs (leasing, solidarity savings, sharing of profits and losses, socially responsible investment, ethical and Islamic funds, insurance "*takaful*" etc.). This relationship of Islamic Bank / MFI complementarity seems to show more support, as well as social performance and less risk for SMEs.

In this context, it is essential to retain certain conditions for the definition of the link between the Islamic Bank and the MFIs. Indeed, the first condition focuses on the structures or elements that constitute this relationship, the second condition is the object or the mission of this relationship, and to finish the third is related to the particular relationship that animates the structures put in relation (Fall, 2010).

These three conditions which govern the articulation between the two financial industries, allow us to define complementarity as: the various coordinations and articulations between the Islamic Bank of Senegal and the MFIs that favor the expansion of the Senegalese financial intermediation system. These articulations will have a positive impact on increasing the financial inclusion of SMEs.

¹⁴ In Harrod-Domar's Keynesian model of economic growth, investment has a key role in wealth creation in a country. This model stipulates that the investment acts doubly: on the one hand on the capacity of supply and on the other hand on the demand of the economy by a multiplier effect. More explicitly, companies generate income in their production process (purchase of inputs, fixed capital, payment of wages, etc.). In this equation DY is the change in demand or income, DI is the change in investment and S is the propensity to save.

¹⁵ The informal sector can be broadly characterized as all units of production of goods or services of a commercial nature with the objective of creating paid employment. In this way, Chouchane-Verdier (2001) defines it as a disorganized, unofficial and unsustainable sector ...

Once again, this means that it is appropriate and useful to use the different relative advantages of the Islamic Bank and the microfinance industry to promote the financing of the vulnerable population, long excluded from the traditional financial system.

In summary, this definition implies in fact that the Islamic banking institution, like the microfinance sector, conducts intermediation activities, based on microfinance operations.

This is why the complementarity between Islamic Bank and MFI is based on the principle of sharing the potential risks, losses and profits resulting from the financing of SMEs in Senegal. However, this funding model makes it possible to spread out the risks more effectively and not simply blame SMEs for all the risks taken when applying for loans.

1. Islamic Bank Partnership and Microfinance Institutions

Studies in isolation, between Islamic Banks and SME financing, have revealed that the theory of counterparty risks, more specifically related to the opacity of information, is the cause of chronic under-financing of SMEs (Shaban, Duygun, Fry, 2016).

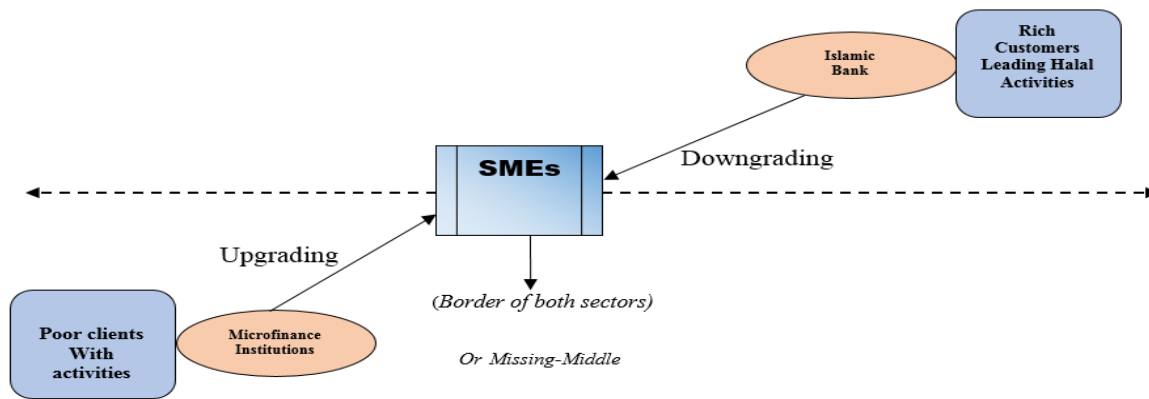
Even if, the opacity of information participates considerably in the development and the justification of the complementarity between banking sector and that of the MFIs, it only partially explained this new theory of financing (Fall, 2010a). The latter mentioned, in view of the extent of these increasingly overlapping financial structures and their evolution in the financial sphere, that banks are turning to microfinance and microfinance institutions in turn, to finance large-scale projects, previously intended for the banking sector. Given this, it will be foolish for Fall (2010a) to simply analyze this complementarity from the angle of the sole cause related to information problems.

In addition, it points out that, as this articulation tends toward a standardization of funding mechanisms, it is reasonable to include other elements, such as the theory of barriers¹⁶ to entry, which its study will make possible justify with relevance, this relationship of complementarity.

In this perspective, we are witnessing a convergence of the two sectors towards the border that suffers until now, financing needs. To illustrate the descent in range of the Islamic Bank of Senegal (BIS) and the upscaling of MFIs, we propose the diagram below.

Figure 2: Point of convergence of the two financial sectors (BIS and IMF)

¹⁶ The diversity of barriers between the banking and microfinance industries justifies the level of integration of these two financial sectors. For Fall (2010), strong barriers to entry and exit emphasize the distinction between the banking and microfinance industry and thus reinforce the idea of two financial institutions with different missions. In other words, the utility of the bank to finance SMEs can justify its willingness to go downmarket to serve this niche. On the other hand, the high financing needs of some SME clients of the MFI justifies the upscaling of the MFI to compete with the banking sector in order to preserve its clientele. For more information on the theory of barriers to entry, review these authors Bain (1956), Stigler (1968), Demsetz (1982).



Source: Author.

The financing of mesoactivity is one of the effective means to fight the banking exclusion of SMEs in Senegal. Indeed, in the desire to significantly affect the financing of microentrepreneurs, the idea of financial inclusion is felt. This financial inclusion is defined by Galor and Zeira (1993), Aghion and Bolton (1997) as a majority of economic agents, poor or low-income, with access to viable and sustainable financial services.

The dynamic of financial inclusion of SMEs is that the Islamic Bank of Senegal and the MFIs both converge, towards the middle where the activities are almost managed by the SMEs. The response to the financial needs of these microentrepreneurs makes it possible to take into account the "missing link" (Barro 2005, Kauffmann 2005) or the "Missing middle" (Sanders and Wegener 2006).

Next, we must first mention Nsabimana (2009) who shows the importance of banking structures, to enter microfinance. The author puts forward the idea that, the commitment of the banks to go down in range, could participate in the enlargement of the financial sector and moreover, to favor the access to the financing of a large part of the population.

Indeed, for Nsabimana, the downgrading of banks, has for mission, to finance the customers who benefited since times, services provided by the MFIs. In addition, this downscaling can generate certain consequences, namely: risk of drifting from the banking mission, professionalisation of management, and improvement of the financing of microfinance institutions. In this sense, Fall (2011), on the other hand, showed that MFIs that are active in the financing of large SMEs must use new techniques and methods to finally reach this layer of SMEs.

These MFIs, as they manage to meet the needs of this niche, will stand out from the activity of banking structures, which establishes competition between the banking sector and that of microfinance.

In addition to the competition between these two intermediation sectors, the considerable increase in the microfinance sector's clientele has not stopped stimulating banking institutions (Jenkins, 2000). This clientele, made up mostly of microentrepreneurs, gave a positive image to formal lenders.

This shows that microentrepreneurs (SME) are real potential reliable and able to repay their loans in the required time.

In addition to this situation, Alcorn (2005) argued that banks are motivated to share MFI clients for two reasons:

- ✓ the increase in stiff competition that continues to exist in the banking sector (Bell et al, 2002, Westley, 2006) and which, however, reduces their profit margin and;
- ✓ pressures from public authorities to facilitate financing relations between banks and a part of the poor population.

With these facts, the financial inclusion of Senegal's SMEs can only be ensured by the link between BIS and MFI.

This complementarity could, in the norms, promote, apart from financial inclusion, a social inclusion of these entrepreneurs. This new financial system, adapted in the context of sub-Saharan Africa, can be translated in two ways:

- ✓ financial partnership;
- ✓ and institutional intermediation (Nsabimana, 2004).

Indeed, this synergy of actions can significantly reduce the distance of information between financial institutions and SMEs.

Despite the scanty review, Tioumagneng (2012) highlighted in his research work the concept of complementarity between the bank and other financial intermediaries. Starting from this process, he conceives that the partnerships observed in recent years, either between the banks themselves, or between them and other financial structures, such as insurance companies ("bancassurance"), strengthen this logic cooperation with customers. The objective of such an external growth modality, in fact, favors an increase in revenues and contributes significantly to the reduction of the price of bank credit, which is essential for the entry or retention of SMEs in their financing relationships with the financial sector.

From another angle, Fall (2009a) believes that the fact that MFIs are profitable gives them an opportunity to occupy a significant place in the formal financial system.

Some of these microfinance structures, for example, choose to make direct entry into the formal market, and others, in turn, prefer to establish cooperative relationships with banks. Co-operation finally brings into play mutually beneficial relationships (Richardson, 1972).

2. Migration Product: An Effective Complementarity Option Between Islamic Bank and Microfinance Institutions

In the logic of cooperation between banks and MFIs, Fall (2011) emphasizes that the product migration can be, an eloquent and beneficial example for these financial institutions, but also an essential financing model for SMEs. This vision of complementarity between the two sectors is defined as a profitable agreement between banking institutions and MFIs through which, MFIs are content to migrate, as and when, some SME customers to its banking partner.

Such a situation arises when the SME is in a phase of evolution and of need of financing, which exceeds the capacities of self-financing of the MFIs.

In addition, the bank, aware of this advantage, guarantees to cooperate and refinance the microfinance institution. This relationship does not justify the SME being the exclusive client of the bank with the idea of the term "Migration". But on the other hand, it highlights the change of scale (level of need and

financing) of SMEs. This migration is done progressively throughout the process of financing SMEs compared to their stage of evolution situation (micro level then meso level to reach macro level).

The SME therefore remains the client of the microfinance organization, but, for reasons of need for financing, it nevertheless calls on the banking institution. The bank / SME relationship is then directly or through the MFI. It is tempting to conclude that, in this case, the SME becomes a full-fledged client of the commercial bank. Such a situation can be realized, if the microfinance institution can no longer implement, a financial strategy adequate to the needs of the latter. The following illustration of Fall (2011) is a convincing case that the complementarity between these financial structures is an effective way to respond to the lack of financial resources of MFIs and the high financing needs of SMEs: "Agreements between Association for the Promotion and Support of Micro-Enterprise Development (PADME) and ECOBANK, and between the Agency for Promotion and Support to Small and Medium Enterprises (PAPME) and BOA in Benin, show that the MFI is committed to migrating some SME customers who reach a size funding critique. When the clientele (SME) reaches a critical threshold of credit demand compared to the long-term resources of the MFIs, the latter, in order to keep this clientele, want at all costs to establish a strategic relationship with the banks in order to be able to keep it. The mission of the "Product Migration" is to save the time of the MFI or to obtain a sufficient time to acquire an important financial and institutional level for the creation of an "ad hoc" institution ready to meet the needs of the MFIs. SMEs that currently exceed the thirty million CFA francs mark. To this end, the financial partnership between the bank and the MFI can be very efficient and mutually beneficial for both financial sectors.

As far as the microfinance institution is concerned, losing its core clientele for which it has been the main source of support and financing for the benefit of the banks would be irrational. On the side of the SME, the fact of migrating to the bank without the intermediary of the MFI, submits it to the same financing conditions as the usual clientele of the bank.

Thus, the two situations that are necessary for SMEs are:

- Establish direct relations with the bank and submit to the demands of the banking sector that will be costly, given the cost of selection related to ex-ante, on-going and ex-post information;
- Continue to maintain funding relationships with the MFI, which can provide credit at lower costs to banks.

In the framework of the "Migration Product" agreement, the SME is content to stay with the microfinance institution, to finance its critical size. Such financing will be through the guarantee of the MFI, through its account held with the bank concerned. In case of default of payment by the SME, the bank structure wants to debit the account of the MFI.

The "Migration Product" can be an advantage for the bank, the MFI and the SME, because with this type of contract, the SME will be able to obtain flexible credit conditions adapted to its survival. It will expose itself less to the costs of bank credit which are in fact very expensive.

From the bank's point of view, it sees that its management costs will be minimized, as well as its risks of default related to asymmetric information (adverse selection, moral hazard ...), since the costs of selection, monitoring and incentive to pay are the responsibility of the MFI. The latter, is committed to retain its customers (SMEs) and is offered more and more refinancing benefits, if it manages to honor its commitments vis-à-vis the bank. This contract can play a crucial role.

In fact, it seems more efficient in terms of incentives to repay credit than the direct relationship between banks and SMEs. In turn, when the SME has a direct relationship with the bank, she can choose to default strategically if she is a bad payer, the sanction of his actions remains only on the banking sector. The demand for credit allows it to solicit the microfinance sector where it can continue to build credit relationships. While in the product migration contract, it is committed to both sectors. Once the SME knows the risk of strategic default, it knows that it runs the risk of double exclusion from the two financial sectors.

Conclusion

The complementarity between the Islamic Bank of Senegal and the microfinance institutions is due to the fact that both Islamic banks and MFIs can not, in isolation, effectively finance Senegalese SMEs that make up the sector of mesoactivity. Currently, the various barriers that served as borders between the Islamic Bank and microfinance, are shrinking more and more with the changing needs, the socio-economic context but also, the extent that takes the Senegalese informal sector. Thus, to counter the financing difficulties and the non-banking of microentrepreneurs, in this case SMEs, the complementarity between the banking sector and that of MFIs, is presented as an effective solution (Fall, 2011, Nsabimana, 2009; Diagne and Fall, 2009).

The financing of mesoactivity makes it possible to reduce extreme poverty and give these job promoters the chance to enter the formal financial sector.

Such inclusive financing must be through the support of MFIs, who on their part must increase funding opportunities or offer other initiatives to SME clients, in order to enable them to integrate into the financial circuits formal, hence the Upgrading phenomenon of MFIs (Christen 2001, Porteous, 2006).

On the side of the Islamic banking institution, its mission will be to go downmarket, in order to reach the micro-entrepreneurs with modest incomes: this is called the Downgrading phenomenon (Lopez and Rhyne, 2003, Clarke and al 2005, Segrado 2005, Westley 2006, Young and Drake 2005, Delfiner and Peron 2007). This need for SME financing once realized, makes it possible to achieve the desire for financial inclusion which is a necessary element for the reduction of poverty and financial discrimination (World Bank, 2014).

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