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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-6, ISSUE-11 of IJIER** which is scheduled to be published on **30th November 2018**.

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,
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Table of content

Science, Technology and Innovation Bibliometric Evaluation SME´s in order to improve Brazilian economic growth

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Abstract

Innovation has been pointed out as one of the main tools for the countries' economic development facing globalization. For economic growth to happen in an egalitarian way, it is necessary to strengthen, expand, consolidate and integrate a country's research and innovation capacities, that is, strengthening its National Science, Technology and Innovation System. In this system, it is primordial that t there is a close relationship between research institutes, ST & I developers, and companies, especially small and medium-sized enterprises (SMEs), considered to be key players in the socio-economic development of countries. Brazil already presents initiatives that seek to strengthen relations and encourage the development of technology among these actors. This article aims to discuss the relationships between the CT & I sector and its relations with SMEs, especially in Brazil, so that together they allow the development of the economy. For this, a brief literature review was carried out, which was structured in: Relation between ST&I and the national development, where will be treated some countries experience and where brazilian hystorical process will be shown; The importance of SMEs for a country economic growth, where the relations between ST&I and SME will be treated and also its indicators. Despite the innovation power for the development of the countries economies is in constant discussion, it is still a need for discussion between companies and SMEs as a fundamental relation for the growth of companies and consequently for the socio-economic growth, since as SMEs are today driving forces for development. For the central

dialogue current in Brazil, the proceedings of these countries between ST & I and companies are required.

Keywords: Science Technology and Innovation, SMEs, economic growth, national policies

1. Introduction

Brazilian hystorical process shows a late Science, Technology and Innovation (S,T&I) development. With notably rural landmarks, the country only achieved the promises of modernity in the first decades of the twentieth century with the arrival of industry. In this sense, the creation of the CNPq (National Council for Scientific and Technological Development) in 1951 brought to light the importance of science, technology and innovation for the country's development.

This relationship between ST & I and national development is undeniable and is verified by the current concern of researchers and policy makers in conducting research in this area. There is consensus in academia, government and society that economic growth with equity depends on strengthening, expanding, consolidating and integrating the National System of Science, Technology and Innovation. Brazil's and other countries' historical experience show that the generation of wealth, employment, income and opportunity, together with the diversification of production and the increase of the value added in the production of goods and services, depend directly on the strengthening of research capacities and innovation in a country [INOVAÇÃO, 2015].

In this context, small and medium-sized enterprises (SMEs) gain a fundamental prominence because they are the basis of the economy, while they are overwhelming majority in Brazil, generating jobs, which in turn generate income, and consequently greater consumption and production. The great numbers related to the development brought by SMEs have been announced by the Brazilian Service to Support Micro and Small Enterprises (SEBRAE), which indicates that these companies in 2013 were responsible for 52% of formal jobs in the country and 27% of gross domestic product (GDP) (VITTIELO, 2017), proving that, away from market, SMEs are growing, and their importance for the growth and strengthening of the country's economy becomes undeniable.

Development, as mentioned before, is linked to the growth of innovative initiatives, shows that investment in S & T is essential for small and medium-sized enterprises, so that they can survive in an increasingly competitive market, including in small states. However, Brazilian reality shows that difficulties have been encountered by SMEs. Contrary to oligopolies, which invest heavily in innovations that result in profound changes in current technology, SMEs seek to incorporate innovations that are characterized by relatively small changes in processes and/or products to improve their quality or work productivity (RATTNER, 1984).

In order to better glimpse this production of Science, Technology and Innovation, and thus the growth of SMEs in Brazil, the so-called indicators are used, which are, within a more general panorama, a correlation between two variables. More specifically, indicators can be identified as a composite analysis of the variables involved in the innovation process, looking for the actors involved, the types of relationships that were built and the impacts caused (BENELI, et al, 2014). More than simple quantitative indications, the indicators tells how much a country or a region is developing, how much investment is being applied in

each area, and how much still needs to be invested to reach a certain level.

The importance of the analysis of how SMEs are affected or benefited by ST&I policies, and how relevant indicators could help brazilian SMEs to grow, justifies this paper. To reach that, an exploratory research based on data, secondary indicators and documentary research on ST&I policies, on how ST&I can help countries economies grow, initiatives to stimulate innovation, made available by the federal, state and municipal institutions operating in Brazil. This paper is structured in three main topics: Relation between ST&I and the national development, where will be treated some countries experience and where brazilian hystorical process will be shown; The importance of SMEs for a country economic growth, where the relations between ST&I and SME will be treated and also its indicators.

2. The relation between Science, Technology and Innovations area and nacional development

Not today that innovation has been pointed out as a main tool to guarantee economic development in a globalized world. Galindo and Méndez (2014) point out that innovation is part of human history, through its capacity to change human behavior and ways and methods of work. Schumpeter (1997), a precursor in this recognition of innovation, said that innovation was important not only to companies but also to nations. According to him the innovation can have five fronts of application: product, processes, marketing, input and organizational. In 2014, Cornell University launched the Annual Report on the Global Innovation Index, where it considered innovation as an important factor for the development of developed or developing countries, as well as providing economic growth and well-being (Cornell University, 2014). In this way innovation improves taxes, helps economic growth, thus increasing the creation of employment and consequently improves the quality of life of the population (Franco and Oliveira, 2016).

Innovation process is interactive and gradual, based on communication and knowledge exchange. In order to better understand national policies and the dynamics of countries in relation to technological change, this structure is used by international organizations such as the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), the Organization for Economic Cooperation and Development (OECD) and the Inter-American Development Bank (IDB) (Padilla-Pérez and Galdin, 2014).

For economic growth to happen in an egalitarian way, it is necessary to strengthen, expand, consolidate and integrate a country's research and innovation capacities, that is, strengthening its National Science, Technology and Innovation System (SNCTI). Following the 2008 crisis, the innovation-based growth recovery strategy is applied in countries such as the United States and China, as opposed to late industrialization countries that based their strategies on decisive changes in education, science and technology. (MCTI, 2017). According to Lundvall et al. (2009), national innovation systems encompass relationships between organizations, institutions and socio-economic structures, also individually, and dictate the direction and speed of the innovation process, as well as the capacity for technological development.

But what is the role of governments in the innovation process? According to Padilla-Pérez and Galdin (2014), governments have two main activities that make them central to this process: generating and

disseminating knowledge through public research centers, universities and companies; create and modify institutions with laws and public policies that support STI activities, including funding and promote interaction between government, universities and society and disseminate technological knowledge. Public funding can be provided through tax incentives or special incentives for innovation and development. In addition, other financial instruments such as public loan guarantees, soft loans, public venture capital funds and support for the marketing of innovation (Padilla-Pérez and Galdin, 2014).

Achieving economic competitiveness can be very difficult to understand in practice by policy makers, for different understandings of their definition. Some consider that the creation of jobs, improvement in quality of life among others, is the ability to ensure good economic results. While others believe that economic activities are favored by low inflation, skilled labor among other characteristics (Krammer, 2017).

3. Historical process of Science, Technology and Innovation in Brazil

Since the second half of the twentieth century, a radical revolution has been underway, driven by two great advances in knowledge: the expansion of the capacity of communication systems and the technological processing of information. Countries whose population does not have an educational level for such a revolution will suffer from the growing backwardness and political-economic dependence of more developed nations. (Academia Brasileira de Ciências, 2001).

In 1951, during the post-war period, the National Research Council was born in Brazil, renamed in 1974 to the Council for Scientific and Technological Development (CNPq), with the purpose of enabling the country at that time to become the domain of atomic energy, a topic of strategic importance (Brazil, 2015). Later, in the Brazilian redemocratization period, in 1985, the Ministry of Science and Technology (MST) was created, and soon the Science and Technology Conference was held. It sought to involve the scientific community in political decisions at all levels. However, political-economic turmoil and changes in MST management have impeded discussions more effectively. In 2001, the second conference took place as a focus on internationalization and economic competitiveness as the world was globalized and technologies changed faster (Academia Brasileira de Ciências, 2001). In 2005, a third conference took place, representing a milestone in the country's Science, Technology and Innovation, redesigning C, T & I policies and proposing an agenda of concrete actions for its operationalization (Centro de Gestão de Estudos Estratégicos, 2006).

In 2008, the Federal Network of Vocational, Scientific and Technological Education was introduced, through Law No. 11,892, of December 29, 2008, formed a set of federal institutions, linked to the Ministry of Education, focused on professional and technological education in level and above. Since then, the Network has been presenting satisfactory results as the growth of applied research and technological innovation, perceived by the increase of deposits in the National Institute of Industrial Property (INPI) (Prado et al, 2017).

The fourth Science and Technology Conference took place in 2010, bringing the construction of a ST&I State Policy, based on sustainable development, from an economic, environmental and social point of view (Davidovich, 2011). In 2016, the now called, Ministry of Science, Technology, Innovations and Communications, launched the National Strategy for Science, Technology and Innovation (Encti) for the

period of 2016-2022. This document aims to strategically guide the implementation of public policies in the area of ST&I and strengthening of the National System of Science and Technology so that national production has greater added value and so that knowledge is incorporated in all economic activities (MCTIC, 2016).

Souza et al. (2017) says that for decades, universities have been moving towards entrepreneurship as a way of achieving technical-scientific and financial autonomy, as well as responding to society's demand that understands the role of universities in the country's economic development. In this way, it is already possible to perceive a greater approximation and interaction of the University-Government-industry axes.

4. SMEs importance for a country's economic growth

Industrial Revolution changed its form of production into series production. In this way, small and medium-sized companies, especially "home-makers", controlled Europe and America in the late 19th century.

The development of SMEs facilitates human and capital resources mobilization for economic development in general and the rural sector in particular. They have been identified as a vehicle for generating jobs and providing opportunities for outsourcing, training, development and entrepreneurship (MICAH, 2017). Cravo (2010) argues that entrepreneurship and the formation of small businesses can reduce the differences between specific parts of technological knowledge and innovation. Thus, showing how small and medium-sized enterprises affect growth, could help in the theory of economic growth.

SMEs are vehicles for jobs' generation and opportunity offer for human development and empowerment, since it facilitates the movement of capital and human resources for the development of the economy. (MICAH, 2017). Faced with different characteristics and socio-economic realities and how they were conducted, each country or region has its definition of what SMEs are.

In recent years, a number of political and economic initiatives around the world have been held to encourage and strengthen SMEs. Taiwo (2012) notes that such initiatives are being implemented in SMEs in poor and developing countries as they have a considerable impact on the best use of local raw materials and rural development, development of entrepreneurship, connection with large companies and consequent generation of jobs, a more balanced dispersion of investments among other socio-economic impacts.

In developed countries, SMEs have high growth potential and show considerable results using available technologies and thus increasing their productivity (Christopoulos and Tsionas, 2014). This shows how technological innovations, especially in telecommunications, have enabled low-cost and highly skilled competition in Eastern Europe and Asia, resulting in an entrepreneurial economy (Audretsch and Thurik, 2001).

Companies argue that productivity growth, efficiency and innovation bring tangible benefits to the economy and therefore, it is necessary the greater incentive and government support for entrepreneurship. To encourage SMEs in developing countries, the World Bank group of Executive Boards of the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA), along with other funding agencies, have a policy of targeted assistance to SMEs, based on three arguments (BECK et al, 2005):

a. The increase of entrepreneurship and competition, thus improving efficiency, innovation and productivity;

b. Encourage government financial support so that SMEs, overcome financial market barriers and institutional failures, and thus boost economic growth and development;

c. Subsidize SMEs allowing them to absorb labor, thus generating more jobs.

By 2017, the World Bank Group has committed more than $ 61 billion in loans, grants, capital investments and guarantees to its members and private companies. IBRD has received ongoing customer demand for its services and has made commitments totaling $ 22.6 billion. And the International Development Association (IDA), a fund for the poorest, has earmarked $ 19.5 billion to support the neediest countries facing the most difficult challenges. In addition, the Reimbursable Advisory Services revenue in fiscal year 2017 was about $ 40 million, with the program expanding beyond the traditional areas of education, governance, economic diversification and small and medium-sized enterprises. For example, Algeria, the Arab Republic of Egypt, Jordan, Morocco and Tunisia can assess their infrastructure, analyzing the legal, regulatory and financial environment to increase private sector participation in infrastructure (Banco Mundial, 2017).

4.1 SMEs in Brazil

In order to better adapt to globalization and economy stabilization, many companies sought to increase their productivity and reduce costs, causing unemployment (Dornelas, 2005). As a result of this opportunity, new businesses and market solutions were explored by increasingly younger entrepreneurs who better understand and dominate the dynamism of the technology market (ROSSI and Theisen, 2017). Since 2014, Brazil has faced an economic recession that has affected, among other sectors, small and medium-sized enterprises due to the difficulty in obtaining credit and its smaller structures.

According to data from the Yearbook of Work in Small Businesses - 2015, carried out jointly by SEBRAE and the Department of Statistics and Socioeconomic Studies (DIEESE), micro and small enterprises are extremely relevant to the country's economic structure as well as to the generation of jobs, with MEPs representing 6.8 million establishments responsible for 17.2 million private non-agricultural formal jobs (DIEESE, 2017).

The complex and heterogeneous classification of Brazilian companies may explain the difficulty in studying them and proposing more appropriate new theories and conclusions (Leone and Leone, 2012). In Brazil, the most commonly definition used to classify a small company is in Complementary Law 123/2016, also known as the General Law of Micro and Small Enterprises (MPE), which was updated with complementary Law 147 / 2014, which classifies a small company according to its billing, which must be between $ 360,000 and $ 3.6 million annually. The Brazilian Institute of Geography and Statistics (IBGE), classifies the size of the company according to the number of employees. Thus a small company comprises between 20 to 99 employees, while the medium company, 100 to 499. The medium company is not mentioned in the General Law, however, different financing agencies in the country present their own classifications, such as the Bank of the Northeast (BNB) and National Bank for Economic and Social Development (BNDES) that use revenues over R$ 16 milions up to R$ 90 milions.

5. Relations between SMEs and S, T & I

The concept of the association between science and technology (S & T) and economic development is not new. According to Vonortas (2002) in Latin America, the foundations of S & T in Brazil and Mexico, were at the beginning of the decade of 50, followed by the other countries of the region. However, the results do not follow the international standards to be applied by Asia, for example. As research and development (R & D) expenses, international change and marketing expenses tend to be driven to universities and universities. Therefore, for SMEs, a new form should be opened.

As discussed earlier, with globalization, advancing of technology plays a key role in increasing competitiveness and improving social and economic factors. From this, new approaches to the scope and objectives of S & T policies have opened up new opportunities and challenges for companies, universities and governments. The government acts as a catalyst and facilitator, subsidizing the development of technologies and companies, collective actions and learning processes (Vonortas, 2002. Vila, Pérez, & Coll-Serrano, 2014).

According to Bahia and Sampaio (2015) the transformation of industry through innovation is the central theme for the development of Brazilian production. For this, the state seeks to engage companies in this change of position regarding new technologies, creating policies to encourage innovation.

The participation of foreign companies during the Brazilian industrialization process, especially during the 1980s and 1990s, where the import substitution model blocked Brazil's technological development and capacity, facilitated the transfer of technology and accelerated the industrialization process (Pacheco, 2003; Gonçalves, 2007). For national companies, the case for technology came from the importation of machines and equipment (Pacheco, 2003).

Bahia and Sampaio (2015) comment that there is a confrontation regarding the symmetry of the innovation system in Brazil between good academic indicators and low levels of private sector R & D activity. There is a great effort in the qualification of people and the strengthening of academic research, however, companies have not been able to strengthen themselves with regard to technologies (Pacheco, 2003). On the other hand, Gonçalves (2007) states that Brazilian industries are more concerned with licensing and purchasing R & D, know-how, patents, trademarks, consulting services and signing technology transfer contracts.

In 2004, the Law of Innovation was sanctioned, Law n° 10,973, aiming at greater interaction between universities, research centers and companies. In 2016, the Regulatory Framework for Innovation emerges, Law n°. 13,243, with the objective of debureaucratizing these relations and thus the law gain greater autonomy. In this way, a more competitive and cooperative environment is expected with the ICTs and the empowerment of small entrepreneurs and startups.

Within this context, the institutionalization of entrepreneurial university concepts and mechanisms for this to take place is necessary, so that, a strategic vision that benefits university-business interaction can be drawn and allows the better development of innovation processes (Souza et al, 2017)

6. ST&I indicators for SMEs

Paranhos and Palma (2010), showed that although the Science and Technology (S & T) indicators showed that Brazilian research had improved in number and quantity, yet it was difficult to transform scientific knowledge into wealth and development. In more developed countries, the relationship between scientific knowledge and technological development is much more aligned due to government initiatives and policies that promote such advances.

A widely used indicator to measure innovation is the number of deposited patents, however, it may not be effective for countries with a poorly developed innovation system. These, use this indicator for a knowledge analysis and thus guide how the to manage ST&I policies of a country or region (Costa et al, 2018).

Thus, the Legal Framework mentioned in item 5 of this paper, have come to supply the need to better use the knowledge to generate innovation, advancing in the processes of technology transfer, pointed out by the authors.

The discussion about the influence of SMEs in the country economy is of solar importance to understand, also, the production of science, technology and innovation. With a significant participation in the economy, small businesses (here also include micro-enterprises) gain space and visibility in the national business scenario, corresponding, according to SEBRAE, to more than a quarter of the Brazilian GDP in 2011. (SEBRAE, 2014).

The distribution of SMEs in the main sectors of the economy is a relevant indicator of where their growth is best envisaged. In the Northeast region, between 2009 and 2011, 11.3% of MPEs are in industry and 88.7% in services, while medium-sized companies had 33.3% in industry and 66.7% in activity according to SEBRAE data. (SEBRAE, 2015).

This paper shows an exploratory research based on data, secondary indicators and documentary research on initiatives that stimulate innovation. For this item, it was held a brief bibliometry using the Web Of Science platform as a source of bibliometric data to perform the compilation of information and their respective comparison. The WoS research was done by inserting the key words: 'science technology and innovation indicators' OR 'innovation indicators' OR 'Science Technology Innovation' OR 'SME' OR 'small and medium enterprises' OR 'small business'. A total of 384 files were found, and were arranged in spreadsheets, for their better visualization and systematization. Graphs were then drawn up to demonstrate the results.

With the bibliometric evaluation, it was possible to verify the scientific production on C, T & I indicators in small and medium enterprises worldwide. With this bibliometric evaluation, it was possible to verify the scientific production on C, T & I indicators in small and medium enterprises worldwide.

In data analysis collected from the Web of Science, it was noticed that most of the authors work in network and that the country with the highest production is China, with 60 publications, corresponding to 15.6% of the total of publications as shown in Figure 1.
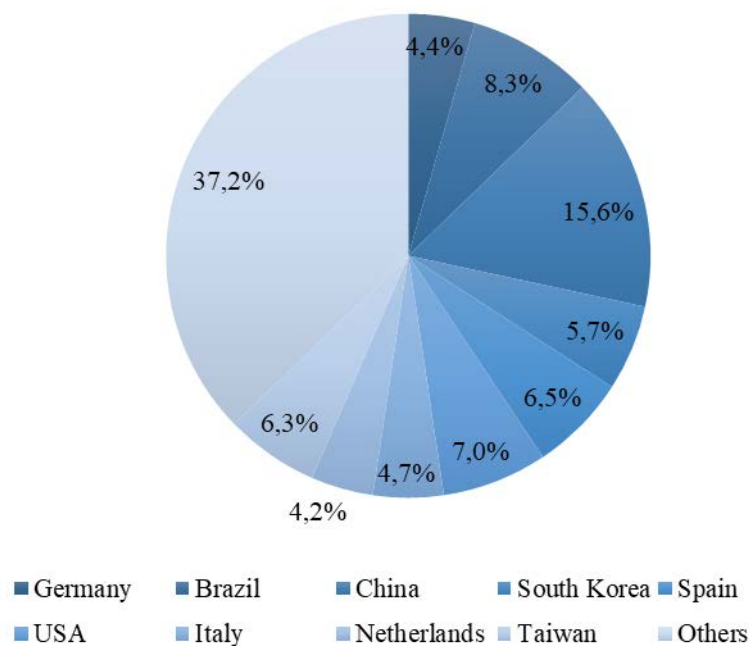
Figure 1 - Percentage of publications by country

Brazil has reached the second position, with 32 publications, as it can be possible seen in Figure 2, which coincides with the entrepreneurial tendency of these two countries, which occupy the first two positions within BRIC's (CHEREZ, et al, 2014).
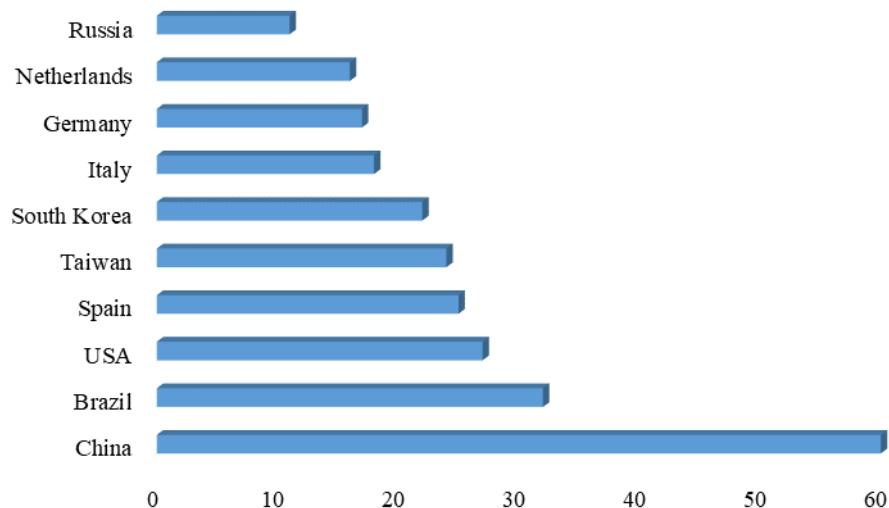
Figure 2 – Ranking of 10 countries with the higher number of production at the theme.

The annual appreciation of these indicators shows us the behavior of scientific production in the world and its changes within each period. Figure 3 shows data from 2005, a milestone that was chosen because it was the date when the law on technological innovation in Brazil was regulated until 2017, the date on which the data was collected for this research in the WoS.
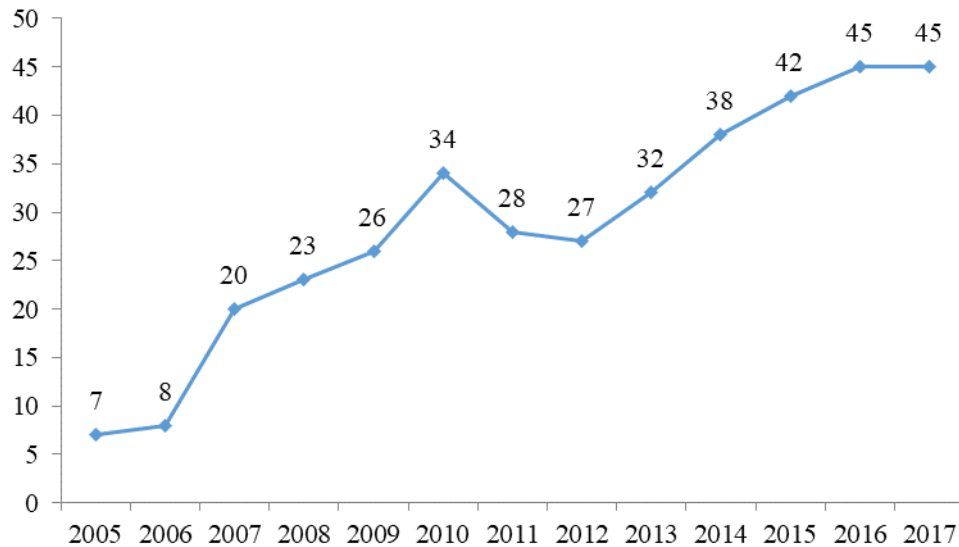
Figure 3 - Number of publications about ST&I indicator per year.

From 2006 to 2007, the number of publications on C, T & I indicators for SMEs almost tripled from a small number of 08 publications to a considerable 20 publications. Another numerical growth that stands out is the one presented between 2009 and 2010, a fact that was mainly due to the researchers' interest in dealing with economics, and consequently the influence of C & T in small businesses, to the detriment of the calamitous world crisis which haunted the world.

When analyzing the articles with the largest numbers of citations, we find that within these journals the most prominent, within the key words used in the research, is the Research Policy, with 129 references made to the article "How journal rankings can suppress interdisciplinary research: A comparison between Innovation Studies and Business & Management. In addition, the cited journal has an impact factor of 4,661, a number that shows how cited are the publications of that periodical in a period of time.

7. Conclusions

From this brief survey, it can be seen how important is the development of Science, Technology and Innovation for the socio-economic development of a country. Each region and each government has sought the best way to encourage the development of this strategic area according to its specificities. Government policies are built for innovative growth and development within educational institutions and research centers, as well as in the productive sector, giving subsidies to industries and small businesses.

As already mentioned, SMEs, in face of the global economic crisis, were fundamental for the recovery and growth of the economy, generating more jobs, increasing exports and making money circulate within the country. Thus, government policies that de-bureaucratize and facilitate the interaction of technology and innovation actors with SMEs, allowing technologies to be transferred and thus companies to grow and continue the cycle are fundamental.

Brazil, in recent years, especially after the Legal Framework for Innovation, has shown an effort to improve the interaction between the ST&I actors. However, the current Brazilian political scenario has generated

distrust and concern in the world market and between research institutions and the business sector. The freezing and cutting of resources for the education and research sector is one of the main obstacles to the development of   ST&I in the country, directly affecting the generation of internal wealth. From the results shown in item 6 of this paper, an alternative for both researchers and SME production and development sectors would be the development of networked research, with countries that are advancing in studies on the benefits of relations between the two sectors and in the evaluation of ST&I indicators within the companies, which would help in the future development or even adjustments in the national policies.

It is suggested as a theme for future work, the evaluation of the current indicators used in Brazil to evaluate the technological development and innovation of SMEs and perhaps, if necessary, the proposition of adjustments or new indicators more suitable with companies realities within the Brazilian economy.

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Absorption of Hydrogen in the HBond©9000 Metal Hydride Tank

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Abstract

The present article describes the measurements of hydrogen absorbed into an intermetallic alloy. The process of hydrogen absorption into a metal hydride tank is accompanied with generating heat that must be removed during the process. If the tank is not cooled, the gas pressure rapidly increases and even with a small amount of the stored hydrogen the pressure exceeds the permissible value. By contrast, during hydrogen desorption it is required to supply the same amount of specific heat to avoid a significant decrease in pressure which would result in a decrease in hydrogen release kinetics.

Keywords: hydrogen storage; intermetallic alloy; metal hydride; hydride tank;

1. Introduction

Hydrogen storage represents a key problem and an elementary obstacle with regard to its massive practical applications. One of the prospective possibilities is hydrogen accumulation in MH materials.

Such accumulation is appropriate mainly in stationary applications and power engineering that facilitate hydrogen absorption into the intermetallic space of the metal lattice. It is the safest method of storage, as compared to conventional methods.

The measurements of hydrogen storage capacities for individual alloys provide the knowledge of the specific amount of the stored gas; however, the determination of characteristics in real-life storing of hydrogen provides an overall view of thermal fields, energy flows and other relevant parameters of the used equipments that are interconnected.

2. HBond©9000 Metal Hydride Tank

From the structural point of view, the tank is a double-shell vessel. The internal part consists of seven symmetrically arranged cylindrical tubes (Ø 50 x 2 mm) containing metal hydride (Fig. 1 and 2) that are placed in a storage vessel (Ø 168.3 x 2 mm) with an option of liquid cooling during absorption (or heating during desorption).

The tank is made of stainless steel. The total length of the tank, including the internal tubes and without the inlet valve is 1,612 mm. The tubes are welded at both ends and form a compact unit. The tank contains 56 kg of $La_{0,85}Ce_{0,15}Ni_5$ alloy into which hydrogen is absorbed.

The capacity of a single tank is as much as 9,000 Nl (9 Nm^3), representing only 0.80892 kg of hydrogen at a very low hydrogen density. The percentage by weight of the stored hydrogen for this alloy is 1.43 % (measured by the volumetric method). The required hydrogen purity at the inlet into the MH tank is 99.9 vol. %. The metal hydride alloy was tested at the Technical University in Helsinski where it was observed that the absorption capacity did not degrade even after 1,000 cycles of absorption/desorption.
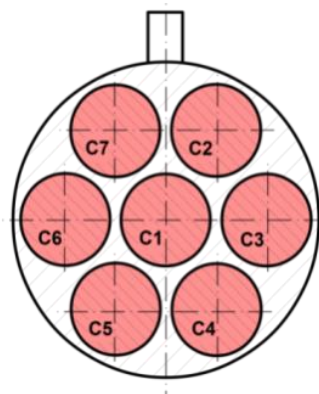
Figure 1. Horizontal cross-sections of the MH tank.
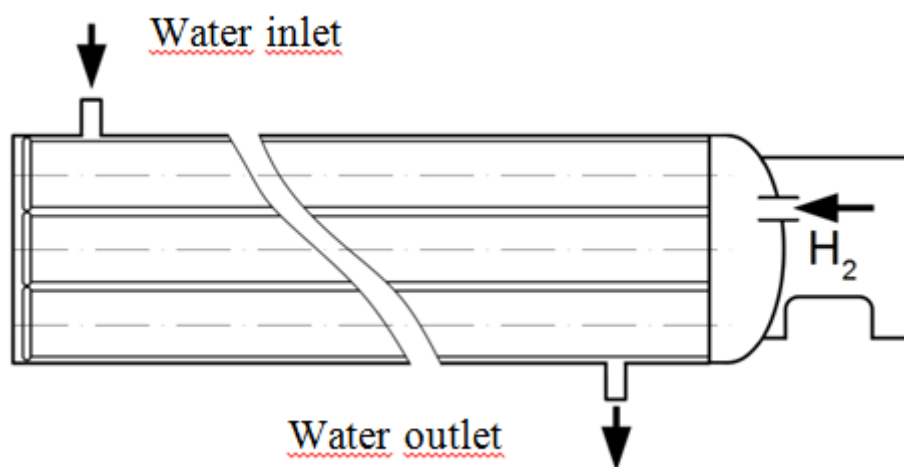
Figure 2.Longitudinal cross-section of the MH tank.

Cooling water is supplied and discharged at the terminal sections of the tank in the radial direction (Fig. 2).

The tank is thermally insulated along its entire surface, with the heat transfer coefficient of $1.8 \ W \cdot m^{-2} \cdot K^{-1}$. Radiation is negligible due to low emissivity of the insulation surface.

2.1 Accumulation of Hydrogen in the HBond©9000 Metal Hydride Tank

Accumulation of hydrogen in the metal hydride tank was tested during two measurements. In the hydrogen storage process, the pressure in the tank must not exceed the value of 1.5 MPa and the temperature of 25 °C (determined by the tank manufacturer). As the measurements indicated, these conditions were not adhered to.

As the metal hydride tank was gradually filled up with hydrogen, the pressure in the tank was rising up to the value of 1.6 MPa and the resulting amount of the stored hydrogen after the first measurement was 2.048 Nm^3 (Fig. 3).
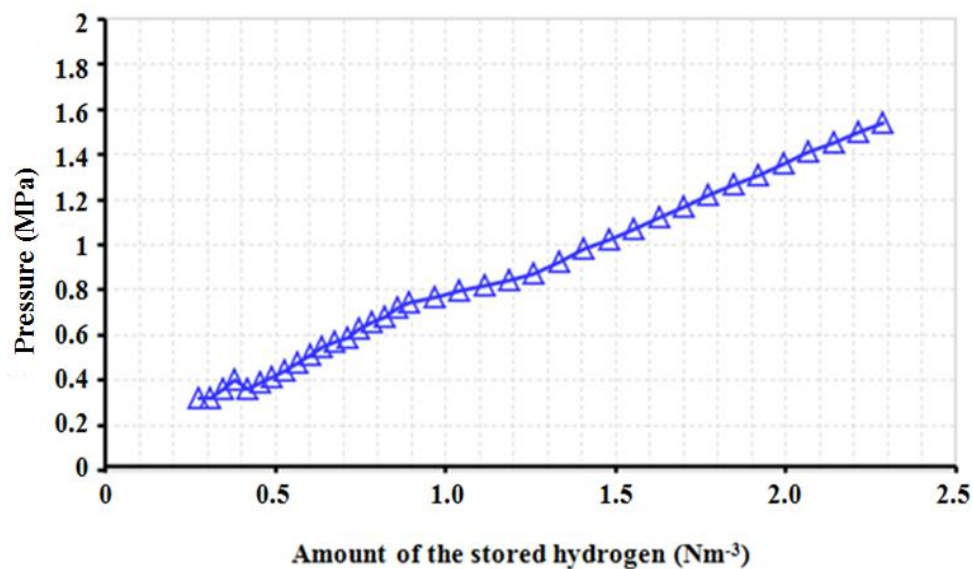
Figure 3. Relationship between the amount of the stored hydrogen and the pressure in the tank - without cooling.

The measurements of the temperature of the metal hydride tank were carried out using the FLUKE Ti10 thermal imaging camera and the ALMEMO 2390-8 contact thermometer. During the measurements, the observed temperature of the metal hydride tank was 36 °C while the max. permissible temperature of the tank is 25 °C (Fig. 4).

Figure 4. Measurement of the temperature of the metal hydride tank.

With regard to the fact that at the first measurement the surface temperature of the tank exceeded the maximum permissible temperature, the second measurement was carried out while cooling the tank using a water cooler with the electrical input power of 600 W.

As a result of water cooling, the temperature was reduced down to 19 °C. Water cooling was activated in 15-minute intervals (Fig. 5).

Figure 5. Cooling the metal hydride tank with a water cooler.

In the beginning of the second measurement, there was a decrease in the pressure down to 0.67 MPa. This was caused by a decrease in the temperature inside the tank, i.e. by partial absorption. Subsequently, during further filling of the tank the pressure in the tank was rising again, primarily as a result of a gradual increase in the volume of the stored hydrogen, as well as a temperature increase.

Due to a lower temperature in the tank, the achieved pressures were lower than 1.5 MPa (despite a larger

amount of hydrogen in hydrides).
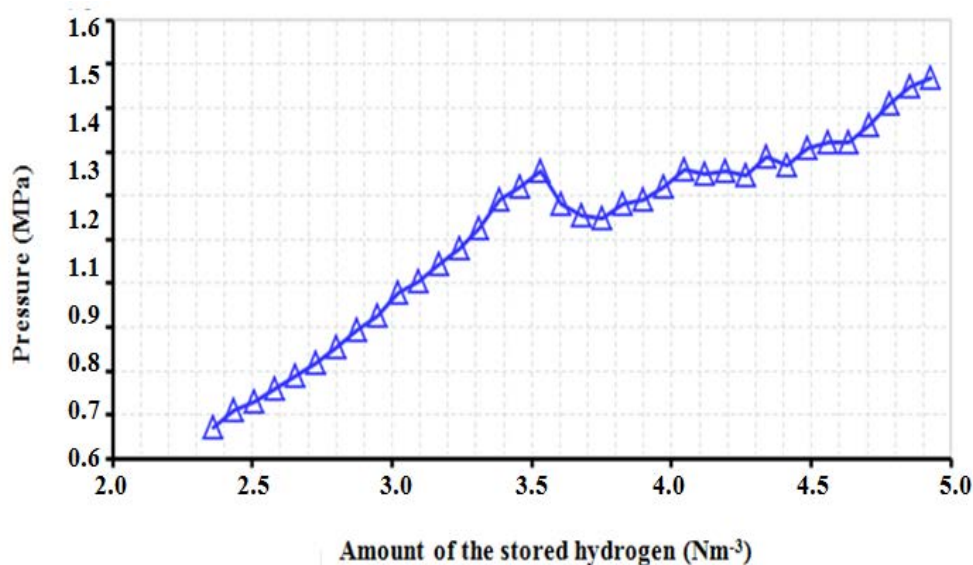
Figure 6. Relationship between the amount of the stored hydrogen and the pressure in the tank - with cooling.

3. Conclusion

The experimental measurements indicated that in order to eliminate fluctuations in pressure and ensure a stable pressure it is necessary to maintain a stable and optimal temperature of the metal hydride tank. Achieving the necessary temperature requires the use of an appropriate type of a cooling device or a cooling set, thus stabilising the pressure and increasing the efficiency of the tank filling procedure.

As the absorption temperature must not exceed 25 °C and hydrogen production is at the highest level in summer months it is necessary to engage compressor-based cooling or any other form of cooling, for example the one based on the Peltier Module principle.

4. Acknowledgement

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Model of a Hydrogen Vehicle Driven by a Fuel Cell and Metal Hydride Materials

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Abstract

The present article describes the structure of the model of a vehicle driven by a fuel cell and using metal hydride alloys. The model was created in the scale of 1:6 and was subjected to measurements of the real hydrogen consumption by a fuel cell; subsequently, the real power was compared to the theoretical power. The model of a hydrogen vehicle was developed with the aim of testing various types of metal hydride materials used for hydrogen accumulation in real conditions, at sudden changes in the amount of the collected hydrogen. The purpose of the designed model was to demonstrate the adjustment of a hydrogen drive to the burdening operating conditions of the vehicle and demonstrate the capacity of metal hydride materials to satisfy the requirements regarding accumulation and release of the required amount of hydrogen.

Keywords: metal hydride; fuel cell; hydrogen; automobile;

1. Introduction

An automobile is one of the important inventions throughout the history of mankind. Due to decreasing reserves of fossil fuels and growing problems with environmental pollution, approximately thirty years ago humans began to search for alternative energy sources. A primary objective was to find energy sources with minimum negative environmental impacts that would facilitate the long-term development of transport and haulage. As for the transport, there are currently several options of alternative fuels to choose from. Important alternatives to gasoline and diesel, that are nowadays predominantly used, intended for the application as the fuel for the means of transport are the fuels based on hydrocarbons in form of compressed gases and liquids, as well as hydrogen fuels. At present, there is a boom of electrical and hybrid fuels.

The enforcement of the application of these alternative fuels is accompanied with several problems related to the power, accumulation, electric range, as well as the costs related to the transport infrastructure.

2.VehicleStructure

The main component of the vehicle is the welded structure consisting of duralumin profiles with a rectangular cross-section of the EN AW6060 type with the T6 heat treatment. The structure is attached to eight arms that provide suspension of axles. The arms are manufactured using the additive technology – 3D printing from aluminium. The arms are attached to the main structure by attachments made of 11 500 steel. In order to relieve the vehicle, suspension components are manufactured using the technology of 3D printing from ABS plastics. The chassis suspension is constructed using bicycle shock-absorbers with springs than were made to measure.
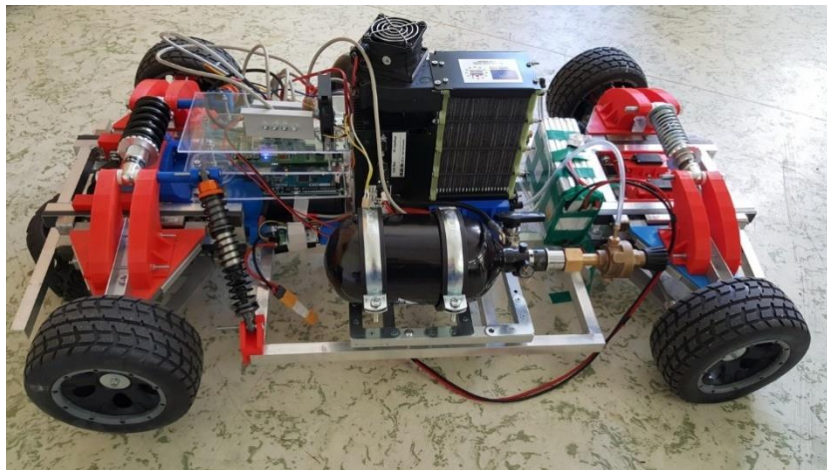
Figure 1. Chassis of the vehicle model with the controlling modules.

Figure 2. Model of a hydrogen vehicle including the body.

2.1 The Used Concept of the Vehicle's Drive

The used concept of the drive consists in the use of a fuel cell, electric motor, and lithium batteries. The mechanical concept of the drive consists of a DC motor with the power of 200 W at the voltage of 12 V. This electric motor was selected in order to achieve the required power for the vehicle model. With regard to the concept of the drive, it is possible to choose from different vehicle operation modes. A vehicle can be operated as a mere electric vehicle (operated using the set of lithium batteries with the capacity of 16 Ah). Another option is the use of a fuel cell as the primary source of electric power for the electric motor. Fuel cells are suitable for mobile applications working at low operating temperatures. One of their benefits is achieving higher thermodynamic efficiency of the electrochemical reaction, as compared to the efficiency of the transformation of energy from a chemical bond into electrical energy using heat engines. The model was driven by the PEM DEA_0.5 fuel cell with the power of 500 W, providing the voltage of 12 to 16 V.

Low-pressure metal hydride tanks were primarily used; they contained 0.4 kg of intermetallic alloy consisting of LaCeNi and their hydrogen storage capacity was 1.43 % at the pressure of 1 MPa.

The volume of the metal hydride tank was 1.1 L. A single metal hydride tank can be used to store 42 L of gaseous hydrogen at the pressure of 1 MPa that facilitates approximately 40 minutes of vehicle operation. A pressure tank without the metal hydride alloy, but with the same parameters as the metal hydride tank, can be used to store only 10 L of gaseous hydrogen at the pressure of 1 MPa.

Storing hydrogen in metal hydrides is performed using the principle of absorbing atoms of hydrogen into interstitial spaces of the crystalline lattice in metals while hydrogen becomes a part of the chemical structure of such metals. Because hydrogen is released from metal hydride materials at low pressures, such materials basically belong to the safest systems for hydrogen storage.

Figure 3. PEM fuel cell and metal hydride tanks with the attachment.

2.2 Control of the Vehicle's Drive

The control of the model of a hydrogen vehicle driven by a fuel cell and metal hydride materials is based on the pair of microcomputers, each one of them having a specific function. Raspberry Pi3 micro PC represents the access point that controls the vehicle using the application programmed in C++. Also, Raspberry Pi3 streams a video recording from the camera located in the vehicle to its own sub-network from where the video is broadcasted either from the cabin of the vehicle or as the view from in front of the vehicle. Raspberry Pi3 is also used to communicate with Arduino micro PC, i.e., with the hardware. Arduino is used to control the servo drive, power regulator for the electric motor, fuel cell, lights, sensors recording the temperature, hydrogen leaks, and other devices.

A non-conventional control of the model, using microcomputers, facilitates more precise recording of the electric motor operation in order to control the driving direction and facilitate accurate measurements and recording of the measured data, such as temperatures, pressures, flow rates, etc.

The control system also includes HS-7955 TGHightorque servo drive that is intended for controlling the driving direction of the model. To control the model, two servo drives were selected. The reason of using two servos was to ensure a sufficient force for turning the wheels at the given weight of the vehicle.

2.3 System for Measuring Fuel Consumption for the Hydrogen Vehicle Model

For the purpose of measuring the consumption, we chose the system within which the measurements are carried out for the pressure of hydrogen in tanks and current temperatures inside the tanks. The model of the vehicle was subjected to the measurements of hydrogen consumption in the fuel cell during the operation, including the driveway, driving, acceleration and subsequent stopping. The data from the fuel cell and the values of the electric motor power were recorded automatically every 10 seconds. The power was recorded as the average value of the power within the period of ten seconds.
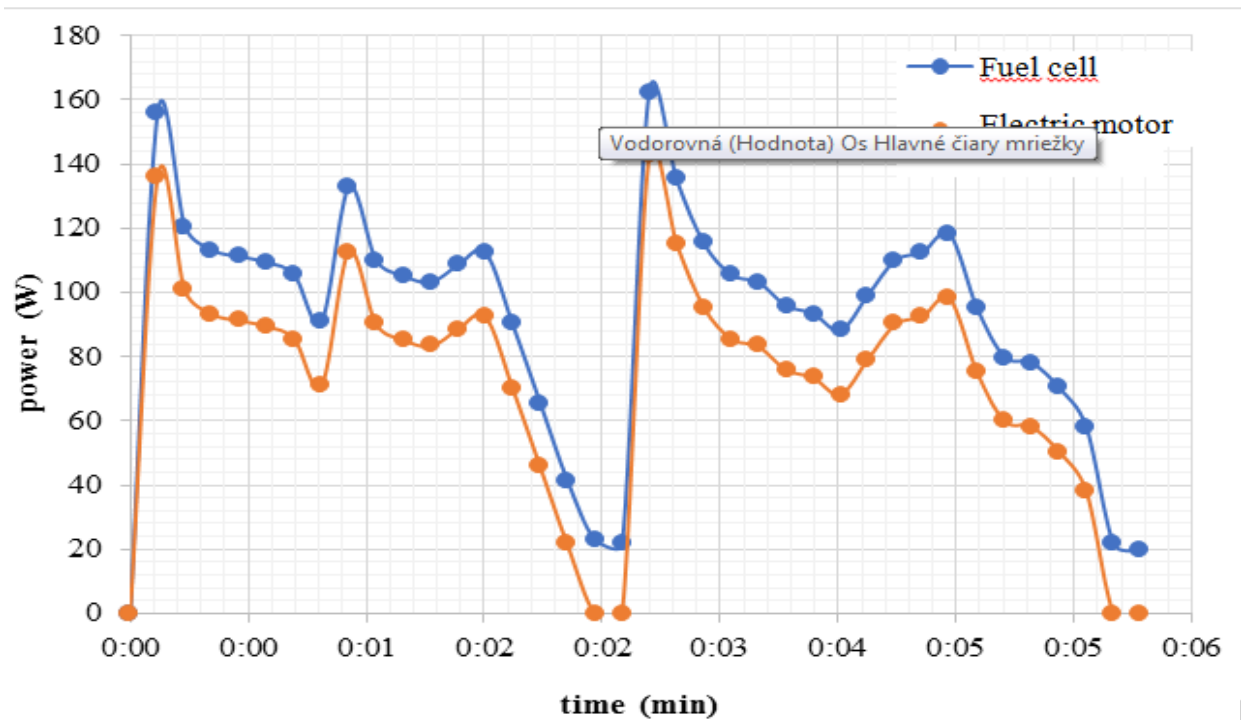
Figure 4. Curves of the fuel cell power and the electric motor power.

Following the measurements of the data regarding the fuel cell operation, it was possible to calculate the theoretical consumption of the fuel cell and the fuel cell operation time on the basis of the amount of H_2 and then compare such time with the real operation time.

The calculation was made to determine the weight of hydrogen contained in the tank which was identified as 2.7955 g at the temperature of 25 °C. On the basis of the subsequent comparison of the consumption figure and the amount of hydrogen contained in the tank, it was possible to conclude that the driving time of the model with the given amount of hydrogen is approximately 39 minutes. During experimental rides, the average driving time with the tank, in which hydrogen was under the pressure of approximately 3.15 MPa, was approximately 30 minutes.

Following the subsequent comparison of the theoretical driving time and the real measured time during which the fuel cell was able to supply electrical energy to the electric motor, it was possible to conclude that the real operation time of the fuel cell, as compared to the theoretical one, is 77 %. Such decrease could be potentially avoided by recuperation of hydrogen that was used for blowing through.

During the experimental measurements, the fuel cell temperature was rising. The maximum temperature of the fuel cell is 50 °C; however, as a result of cold weather, in none of the measurements the fuel cell temperature exceeded 50 °C, representing the maximum as well as the operating temperature. If the temperature exceeded 50 °C, it would result in triggering the fan that would substantially disturb the measurements because the consumption of the fuel cell would rise from the average value of 20 W up to the value of 100 W; this would significantly reduce the period during which it is possible to obtain energy from the fuel cell from the given amount of hydrogen.

3. Conclusion

The designed model of the vehicle provides an appropriate base for subsequent tests of hydrogen fuel cells, or, after small adjustments, also methyl alcohol fuel cells that might facilitate applications in smaller robotic devices in which the use of hydrogen is excluded for various reasons.

The structure of the chassis facilitates not only testing various fuel cell modules that may differ in fuel, arrangement or power but also testing various tanks, either high-pressure or low pressure – metal hydride tanks.

Due to the concept of the drive, it is possible to choose from different operating modes. The vehicle may be operated as a mere electric vehicle (operated using the set of lithium batteries with the capacity of 16 Ah). Another option is the use of a fuel cell as the primary source of electric power for the electric motor. Fuel cells are suitable for mobile applications working at low operating temperatures. One of their benefits is achieving higher thermodynamic efficiency of the electrochemical reaction, as compared to the efficiency of the transformation of energy from a chemical bond into electrical energy using heat engines. The dimensions of the model in the scale of 1 : 6 facilitate easier performance of tests of various systems of fuel cells and metal hydride alloys because the measurement of relevant data does not require the use of larger amounts of costly metal hydride materials for the purpose of hydrogen accumulation in tanks.

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A Translation into English of Khalil I. Al-Fuzai's[1] "Before the Station"[2]

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Abstract

Hassan sits behind his wooden box selling cigarettes and matches. In front of him, he sees people struggling to make a living. This scene illustrates what is going on inside the poor boy's mind. It dramatizes the inability of Hassan to cope with what is going on around him. Yet he has to find a way to earn money and make a living, and this is the reason he is sitting before the station.

As a boy, Hassan is not expected to play such a social role, which is usually managed by adult men. That is why a man asks Hassan, "Do you sell cigarettes?" expecting that he is taking the place of an adult who will be back soon.

Hassan is not the only young person who is in charge of a family in the society, as the story indicates that "there are many people like him scattered in front of this car station." Particularly during the 70s and early 80s, such a case was common.

Indeed, Hassan has only his mother at home. Imagine if he had brothers and sisters: what would happen to this boy? Hassan's family is not the typical family in Saudi Arabia; it is hard to find a family with only one child.

Though culturally and traditionally the family is encouraged to have many children, yet it is the society here that grants Hassan's mother no other option but to send her son out so as to assume his dead father's responsibilities.

In brief, Khalil I. Al-Fuzai manages in this story to criticize the society that creates and enforces traditional and cultural restrictions and at the same time does not provide solutions to the problems of families and individuals like Hassan. Finally, in my translation, some well-known words are kept with their original pronunciation and written in italics to keep the reader aware of the Arabic text.[3]

Keywords: *Khalil al-Fuzai, Saudi, short story, "Before the station"*

* * *

Translation:

The sun rose from the far distance of the city, struggling through the legions of darkness, and drawing up in the pages of the universe the birth of a new day . . . [4] new to the world in all surprises it hides . . . every one of this day's moments holds something new for the world. As for Hassan . . . he feels confident that there will be nothing new in his day, as this was the case with his yesterday. Who knows? Perhaps

there will be nothing new in his tomorrow. He yawned lazily, feeling the desire to sleep. But his poverty will not allow him to sleep. He sat cross-legged after putting his wooden box in front of him, and on the top of it he arranged his negligible merchandise.

Again today he started by sorting the packs of cigarettes and matches that lay in front of him . . . in a variety of geometrical shapes. He does so to amuse himself until a new customer comes to buy a pack of cigarettes from him.

This is his work the whole day long . . . except for some skirmishes he finds himself involved in without a choice . . . skirmishes with one of the vulgar drivers scattered about this station in front of which he sits with his inconsiderable merchandise.

From the early morning he awakens . . . and before the sun rises all the people find him isolating himself behind his wooden box, playing many times with the boxes of cigarettes and matches.

Often he becomes absent-minded . . . imagining himself owning one of those cars he sees parking in front of him, while both of his hands are busy arranging the boxes of cigarettes and matches that he intends to sell to passers-by. In the past, he used to carry the box on his chest after he tightened it with a rope and put it around his neck. Recently, he has preferred to sit behind the box in this station in order to have a rest. And he may sell in this location more than he can sell while moving here and there. Despite the fact that there are many people like him scattered in front of this car station, he assumes that his little stock of merchandise will start growing to the extent that he may be able to open a supermarket one-day. Then, he will not resort to putting some empty packs of cigarettes in his box in order to delude people into thinking he owns a lot--which is what he is doing now.

Horns of noisy cars, the uproar of the traffic and the crowds of the passers-by, and the noise of the engines in the near-by workshops, and the shouts of drivers calling the passengers to come and ride their cars . . . they yank in the passengers . . . a passenger's items might be divided by the drivers . . . seeing him coming to where they are waiting, they run toward him: his belongings will be taken and put in one car, while his clothes are divided. His *abaya*[5] goes in another, his *ghutra*[6] in a third car, and his *igaal*[7] in a fourth car, while more than one hand pulls him in different directions; every driver wants to have him, as the poor passenger's complaining shouts rise. He throws himself into the closest car, asking the driver to collect all his scattered pieces that have been taken to other cars.

All this distracts Hassan's thinking as he contemplates more than one subject. And every time his thinking takes him away from his real status, it will not be long before he returns again to his small world . . . to his wooden box that contains packs of cigarettes and matches. Suddenly, a customer is standing before him as if he came out from the inside of the earth, hands over paper money, and asks for the brand of cigarettes he wants. Hassan gives him what he wants, and with a sudden movement, searches his pockets in order to give the customer change from the paper money which he carefully puts in his pocket. Then, he heaves a deep sigh, having insured he has enough money to be able to buy the only meal that he will have with his mother when he returns this afternoon to his home—a home he inherited after his father's death. It is all he has. He is proud of it in spite of its age and its antiquated features. Regarding dinner, he has become satisfied with whatever is left from his lunch, if anything, or with stale bread.

Sometimes he finds it enjoyable to entertain himself by repeating one of the songs the nearby café always used to broadcast . . .

Hassan is not content with himself . . . his skeleton is covered with a torn *thobe*[8] . . . his skin with a pale color that worries his mother . . . his insignificant merchandise that always makes him feel ashamed . . . all this renders him discontented with his true state of affairs.

He notices a man . . . hence he tries to smile for no purpose . . . it seems the man is going to buy a pack of cigarettes from one of those sellers who are sitting before the car station, yet Hassan's smile draws his attention, so he heads over.

"Welcome! . . . which brand of cigarettes do you want?" Hassan said after he squatted.

Before the man replies, Hassan starts looking at him curiously so that the man feels restless because of his ambiguous looks.

"I want . . ." Yet at the last moment he changes his dialect and asks, "Do you sell cigarettes?!"

"Of course, sir! And I think this is so clear that you do not need to ask such a question."

"I know . . . I know . . . but I was asking . . ." He pauses for a moment. Then he says, "Do you see that this work is not suitable for you?"

"Yes it does not suit me . . . but at least it does not require much effort."

The man does not want to continue this conversation, hence he takes a pack of cigarettes and leaves Hassan with his thoughts. The conversation does not make any impression on Hassan for he has become accustomed to such curious customers like this one who enjoy intruding upon other people's business. As long as Hassan's affairs are not of importance, he does not object to talking about them.

He hears people screaming at the station. He guesses that it is a new dispute, taking place among the drivers as usual. So he does not bother himself to turn his face to look at the source of the shouting. He is trying at the same time to ignore the comments coming from many people regarding this disturbance.

Not far away, there is a small row of homeless ants . . . blundering in agitation.

A youth, not much different in social status, asks, "Do you not hear, Hassan?"

Before he finishes what he wants to say, he points to another person of the same low class who seems impudent, and laughs noisily.

"He has farted." He covers his nose with his thumb and index finger and says, "A stinker."

Then, Hassan says, "He has to give up eating fava beans . . . they cause farts."

All three laugh heartily, and some passers-by who hear the conversation from its beginning laugh as well.

The sky becomes cloudy, although it was not like that a few minutes ago. The ground becomes wet. And Hassan begins hitting the sidewalk with his bare feet on his way home where his mother waits for him. The cold permeates his body to the bones. The wind blows away the leaves of the trees--spread on both sides of the street--which are long like "the heads of devils." At this time, cars rush past forcibly. He remembers that one day he wished that he would be hit by a car, on the condition that he would not be hurt much, so that he could get paid for his probable injuries. But he realized that he might lose his life and at that point there would be no monetary benefit. Maybe the driver would be so clever that he would avoid hitting Hassan even if he were to hit one of the trees spread out on both sides of the road. Then Hassan

would have to take the driver's punches, and insults--this would take place if the driver did not bring him to the police station. After considering the risk, Hassan has not thought of it anymore.

There is an alley at the end of the street toward which Hassan turns on his way home. He appears skinnier as he disappears from onlookers. And if it happens that one could read his thoughts, he would find that Hassan's waiting mother's image occupies all his thinking, for he does not think of anyone other than his mother.

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Translator's Notes:

1- KHALIL I. AL-FUZAI (1940-   ) is a literary writer from Saudi Arabia. In his writings, he introduced his culture, addressing many social, cultural, and religious issues he saw in his society.

2- This story was translated from the following Arabic source:

Al-Fuzai, Khalil I. Thursday Fair. (سوق الخميس). Taif: Taif Literary
  Club, 1979: 5-10.

3- An introduction a reader may need to connect the text to its context.

4- . . . Every now and then there are few dots found in the source text.

5- *abaya*: a cloak over the dress; usually thin with different colors for men, and black and thick for women.

6- *ghutra*: an Arabian headdress worn by men.

7- *igaal*: a cord worn on the headdress.

8- *thobe*: a gown worn by men.

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STRATEGIC LEADERSHIP AND SERVICE DELIVERY IN AFRICAN CONTEXT: DOES ORGANIZATIONAL STRUCTURE AND ETHICAL PRACTICES INFLUENCE THE RELATIONSHIP?

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ABSTRACT

The general objective of the study was to determine whether ethical practices and organizational structure influence the relationship between strategic leadership and service delivery of County Governments in Kenya. The findings would aid the audit, review and strengthening of existing policies aimed at ensuring good ethical practices in public entities. The relevant theories reviewed for this study were the New Public Management (NPM) theoretical perspective, upper echelon theory, institutional theory and principal agent theory. This study used a positivism research philosophy. The study used a cross sectional survey. The target population for the study was drawn from the 47 Counties in Kenya as per 2010 constitution. The study used both primary and secondary data which were collected using questionnaires, interviews and desk review. Data analysis took place at two levels – descriptive statistics level and inferential statistics level. The study found that the entire hypothesis tested were statistically significant and thus supported by the study. It was therefore recommended that county governments must understand the service delivery dimensions in order to carry out frequent analysis and develop strategic leadership concepts relevant to their counties.

Key words: Strategic leadership, Organizational structure, Ethical practices and Service delivery

1. INTRODUCTION

Strategic leaders have to contend with proper organizational structure in place and acceptable ethical behaviour to achieve desired results which in the case of public entities such as counties relate to service delivery. The study thus conceptualises that quest for satisfactory service delivery in public entities is interlinked with strategic leadership, ethical practices and organizational structure and faces varied challenges (Van Rooyen, 2008). Strategic leadership concept therefore emanates from the contention that good leaders are tied around strategies, good organizational structure in place and ethical practices in enhancing service delivery in public entities (Allio, 2015).

Strategic leadership is defined as the interaction between leaders and their followers and how such leaders influence the said followers in pursuing certain organizational goals through exchange and application of

individuals' tacit and explicit knowledge in a certain thinking pattern to enhancing service delivery (Judge, 2012). Ethical practices constitutes moral principles that are deemed to guide the officials in an organization in work related aspects which controls conflicts of interest and abusing of positions or offices by the individuals in hierarchical positions (Bubble, 2012). Organizational structure involves the architectural representation of the leadership, relationships that are functional and talent within an organization workforce. Bass (2007) referred to service delivery as a bundle of customers or the things that offered or enhanced value or utility to such a customer.

The emphasis that strategic leaders are visionary by description requires the ability to strike a balance between short-term and long-term organization obligations (Rowe, 2001). The study posits that strategic leadership possesses unique personality traits, skills and management styles which they apply to the context of the organisations they lead. Strategic leaders defines key and crucial organizational strategic change moments, creates appropriate strategies and translates such strategies to actions in operational terms for the change direction required (Mulcaster, 2012). This is important for any organization that is obligated to achieve the desired goals as far as key stakeholders interests are taken in to the equation.

Service delivery concept is derived from the process of providing satisfactory services. The service delivery concept has been defined in many different ways. Bass (2007) referred to it as a bundle of customers or the things that offered or enhanced value or utility to such a customer. This study argues that 'service delivery' as a variable is widely used in developmental studies in the public sector. Service delivery in public entities is defined by political promises and commitments by the government agencies and other political players whose credibility is largely shaky (Keefer, 2004). It is therefore necessary to assess service delivery of county governments in Kenya on the perspective of performance measures which are deemed to have direct effect on the operation and efficiency to the citizens who receive the services. Therefore, it's useful to adjust the structure to accommodate both strategic leadership roles and the associated ethical practices in the public organizations in order to facilitate better service delivery to the citizens.

2. MATERIALS

The relevant theories reviewed for this study were the New Public Management (NPM) theoretical perspective, upper echelon theory, institutional theory and principal agent theory. Theoretical assumptions, their critique and how they relate to the study variables were well articulated. The new public management theory advocates application of private sector's best practices for efficient and responsive service delivery by public entities (Denhardt & Denhardt, 2000; Hope, 2001; Savoie, 2003). Therefore, the NPM perspective key tenets as put forward by Haque (2004) and Islam (2015) align with the objectives of this study whose drive is the quest for better services by public entities by a strategic leadership which is ethical. The proposed study hypotheses hold that strategic leadership, ethical practices and service delivery concepts have been applied successfully in the private sector and thus the need to test how they fair in public entities on the basis of NPM.

As noted by Aziz et al. (2015), NPM identifies the need for leadership which undertakes strategic planning while upholding values such as professionalism, fairness and responsiveness to public needs, issues which

the study sought to understand how they relate to service delivery. The study conceptualizes situation where the public are treated as private sector customers who desire quality and satisfactory service.

The premise aligns with the NPM perspective which emphasizes on competition, quality services and customer satisfaction as desired outcomes in the public sector (Haque, 2007). The flexibility of NPM perspective to diverse conceptual and contextual adaptations also makes it suitable for this study which was based on county governments in Kenya which possess unique characteristics distinct from the Eurocentric or Western public sector models.

The Upper Echelon Theory (UET) as developed by Hambrick and Mason (1984) view strategic organizational processes and outcomes as a product of managerial qualities of topmost managers. Hambrick and Mason's (1984) as well as Hambrick's (2007) arguments are a basis for this study which also holds that styles (such as strategic leadership) and top leadership qualities (such as ethicality) shape the services offered by county governments.

The central tenet of the upper echelon theory is that, organizations are a reflection of the skills, expertise and values of the senior leaders as they work at a strategic level (Chuang, Nakatani & Zhou, 2009; Phipps & Burbach, 2010; Mason & Reilly, 2006). The assertion is similar to the study's main objective which supposes that an ethical strategic leadership can influence the services provided by public entities such as county governments.

This theory provides a framework within which the role of strategic leaders in influencing organizational outcomes can be interpreted, the key postulation being that organizational outcomes and strategic decisions are partially predicted by strategic leaders (Carpenter et al., 2004. The propositions by the upper echelon theory have brought forth significant literature in research of the role of strategic leadership and service delivery. Strategic leaders are therefore critical in yielding quality service delivery of public service organizations. This theory guides the conceptualization of strategic leaders in influencing service delivery in the context of county governments in Kenya.

Institutional theory assumptions are founded on the argument that organizations are operated under a certain structure that takes in to consideration both social, environmental and internal performance goals and objectives (Cohen et al., 2007). This therefore demand the ability of strategic leaders to ensure that goals and objectives are formulated in line with the structure in place to avoid inefficiencies in operations. It calls for understanding of norms and processes of the organizations both traditional and new changes that may facilitate strategy implementation processes.

According to Weir et al. (2002) organizational structure is linked to the concept of institutional theory. The theory explains the deeper and more resilient aspects of structure, processes, schemes, rules, norms and routines that have become established as authoritative guidelines for the organizational behaviour and also integrate the financial structure and capital structure which are key to strategy implementation.

The theory also looks at how organizational structure are created, diffused, adopted and adapted over space and time, and how they fall into decline and disuse but fails to clearly show the applicability in organizations especially during strategic leadership decision making process (Markiewicz, 2011). It is therefore asserted that the choice of processes and structures of an organization is reflected on external institutions that prefer such choice. There are rules and other beliefs that should be rewarded in well-

coordinated economic transactions based on strict adherence to the set structures (Hinton, 2012).   The paper applies institutional theory to underpin the concept brought out in the literature review concerning the applicability of organizational structure in adding on the concept of strategy implementation.

The agency theory, also referred to as the principal-agent model, is applied in the organizational and strategic management publications as a framework for setting up and managing contract arrangements and explains the behaviours of principal and agent (Eisenhardt, 1989). The theory focuses on ethical practice and accountability mechanisms to correct opportunistic behaviour that result from principals exploiting asymmetric information to the disadvantage of the agents (Heath, 2009).

Strategic leaders, employees, suppliers and customers/citizens among others are the actors whose interactions lead to agency problems which have to be resolved. Given that strategic leaders have both the ability to commit public entities to contracts transactions they deem appropriate while the responsibility sits on the public as the taxpayers and consumers of public goods and services, there is need to ensure that this is done ethically and with accountability in line with the tenets of the principal agent theory (Crowther & Jatana, 2005).

In agency theory, as noted by Northouse (2013) a principal decides to engage an agent due to cost considerations and expertise. In the public entities' context of the study the citizens act as the principal while the leadership acts as the agents who manage scarce resources to deliver satisfactory services (Van Essen, 2011). Further, once elected the leaders in the public sector assume principal role and appoint/hire staff who become agents on their behalf. The agency theory is relevant to this study as it explains the interactions between various actors in the public service delivery whose components including leadership and ethics.

The underlying purpose of any public institution is the effective and efficient delivery of public services. Ethical practices, organizational structure and strategic leadership enable public sector entities in their pursuit of excellence in the service delivery outcomes (Robbins, 2008). Strategic leadership focuses on undertaking tactical approaches where ethical practices and organizational structure direct the behaviour of the strategic leaders towards the accomplishment of the organisation's objectives, thus attaining better service delivery (Schutte et al., 2014).

It is vital to note that decentralized kind of structure is necessary and important since it generates more levels of business units which are good at decision making and also allows ethical practices adherence from one unit to the next (Gupta & Michailova, 2004). According to Public Service Commission (2008) strategic leadership that is based on ethics rather than position and is structured around strategic leadership is a key building block for overall service delivery and public confidence in government institutions and leaders in general is one of the other jointly linked to strategic leadership, ethical practice organizational structure.

Siphumeze (2015) found that strategic leadership can play a great role in facilitating service delivery. This can be facilitated by better organizational structures in place coupled with the internal measures that facilitate ethical practices. The study by Masungo and Marangu (2015) found that strategic leadership has significant positive effect on service delivery and suggested that better structures should be put in place to monitor the process of service delivery. It is therefore necessary that organizational structure that supports ethical practices to be enforced by strategic leaders to guarantee better service delivery.

3. METHODS

The target population for the study was drawn from the 47 Counties in Kenya as per 2010 constitution The study selected participants based on how the study deems their input necessary to accomplish the objectives of the study and also their availability during data collection period. The County Public Board establishes fourteen departments upon which all counties should be based in establishing their respective departments. However, each county is allowed to establish departments as guided by the county's service charter as per the citizens needs in that particular county and therefore each county has a varied number of departments. The study purposively selected six departments which were common across all the counties and offers services which are the same in all the counties that is, Education, Health services, Public works, Economic planning, Natural resources and Agriculture. Chief Officers and administrators were selected to participate in the study since they were directly involved in the service delivery process and capable of giving information especially on strategic leadership and service delivery.

The study used primary data collected using questionnaires. A close-ended questionnaire was used to collect primary data relating to the all variables. The questionnaire enabled the researcher to collect views of respondents on the manifestations of strategic leadership and service delivery.   The questionnaire adopted a 5-likert scale. The use of 5-likert scale made it possible to quantify the qualitative data, and therefore, enable the attainment of more objective results regarding the views of respondents on the different manifestations. Before administering the data collection instrument, respondents were assured of complete confidentiality and anonymity regarding their responses. The questionnaire was administered using the 'drop and pick up later' method so as to allow the respondents ample time to respond to the questions, thereby enhancing accuracy in responses and improve response rate.

4. RESULTS

The study determined the joint effect of strategic leadership, organizational structure and ethical practices on service delivery through the hypothesis that; the combined effect of strategic leadership, organizational structure and ethical practices on service delivery of county governments in Kenya is different from their independent effects on the same variable.

This hypothesis was tested using multiple regression analysis. The results are presented in Table 2

Table 2: Regression Results of the Joint Effect of the Strategic Leadership, Organizational Structure and Ethical Practices on Overall Service Delivery

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
1	Strategic leadership	.585[a]	.342	.340	.38402
2	Joint-Strategic leadership, organizational structure, ethical practices	.830	.688	.668	.39410

(a) ANOVA

Model			Sum of Squares	df	Mean Square	F	Sig.
1	Strategic leadership	Regression	37.526	1	37.526	254.469	.000[a]
		Residual	72.260	271	.147		
		Total	109.786	272			
2	Joint-Strategic leadership, organizational structure, ethical practices	Regression	116.116	3	5.372	34.586	.000
		Residual	107.300	269	.155		
		Total	223.416	272			

Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.		
		B	Std. Error	Beta					
1	(Constant)	1.335	.108			12.333	.000		
	Strategic leadership	.473	.030		.585	15.952	.000		
2	(Constant)	1.656	.596		-2.778	.008			
	Strategic leadership	.741	.188	.383	3.933	.000	.700	1.429	
	Organizational structure	.188	.125	.174	7.100	.000	.558	1.791	
	Ethical practices	.820	.145	.803	.830	.001	.430	2.326	

Predictors: (Constant), Strategic leadership, organizational structure, Ethical practices
Dependent Variable: Service delivery

The study findings in Table 2 indicate that the joint effect of strategic leadership, organizational structure and ethical practices explain 68.8% of the variation in service delivery (R^2=0.688, F=34.586, P<0.05). The remaining 31.2% is explained by other factors not considered in the study.   It is clear from the value of R^2 =.668 and F ratio that the regression model was fit for use in the analysis.   Therefore, strategic leadership, organizational structure and ethical practices have a significant joint influence on service delivery and hence can jointly be used to predict service delivery.

5. CONCLUSIONS

The study determined the joint effect of strategic leadership, organizational structure, ethical practices and service delivery among county governments in Kenya.   Strategic leadership that is based on ethics rather than position and is structured around strategic leadership and thus a key building block for overall service delivery and also argues that public confidence in government institutions and leaders in general is in one

of the other jointly linked to strategic leadership, ethical practice organizational structure. It was found that strategic leadership can play a great role in facilitating service delivery. This can be facilitated by better organizational structures in place coupled with the internal measures that facilitate ethical practices. The underlying purpose of any public institution is the effective and efficient delivery of public services. Strategic leadership has significant positive effect on service delivery but suggested that better structures should be put in place to monitor the process of service delivery. It is therefore necessary that organizational structure that supports ethical practices to be enforced by strategic leaders to guarantee better service delivery.

6. IMPLICATIONS OF THE STUDY

The findings of this study demonstrate that the variables considered are important in a developing country and that it helps in identifying theories unique to county governments and enhances how conceptualization of the variables are important in building further on these variables. The study has demonstrated that county governments do operate in a situation where service delivery is expected by the citizens and therefore need to apply various leadership paradigms. The agency theory and institutional theory have also been supported in that the county governments are supposed to act on behalf of the national government and deliver to the agenda. These study findings statistically confirmed that significance to support the proposition.

The results of the study show that organizational structure has significant influence on the strategic leadership dimensions that counties can apply. The findings that ethical practices and organizational structure give better service delivery in line with strategic leadership are areas which counties need to focus their efforts. They need to strengthen their structures in place, enforce ethical practices and get best leadership acumen in an effort to give best services to the locals. It will create a clear road map on how service delivery will be achieved. The results of this study will assist policy makers to ensure county governments give correct and timely data on drafted policy decisions.

The findings that organizational structure moderates the relationship between strategic leadership and service delivery certainly make their work easier. The positive effects have higher contributions to the service delivery and this implies that county officers should concentrate not only on monitoring the ethical behaviours but also on building on the areas that impact on service delivery including better structure. This should form the basis of how organizational structure have to be observed by the counties if it has to succeed. They should not pay excessive attention to one factor as the service delivery is imperative.

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Children are a gift and they must be happy in spite of their chronic illness.

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Abstract

Type l diabetes is one of the most common chronic diseases, even in childhood. New data sugest a trend towards a decreasing age of onset of type 1 Diabetes mellitus.

Education of pre-school children and their parents

We are living in the World of moderns technologies which penetrate more and more in education of children and help better and better to manage their diabetes.

However, still exists the gap in education of the smallest children with diabetes. These are toddlers and preschoolers. Their universe is different- i**t** is the universe of fairy talles, mystery, fantasy. They believe these creatures. and are willing to cooperate with them.

This youngest group have lived with their illness maybe all their life and a threat of chronics complications is the biggest.

Age-related characteristics of type

- The specific problems of diabetes in the young child include high insulin sensitivity and large variation in physical activity and diet.

In addition, young children, infants and toddlers are often unable to detect and communicate symptoms of hypoglycaemia

How to explain to pre-school children that every day multiple insulin injections are not punishment for something that they have done wrong ,but it is absolutely normal and the same as, i.e. brushing their teeth. Diabetes has the most serious impact in the family . Parents undergo considerable trauma learning to diagnose diabetes. They may often feel guilty that in some way they are responsible for the child developing diabetes. They fear the consequences of hypoglycaemia and the long term complications of disease.

The child is not ready to give up every day pleasures which give meaning to their lives.

- All physicians face a difficult task in explaining the fundamentals of the disease including its possible limits and complications in the future.

If the patient is a child the task is even more difficult because the ontogenetic level of development of cognitive and volitional processes of a young person is neither ready to receive medical information nor to respect strict restrictions in diet.

All family must be responsible for a child with diabetes
- It has been known that fathers are often less involved with the care of the diabetic child than mothers are.
- In some families grandparents have an important role in the family and their importance creates tension between the parents' children particularly as the grandparents are not targeted for education.
- Siblings are also affected by the diagnosis of diabetes they become jealous of the attention that the diabetic child receives.

Children's natural playfulness and thirst for knowledge
- Through games, pre-school children unintentionally learn how the world works.Their curiosity is a chance for the "entertainers" to involve the information
  they want the children to learn
- *Why has a little puppy started „wetting the bed" ? (symptoms   of disease)*
- *Why was destroyed   Island   kingdoom. How to save „insula."(destruction of Beta cells)*
- *Where is   magic kee ?(tell me about insulin)*

Fairytale motive for explanation of good and evil
- The world of fairytales is lively and attractive to children and allows them to connect the elements of the real world (different problems and situations) with the world of fairytales.
- Imagining where they follow a different set of rules than in the "real world".
- The world of tales is mysterious for children because a lot of funny things happen there.
- Fairytale characters have more authority than the children's parents or their physicians.
- Disrespectful and evil creatures are punished just as children could be if they don't follow the necessary rules.

Diet is perceived by most patients as the most significant threat to their quality of life
- What is Sketo ? Sketo is a Greek word which means without sugar

Davy is 5 year old boy who got ill with diabetes in Greece.It´s fearfull boy and
Sketo is   little hospital´s gimly who helps Davy to get rid off fear of injections
and who teach   Davy to the principles of diet and illness

Hypoglycaemia in diabetic children how can hypoglycaemia be prevented?
- Insulin induced hypoglycaemia is the most common acute complication of type1 diabetes treatment and is probably the single greatest limitation to maintaining strict glycemic control
- *About Karolinka, who forgot to take a snack and forest animals helped her*
- *Karolinka is a little bird which became hypoglycemic due to omission her snack*

Moral authority of fairytale characters

- Fairytale characters set an example for children, so the educators often refer to them during a visit. This principle is used to explain difficult relations and plots that are hard to understand.
- Children are often asked to make decisions that they have recommended to fairytale characters.
- **This is a crucial element of the education**.

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Is Diabetes evil ?

No, it is not, beacause is well curable and you must learn, how to do it. It is similar to the Little Prince to take care about his rose.

„My flower is   threatened with impending death ?

„Certainly.“

„My flower is ephemeral, the little prince said to himself and she has only four thorns ***to defend herself*** ***against the World****. And I have left her all alone on my planet* ! (Antoine de Saint-Exupéry The Little Prince)

The brothers
Rapid and long acting inzulin
How they work

Why the little poppy started weting bed ?
Symptoms of diabetes

Who is Sketo ?
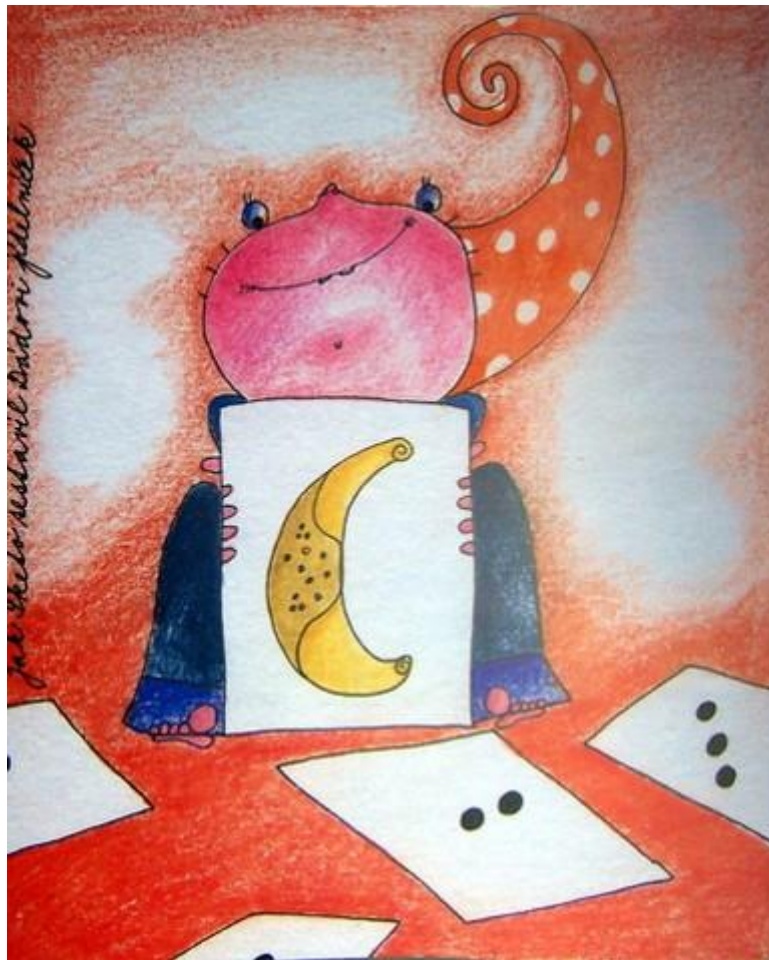
The Impact of Distance Education on University Retention Rates

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Abstract

This study uses new measures of distance education to assess the impact on retention rates at 4-year public and private non-profit universities in the U.S. We present evidence that the percent of undergraduates enrolled exclusively in distance education courses reduces a university's freshmen retention rate, particularly for institutions with a relatively low median SAT score. We find no clear evidence of lower retention rates when undergraduates are enrolled in a combination of on-campus and distance education courses. These findings suggest increased enrollment through distance education can come at the expense of lower retention.

Keywords: distance education, online, retention, university, higher education

1. Introduction

This paper is motivated by a simple question: to what extent does a university's offering of distance education impact its ability to retain undergraduate students? The growth of online education in recent decades has resulted in considerable attention to this topic. According to data from the National Center for Education Statistics (NCES), about 8% of all undergraduates at 4-year institutions were enrolled in at least one distance education course in 1999; this figure increased to 30.3% by 2015.[1] Not all universities have incorporated distance education with equal vigor. Almost 71% of undergraduate enrollment at for-profit institutions in fall 2015 constituted at least one distance education course. In contrast, the figures are 23% and 27% for non-profit and public institutions, respectively.

Distance education is expected to continue to grow in the public and non-profit sectors, as it allows a university to reach a cohort of students that may otherwise have forgone a university education. Another reason distance education may grow is that it may help lower tuition costs. Indeed, there is empirical support that online education places downward pressure on tuition costs (Deming et al., 2015). Average state appropriations in the U.S. declined from \$8,616 to \$7,116 per full-time equivalent (FTE) student from 1991 to 2016 (State Higher Education Finance, 2017), while expenditures per student have been increasing

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[1] Changes to federal legislation in recent decades may have facilitated the growth of distance education. The Higher Education Act of 1992 prevented students from receiving Title IV financial aid if their institution provided more than 50 percent of their courses online. In 1998 the Distance Education Demonstration Program was created which granted waivers to this rule for certain institutions. Finally, the Higher Education Reconciliation Act (HERA) went into effect in 2006 which eliminated the 50-percent rule entirely.

(Baum, Kurose, and McPherson 2013). Given these dynamics, it is not surprising that a survey of chief academic officers across the U.S. recently found that nearly 63% of respondents agreed with the statement that online education is critical to the long-term strategy of their institution (Allen and Seaman, 2015).

Greater enrollment in distance education may increase revenue for a university, but it may also impact a university's ability to retain students. Retention ratings are critical to college administrators as the majority of state legislatures have moved away from enrollment-based funding in favor of performance-based funding, with a university's retention rate often being a key metric (NCSL, 2015). Additionally, retention rates are used by ratings agencies, such as U.S. News & World Report, in determining a university's ranking.

Research on undergraduate retention dates back to the 1930s (Berger and Lyon, 2005). However, the studies which use the institution as the observational unit is considerably smaller, with virtually all of these studies utilizing data from the NCES' Integrated Postsecondary Education Data System (IPEDS). This is a comprehensive dataset for U.S. institutions of higher learning that contains measures of retention, university characteristics, and student body characteristics.

In this paper we study the impact of distance education, a newly collected variable, on a university's ability to retain its undergraduate students. [2] The data used in this study is obtained from IPEDS and covers all higher education institutions that participate in the federal student financial aid programs. We focus on 4-year public and non-profit institutions as it is these institutions that enroll a large majority of undergraduates in the U.S. (about 92% in fall 2015) and where online education has yet to make a large headway. The analysis spans three academic years, beginning in 2012-13 when IPEDS first began reporting distance education data.

1. Data and Literature Review

This study examines the relationship between a university's retention rate and its offering of distance education to undergraduates. IPEDS reports institutional-level data gathered through a variety of surveys given to all institutions of higher education that participate in federal financial aid. [3]

Recent studies that have utilized IPEDS data to study retention rates, or the related topic of graduation rates, include Marsh (2014) which examines retention rates at four-year public universities for the 2007-08 academic year. This study finds that entering student characteristics, such as SAT scores, had the greatest impact on retention rates. Webber and Ehrenberg (2010) estimate whether various non-instructional types of expenditures by universities directly influence graduation and retention rates of undergraduate students in public and non-profit 4-year universities. The authors find expenditures on student services are positively related to graduation and retention rates, and this matters most for schools with lower entrance test scores and a larger number of Pell Grant dollars per undergraduate student. [4] Chen (2012) merges data from

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[2] Distance education, as defined in the IPEDS database, is education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously.

[3] IPEDS stems from the Higher Education Act of 1965, and subsequent amendments, which requires that institutions participating in federal student aid programs report a wide variety of institutional data, including retention and graduation rates.

[4] There are several studies preceding Webber and Ehrenberg which also look at how various types of institutional expenditures influence retention/graduation rates using institutional-level data. See, for example, Gansemer-Topf and Schuh (2006), Gansemer-Topf and Schuh (2003), Dolan and Schmidt (1994), and De Groot (1991).

IPEDS with the *Beginning Postsecondary Students* survey, which tracks a nationally representative cohort of students who began college in fall 1995. Using an event history model, the study finds student integration, financial aid, and expenditures on student services are important predictors of attrition. Our study contributes to this literature by analyzing the impact of distance education on retention rate.

Beginning with 2012-13 academic year, IPEDS began reporting institutional-level data for distance education. A distance education course is defined in IPEDS as a course in which the instructor and students are physically separated and instructional content is delivered entirely via technologies such as the internet, CD-ROM, and audio conferencing. The IPEDS database contains two measures of distance education: (i) the percent of undergraduates enrolled *exclusively* in distance education coursework; and (ii) the percent of undergraduates enrolled in *some*, but not all, distance education coursework. It is worth emphasizing that students enrolled in "some" distance education courses are also enrolled in traditional, on-campus coursework and therefore most likely reside in the vicinity of the university. In contrast, students enrolled "exclusively" in distance education courses are most likely to be fully online students without a tie to the physical location of the university.

There are a number of studies that have investigated distance education from the perspective of student attrition in specific courses or programs (e.g., Carr, 2000; Diaz, 2002; Levy, 2007; Tello, 2007; and Patterson and McFadden, 2013). In a review of this literature, Lee and Choi (2011) indicate the majority of these studies find higher attrition in distance education courses and programs, and that students' previous academic performance is among the most important determinants of attrition, although course design and institutional supports influenced students' dropout decision. More recently, Huntington-Klein et al. (2017) use an endogenous switching model with data from Washington State community colleges and finds that the average student who takes an online class is less likely to continue in his/her field or earn a degree than if this student took the course on campus.[5] To our knowledge, however, no previous study has examined the impact of distance education on university retention rates using institutional-level data.

2. Descriptive Statistics

Table 2 presents descriptive statistics for the main variables used in this study.[6] Column (1) shows descriptive statistics for the full sample, while the remaining columns present information by various subsamples; columns (2) and (3) separate the full sample based on whether or not an institution has any undergraduates enrolled in *all* distance education coursework; columns (4) and (5) distinguish the full sample based on whether or not an institution has any undergraduates enrolled in *some*, but not all, distance education coursework; columns (6) through (11) separate the full sample into "low" or "high" categories according to where an institution's SAT score, proportion of Pell Grant recipients, and net price falls relative to the sample medians; and columns (12) and (13) distinguish public universities from private, non-profit universities.

The question that motivates our study is how university retention rates are impacted by the prevalence of undergraduate distance education. The descriptive statistics in column (1) show that the mean retention rate in the full sample is 77.9%. However, columns (2) and (3) reveal that institutions without exclusive distance

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[5] A related line of literature examines how student performance in the classroom is impacted by face-to-face delivery versus blended or online delivery. See Asarta and Schmidt (2017) for a review of this literature.
[6] A complete list of variable definitions is provided in Table 1.

education have, on average, a 7.9 percentage point higher retention rate than institutions with exclusive distance education. Similarly, columns (4) and (5) indicate that institutions that do not have a single undergraduate enrolled in *some* distance education have a mean retention rate that is 8.5 percentage points higher than institutions that do offer this type of coursework. Looking at the mean retention rate across the various subsamples in columns (6) to (13), the rates are lower for institutions with relatively low SAT scores, high Pell Grant recipients, a low net price, and public institutions.

Table 2 also presents descriptive statistics on the extent of distance education coursework at our sample of universities. Column (1) indicates that a university has an average of 4.1% of and 13.1% of its undergraduates enrolled in *all* and *some* distance education coursework. In addition, columns (6) through (13) indicate that both forms of distance education are more prevalent at universities where retention rates tend to be lower—i.e., institutions with relatively low SAT scores, high Pell Grant recipients, low net price, and public institutions.[7]

The relationship between retention rates and distance education is examined in greater detail in
Table *3*. Institutions are grouped together based upon the percentage of their undergraduates enrolled in distance education using the ranges shown in the left-most column. About 22.6% and 40.2% of the institutions in our full sample do not have a single undergraduate enrolled in *some* and *all* distance education coursework: these institutions also have the highest mean retention rates at 84.5% and 82.6%, respectively. Importantly,
Table *3* also shows that mean retention rates decrease as the percentage of undergraduate enrollment in *all* and *some* distance education coursework increases.
It is also worth noting that the prevalence of undergraduate enrollment in distance education is highly skewed, especially for *all* distance education. The greatest number of institutions, or about 47.6 percent of our sample, have 1-10% of their undergraduate body enrolled in *all* distance education coursework.

Table 1 - Variable Definitions

Variable	Description	Detailed Definition (IPEDS variable name)
RR	Retention rate (%)	Percent of the fall full-time cohort from the prior year that re-enrolled at the institution as either full- or part-time in the current year (IPEDS: ret_pcf).
ALL	% enrolled exclusively in distance education courses	Percent of undergraduate students who are enrolled only in courses that are considered distance education courses. (IPEDS: pcudeexc)
SOME	% enrolled in some distance education courses	Percent of undergraduate students who are enrolled in at least one course that is considered a distance education course, but are not enrolled exclusively in distance education courses. (IPEDS: pcudesom)
MEDIAN_SAT	Median SAT	The median SAT represents the score for first-time, degree/certificate-seeking undergraduates; it is calculated as the average of the 25th and 75th percentiles of math and verbal SAT

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[7] These findings loosely correspond to McPherson and Bacow (2015, p. 138) who write "[i]n general, use of online learning appears to be inversely proportional to prestige and selectivity".

		scores. For institutions reporting the ACT scores instead, the ACT Composite score was converted into its SAT analog using the College Board concordance table.
PELL	% awarded Pell grants	Percentage of full-time, first-time degree/certificate-seeking undergraduate students who were awarded Pell grants. (IPEDS: pgrnt_p)
NET_PRICE	Net price (2014 dollars)	Average net price for full-time, first-time degree/certificate-seeking undergraduates paying the in-state or in-district tuition who were awarded grant or scholarship aid from federal, state or local governments, or the institution. Other sources of grant aid are excluded. Aid awarded anytime during the full aid year is included. (IPEDS: npist2)
SF_RATIO	Student-to-faculty ratio	Total FTE students not in graduate or professional programs divided by total FTE instructional staff not teaching in graduate or professional programs. (IPEDS: stufacr)
Expenditure Controls	Institutional spending	Instructional expenditures per FTE (INSTRUCTION_EXP); Research expenditures per FTE (RESEARCH_EXP); Academic expenditures per FTE (ACADEMIC_EXP); Student services expenditures per FTE (STSERVICE_EXP). All expenditures are in 2014 dollars.
Demographic Controls	Dummies for race, gender, and historically black colleges or universities	Percent of undergraduates who are Asian; Percent of undergraduates who are Black/African American; Percent of undergraduates who are Hispanic/Latino; Percent of undergraduates who are women (IPEDS: pcuenras, pcuenrbk, pcuenrhs, and pcuenrw). A dummy variable equal to 1 if an institution is a historically black college or university, and 0 otherwise (IPEDS: HBCU).
Enrollment Controls	Undergraduate enrollment	Total undergraduates enrolled for credit in the fall of the academic year (IPEDS: efug).
Degree Controls	% of bachelor's degrees awarded in education, engineering, health professions, and business	Percent of bachelor degrees awarded in education (CIP13); Percent of bachelor degrees awarded in engineering (CIP 14); Percent of bachelor degrees awarded in health professions and related programs (51); and Percent of bachelor degrees awarded in business, management, marketing, and related support services (CIP 52) (IPEDS: derived from ctotalt13, ctotalt14, ctotalt51, ctotalt52, and basdeg)
Carnegie Controls	Institution type by highest degree offered	Universities and colleges are categorized into bachelor, master, or doctorate-granting institutions according to the framework in Carnegie Classification 2010 Update: Basic Classification. (IPEDS: ccbasic)
Locale Controls	Degree of urbanization	Degree of urbanization categorized as City, Suburb, Town, or Rural (IPEDS: locale)

Table 2 - Descriptive Statistics 2012-2014

	Full Sample	Are any undergrads enrolled in "all" DE?		Are any undergrads enrolled in "some" DE?		SAT Score		Pell Grant Recipients		Net Price		Institutional Control	
	(1) Total	(2) No	(3) Yes	(4) No	(5) Yes	(6) Low SAT	(7) High SAT	(8) Low Pell	(9) High Pell	(10) Low Price	(11) High Price	(12) Public	(13) Private
Retention Rate % of first-time, full-time undergrads that re-enrolled following year	77.9 (10.8)	82.6 (11.0)	74.7 (9.4)	84.5 (11.8)	76.0 (9.7)	71.0 (8.0)	84.8 (8.6)	84.2 (8.9)	71.7 (8.7)	74.3 (9.5)	81.5 (10.8)	76.2 (9.7)	81.6 (11.9)
All Distance Education % of undergrads enrolled exclusively in DE courses	4.1 (7.5)	0 (0)	6.9 (8.7)	0.8 (3.8)	5.1 (8.1)	5.9 (8.8)	2.3 (5.4)	2.5 (6.0)	5.7 (8.5)	5.7 (8.0)	2.5 (6.7)	4.8 (7.4)	2.6 (7.6)
Some Distance Education % of undergrads enrolled in some, but not all, DE courses	13.1 (13.2)	4.7 (8.8)	18.8 (12.6)	0 (0)	17 (12.6)	17.3 (13.6)	9.0 (11.4)	8.2 (10.5)	18.0 (13.8)	18.5 (13.2)	7.8 (10.8)	17.1 (12.9)	5.0 (9.5)
Median SAT Median SAT score of first-time degree-seeking UGs	1072.6 (143.9)	1137 (169.2)	1029.3 (103.6)	1190.4 (177.8)	1038.3 (111.1)	962.9 (56.9)	1182.5 (122.0)	1162.3 (141.4)	984.8 (81.5)	1016.0 (102.7)	1129.4 (159.0)	1036.8 (108.2)	1147.1 (176.8)
Pell Grants % of full-time freshmen receiving Pell Grants	37.8 (16.5)	31.8 (17.1)	41.8 (14.8)	27.9 (16.5)	40.6 (15.3)	48.1 (13.9)	27.4 (11.7)	24.6 (7.8)	50.7 (11.9)	44.6 (15.4)	31.0 (14.6)	41.0 (15.7)	31.0 (16.0)
Enrollment Undergraduate enrollment, 1,000s	8.7 (8.6)	6.9 (8.3)	9.9 (8.5)	4.1 (5.5)	10.0 (8.9)	6.5 (6.0)	10.8 (10.1)	9.7 (9.5)	7.7 (7.4)	10.3 (8.6)	7.1 (8.2)	11.2 (9.1)	3.4 (3.4)
Net Price Average for first-time, full-time undergrads; 1,000s of, 2014 dollars	16.8 (7.1)	20.4 (7.4)	14.4 (5.8)	22.9 (7.0)	15.1 (6.2)	14.3 (5.7)	19.4 (7.5)	20.1 (7.3)	13.7 (5.3)	11.4 (2.5)	22.2 (6.1)	13.0 (3.4)	24.9 (6.0)
Instruction Instructional expenditures per FTE; 1,000s of 2014 dollars	11.6 (10.4)	15.3 (13.9)	9.1 (6.0)	18.6 (16.3)	9.5 (6.6)	7.7 (2.6)	15.4 (13.4)	15.0 (13.6)	8.2 (3.2)	8.6 (3.9)	14.6 (13.5)	9.0 (3.7)	16.9 (16.2)
Research Research expenditures per FTE; 1,000s of 2014 dollars	3.4 (9.2)	4.9 (12.9)	2.4 (5.3)	6.2 (16.5)	2.6 (5.3)	0.8 (1.5)	6.0 (12.4)	5.6 (12.5)	1.3 (2.5)	2.3 (4.6)	4.6 (12.1)	2.8 (4.8)	4.8 (14.6)
Academic Academic expenditures per FTE; 1,000s of 2014 dollars	3.1 (3.4)	4.2 (4.6)	2.4 (2.1)	5.1 (5.6)	2.5 (2.2)	2.0 (1.0)	4.2 (4.5)	4.1 (4.5)	2.1 (1.3)	2.3 (1.5)	3.9 (4.5)	2.4 (1.5)	4.6 (5.4)
Student Services Student services expenditures per FTE; 1,000s of 2014 dollars	2.9 (2.4)	4.1 (3.0)	2.1 (1.2)	5.5 (3.3)	2.1 (1.2)	2.3 (1.4)	3.5 (2.9)	3.5 (2.9)	2.3 (1.4)	1.9 (1.2)	3.9 (2.8)	1.8 (0.9)	5.1 (2.9)
Observations	2173	874	1299	490	1683	1086	1087	1076	1097	1086	1087	1468	705

Notes: table values represent the sample means (standard deviations); the observational units are 4-year public and private non-profit institutions. For the full sample, there are 748, 744, and 681 institutions in the years 2012, 2013, and 2014 respectively. Columns (2) and (3) distinguish institutions that do not have any undergraduates enrolled exclusively in distance education coursework from those that do. Similarly, columns (4) and (5) distinguish institutions that do not have any undergraduates enrolled in some, but not all, distance education coursework from those that do. Columns (6) and (7) categorize institutions according to whether their median SAT score was above or below the sample median of 1045. In similar fashion, columns (8) and (9) categorize institutions based on whether their percentage of Pell Grant recipients was above or below the sample median of 39%. Columns (10) and (11) separate the full sample into those institutions with a net price above or below the sample median net price of $15,170. Lastly, columns (12) and (13) distinguish public institutions from private institutions.

Table 3 - Distribution of Institutions by Undergraduate Enrollment in Distance Education Courses (2012-2014)

Percent of undergrads enrolled	*Some* distance education		Retention rate	*All* distance education		Retention rate
	Number of institutions	Percent of institutions	Mean (se)	Number of institutions	Percent of institutions	Mean (se)
0%	490	22.6	84.5 (11.8)	874	40.2	82.6 (11.0)
1-10%	611	28.1	79.3 (9.9)	1,035	47.6	76.0 (9.1)
11-20%	493	22.7	75.6 (8.7)	180	8.3	70.7 (8.7)
21-100%	579	26.7	72.8 (9.1)	84	3.9	67.7 (7.8)
Total	2173	100.0	77.9 (10.8)	2173	100.0	77.9 (10.8)
Notes: the observational units are 4-year public and private non-profit institutions. The total number of observations is 2,173 which consists of 749, 744, and 681 institutions in the years 2012, 2013, and 2014 respectively.						

3. The Regression Model

We begin the analysis by estimating equation (1) using panel data that spans three academic years 2012-13, 2013-14, and 2014-15 for nearly 750 undergraduate institutions in the U.S.

$$\ln(RR_{it} /(1 - RR_{it})) = a_0 + a_1 ALL_{it} + a_2 SOME_{it} + \mathbf{X}'_{it}\mathbf{\Gamma} + \mathbf{Y}'_i\mathbf{\Omega} + \mathbf{Z}'_t\mathbf{\Phi} + u_{it} \qquad (1)$$

RR_{it} is the retention rate of institution i at year t, which refers to the percentage of full-time first-time undergraduates who started college in year t and re-enrolled at that institution in year $t+1$. The log odds ratio of RR_{it} is taken to ensure predictions lie within the range of 0% and 100%. ALL_{it} is the percentage of an institution's undergraduates that are enrolled in *all* distance education courses. Similarly, $SOME_{it}$ is the percentage of an institution's undergraduates that are enrolled in *some*, but not all, distance education courses. Vector $\mathbf{X}'_{it}$ consists of institutional controls that vary over time; vector $\mathbf{Y}'_i$ consists of controls that only vary by institution; vector $\mathbf{Z}'_t$ represents year dummies; and u_{it} is the random error term.

The covariates of particular interest to this study are ALL and $SOME$. We expect ALL and $SOME$ to be negatively related with an institution's retention rate which is consistent with the general findings from previous studies of higher student attrition in distance education courses and programs (e.g., Lee and Choi, 2011). In addition, institutions with a larger proportion of undergraduates enrolled in distance education may have fewer extracurricular activities which, in a traditional on-campus environment, would serve to strengthen the bond between a student and institution. For similar reasons, the marginal effect of ALL and $SOME$ on retention rate may be dependent on the amount of distance education already incorporated into an institution's undergraduate curriculum. For example,

Table *3* shows that 22.6% and 40.2% of institutions do not have a single undergraduate enrolled in *some* and *all* distance education coursework, respectively. A university may become more efficient at offering distance education as it gains experience with this mode of education (e.g., learning by doing and resource specialization). For this reason, the main results presented in this study measure ALL and $SOME$ as indicator variables where the percentage of undergraduate enrollment in the type of distance education coursework is categorized into the following four ranges: (i) 0%, (ii) 1-10%, (iii) 11-20%, and (iv) 21% and higher.[8]

Vector $\mathbf{X}'_{it}$ contains institutional control variables that vary over time. Previous studies on institutional-level retention and graduation rates guided our selection of control variables (see, for example, Marsh, 2014; Webber and Ehrenberg, 2010; Berger and Lyon, 2005; Ishitani and DesJardins, 2002; and Astin, 1997). These controls include *MEDIAN_SAT* which is the average of the 25th and 75th percentile SAT scores of first-time degree-seeking undergraduate students; *PELL* which is the percentage of

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[8] We experimented with measuring ALL and SOME as continuous variables, as well as alternative ranges. These alternative measures did not substantively change the results and conclusions in this study.

undergraduates receiving a Pell Grant, a federal grant that is based on financial need; and *NET_PRICE*, which is the average net price for full-time, first-time degree-seeking undergraduates (measured in 2014 dollars).[9]

Distance education may enable institutions to take advantage of economies of scale by way of increased class sizes and/or by employing relatively fewer full-time faculty members (e.g., Bowen, 2012; McPherson and Bacow, 2015). To address these possibilities, vector $\mathbf{X}'_{it}$ includes the student-to-faculty ratio (*STUFACR*), measured as the total number of full-time equivalent (FTE) undergraduate divided by the total number of FTE faculty. Similarly, previous studies, such as Webber and Ehrenberg (2010), have found the level and type of institutional expenditures influence retention rate, thus we control separately for an institution's expenditures on academics (*ACADEMIC_EXP*), student services (*STSERVICE_EXP*), instruction (*INSTRUCTION_EXP*), and research (*RESEARCH_EXP*). The expenditure variables are all expressed in logged 2014 dollars.

There are additional control variables in vector $\mathbf{X}'_{it}$, but we omit their estimates in the following regression tables for brevity. We control for demographic factors including a dichotomous variable for institutions classified as a Historically Black College or University, and the percentages of a university's undergraduate body that is female, Black, Hispanic, and Asian. Following Webber and Ehrenberg (2010) we control for enrollment (both undergraduate and graduate) by specifying enrollment in quadratic form. The types of undergraduate degrees awarded by an institution may also influence an institution's retention rate because of differences across collegiate units, as well as differences in labor market opportunities (e.g., Des Jardins et al., 2002; Des Jardins, 1999). Thus, we control for the percentages of all undergraduate degrees awarded in the following fields: business, education, engineering, and health professions.

Vector $\mathbf{Y}'_i$ consists of controls that vary only by institution. These include dichotomous variables to control for institutional type according to an institution's Carnegie classification (i.e., bachelors, masters, doctorate); public institutions and private non-profit institutions; and the degree of urbanization for the institution's location (i.e., city, suburb, town, rural). Vector $\mathbf{Z}'_t$ represents dummies for the academic years 2012-13, 2013-14, and 2014-15, which help control for macroeconomic influences on retention rate.

Lastly, a note regarding the method of estimation. The distance education variables in equation (1) display little variability within an institution across the three academic years for which we have data, therefore we do not employ fixed effects with our panel data. Instead, we use OLS and cluster standard errors by institution to allow for error terms may be correlated across time for a given institution.

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[9] For universities reporting the ACT score instead, we converted the composite ACT score into its SAT analog using the College Board's concordance tables. Separately, the dollar amount received by a Pell Grant recipient has a minimum and a maximum; in 2015-16 these were $600 and $5,775. Cost of attendance is a prominent factor in determining the dollar amount a Pell Grant recipient receives.

4. Results

Table 4 presents estimates of the coefficients in equation (1) for our full sample. Column (1) limits the covariates to our measures of distance education and a limited set of controls. As discussed in the previous section, the proportion of undergraduates enrolled in *all* and *some* distance education at a given university are each categorized into the following four ranges: (i) 0%, (ii) 1-10%, (iii) 11-20%, and (iv) 21% and higher. The baseline category for both *all* and *some* distance education is 0%, which refers to institutions that do not offer distance education at the undergraduate level. The negative signs for the estimated coefficients on the *all* and *some* categories indicate that, on average, retention rates are lower for universities with undergraduate enrolled in distance education.

Column (2) in Table 4 adds to the model controls for student academic preparation, financial need, cost of attendance, the student-faculty ratio, and four types of university expenditures. As discussed in the previous section, these variables are common determinants in studies modelling retention rates (c.f., McPherson and Bacow, 2015; Bowen, 2012; Webber and Ehrenberg, 2010). The coefficient signs on the additional control variables are as expected: the positive sign on *MEDIAN_SAT* indicates retention is higher for institutions that admit students with higher SAT scores; the negative sign on *PELL*, albeit statistically insignificant in column (2), indicates that retention is lower for institutions that have a larger share of undergraduates receiving the need-based Pell Grant; the negative sign for *NET_PRICE* indicates that retention is lower at higher-cost institutions; and the positive signs for *INSTRUCTION_EXP* and *ACADEMIC_EXP* indicate that higher retention rates are associated with universities that spend more on instruction and academics on a per FTE basis. Finally, the positive sign for *SF_RATIO* is not expected as it suggests that retention is higher when there are more students per faculty member. Note, though, that *SF_RATIO* is not statistically significant in many of the following regressions. For this study, what is perhaps most notable about the estimates in column (2) is the lack of statistical significance for the categories measuring *some* distance education. Indeed, the lack of a statistical relationship between a university's retention rate and the proportion of its undergraduates enrolled in *some* distance education is a finding that holds for most of the remaining analysis in this paper.

Table 4 – Regression Estimates

	(1)	(2)	(3)
2.ALL (1-10%)	-0.220***	-0.101***	-0.0629**
	(0.0518)	(0.0298)	(0.0275)
3.ALL (11-20%)	-0.438***	-0.200***	-0.118***
	(0.0642)	(0.0435)	(0.0425)
4.ALL (>20%)	-0.487***	-0.238***	-0.185***
	(0.0817)	(0.0495)	(0.0569)
2.SOME (1-10%)	-0.485***	-0.0209	-0.00554
	(0.0770)	(0.0384)	(0.0348)
3.SOME (11-20%)	-0.625***	-0.0449	-0.0306
	(0.0802)	(0.0442)	(0.0400)
4.SOME (>20%)	-0.708***	-0.0647	-0.0313
	(0.0838)	(0.0484)	(0.0445)
MEDIAN_SAT		0.00355***	0.00338***
		(0.000200)	(0.000214)
PELL		-0.00200	-0.00960***
		(0.00137)	(0.00164)
NET_PRICE		-0.00695**	-0.00641**
		(0.00319)	(0.00295)
SF_RATIO		0.0166***	0.000816
		(0.00484)	(0.00468)
INSTRUCTION_EXP		0.408***	0.286***
		(0.0572)	(0.0533)
RESEARCH_EXP		0.000984	-0.00778**
		(0.00398)	(0.00385)
ACADEMIC_EXP		0.0531***	0.0477***
		(0.0199)	(0.0151)
STSERVICE_EXP		-0.0383	-0.0401
		(0.0295)	(0.0267)
Constant	2.468***	-6.271***	-4.796***
	(0.0847)	(0.499)	(0.520)
Demographic Controls	No	No	Yes
Enrollment Controls	No	No	Yes
Degrees Awarded Controls	No	No	Yes
Carnegie Controls	Yes	Yes	Yes
Locale Controls	Yes	Yes	Yes
Year Controls	Yes	Yes	Yes
Observations	2,173	2,173	2,173
R-squared	0.417	0.797	0.828

Notes*: the dependent variable is the log-odds ratio of retention rate. All equations are based off of the full sample of institutions, and are estimated using pooled OLS with standard errors are clustered at the institutional level. The omitted group for ALL is 0% (i.e., no undergraduates are enrolled exclusively in distance education). Similarly, the omitted group for SOME is 0%. Variables are defined in Table 1; *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.*

Column (3) in Table 4 presents estimates using our complete set of control variables, although a portion of the estimation output is not shown for brevity. The additional control variables pertain to enrollment (i.e., the number of undergraduates enrolled at an institution); student demographics (i.e., the shares of the undergraduate population that are female, Asian, Black, and Hispanic, respectively) and whether or not the institution is classified as a Historically Black College or University (HBCU); and the degrees awarded (i.e., the share of undergraduate degrees awarded in business, education, engineering, and health professions). As with the estimates shown in the previous columns, the categories measuring *all* distance education are statistically significant, negative in sign, and increasing in magnitude. Other factors held constant, a university's retention rate is adversely impacted by the proportion of undergraduates enrolled exclusively in distance education coursework.

Interpreting the coefficients for the distance education categories is hindered by the fact that the dependent variable in equation (1) is the log odds ratio of the retention rate. To facilitate interpretation, we convert these coefficients into marginal effects using the following equation:

$$\Delta rr = \frac{\rho'}{\rho'+1} - rr \text{, where } \rho' = \frac{rr}{(1-rr)} \times \exp(\alpha) \qquad (2)$$

Note that Δrr is the predicted change in the retention rate percentage; rr is the initial retention rate which we specify as the full-sample mean; and α is the estimated coefficient on a distance education category.

Table 5 – Regression Estimates and Marginal Effects

	Full Sample	Low SAT	High SAT	Low Pell	High Pell	Low Price	High Price	Public	Private
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ALL (1-10%)	-0.0629**	-0.0592*	-0.0438	-0.0134	-0.0655*	-0.0616	-0.0327	-0.0756**	-0.0323
	(0.0275)	(0.0331)	(0.0375)	(0.0353)	(0.0387)	(0.0453)	(0.0311)	(0.0347)	(0.0425)
	[-1.102]	[-1.036]	[-0.763]	[-0.231]	[-1.148]	[-1.078]	[-0.568]	[-1.328]	[-0.561]
ALL (11-20%)	-0.118***	-0.138***	-0.0782	-0.146**	-0.105*	-0.112*	-0.0854	-0.123**	-0.0219
	(0.0425)	(0.0486)	(0.0712)	(0.0606)	(0.0568)	(0.0578)	(0.0650)	(0.0490)	(0.0626)
	[-2.097]	[-2.466]	[-1.375]	[-2.615]	[-1.860]	[-1.988]	[-1.505]	[-2.189]	[-0.379]
ALL (>20%)	-0.185***	-0.226***	-0.00659	-0.224***	-0.129*	-0.142*	-0.177**	-0.185***	-0.175*
	(0.0569)	(0.0717)	(0.0869)	(0.0655)	(0.0732)	(0.0793)	(0.0865)	(0.0696)	(0.104)
	[-3.347]	[-4.133]	[-0.114]	[-4.094]	[-2.300]	[-2.540]	[-3.196]	[-3.347]	[-3.158]
Observations	2,173	1,086	1,087	1,076	1,097	1,086	1,087	1,468	705
R-squared	0.828	0.427	0.841	0.851	0.553	0.712	0.867	0.760	0.890

Notes: table values are the estimated coefficients (standard errors) [marginal effects]. Marginal effects represent the change in the retention rate percentage, and are determined using the sample mean retention rate of 77.9%. Each column represents

an estimate of equation (1) with the full set of control variables for a particular sample of institutions. All estimates use pooled OLS, with standard errors are clustered at the institutional level. Estimate coefficients for categories of *some* distance education are not shown because of a lack of statistical significance. The baseline group for *ALL* is 0% (i.e., institutions with no undergraduates enrolled in *all* distance education). *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Table 5 presents regression estimates of equation (1) for a variety of subsamples, and reports the corresponding marginal effects in brackets. For brevity, the table lists only the covariates corresponding to the categories for *all* distance education. Estimates for the categories of *some* distance education are not shown because of a lack of statistical significance. Column (1) shows the marginal effects using the full sample of institutions. For instance, the marginal effect for *ALL* (1-10%) is about -1.1%, meaning that the predicted retention rate is nearly 1.1 percentage points lower for an institution with 1-10% of its undergraduates enrolled exclusively in distance education courses relative to a university that does not offer undergraduate distance education. Not surprisingly, the marginal effect is greater for institutions with a larger share of undergraduates enrolled in *all* distance education. Indeed, relative to the baseline group, universities with more than 20% undergraduates enrolled in *all* distance education courses are predicted to have a lower retention rate by about 3.3 percentage points.

Columns (2) and (3) in Table 5 present the estimates for the *all* distance education categories when equation (1) is estimated separately for the "low" and "high" SAT subsamples. As discussed in earlier sections, these subsamples are based on whether an institution's SAT score falls above or below the sample median. Only the coefficient estimates in column (2), corresponding to the low SAT group, are statistically significant. This finding suggests that undergraduates at low SAT institutions are not only less academically prepared as measured by their SAT score, but they are also less likely to possess skills necessary to succeed in an exclusively online environment.

In similar fashion, columns (4) and (5) in Table 5 present the estimates for institutions based on whether the proportion of undergraduates receiving Pell Grant is "low" or "high" (i.e., below or above the sample median). With one exception for the low Pell group, the coefficient estimates are negative and statistically significant for both subsamples. There does not appear to be a marked difference in how distance education impacts retention rates between these two subsamples. Columns (6) and (7) present estimates for institutions based on whether the net price of attendance is "low" or "high". Again, there does not appear to be any clear difference in how distance education impacts retention rates between these two subsamples. Lastly, columns (8) and (9) present estimates for public versus private institutions. The categories for ALL are negative and statistically significant for public institutions.

There is one clear pattern that emerges across the subsamples: the estimated coefficients for *ALL*(>20%) are negative and statistically significant for nearly every subsample. This indicates that a university's retention rate is nontrivially impacted when a sizeable proportion of its undergraduates are enrolled exclusively in distance education coursework.

5. Conclusion

This study examines the relationship between a university's retention rate and its offering of distance education to undergraduates. We use data from IPEDS and focus on 4-year public and non-profit

institutions because this is where distance education is likely to grow in the future. The time period analyzed in our study spans three years, beginning with the 2012-13 academic year when distance education data first became available.

We find very little evidence that *some* distance education—defined as the percentage of undergraduates enrolled in some, but not all, distance education courses—impacts retention rates. In contrast, we do find evidence that the proportion of a university's undergraduate body enrolled exclusively in distance education courses has a negative impact on the university's retention rate. These findings lead us to question what the fundamental differences are between the "some" and "all" distance education variables. One key difference is that students enrolled in *some* distance education courses have, by definition, a physical presence at that institution. A related possibility is that students enrolled in some distance education are receiving a different educational experience than students who are enrolled exclusively in distance education courses.

How much does exclusive distance education reduce an institution's retention rate? Our complete model estimated over the full sample suggests that all other factors held constant, an institution that does not offer *all* distance education courses to its undergraduates will have a retention rate that is 1.1 percentage points higher than an institution that has 1-10% of its undergraduates enrolled in *all* distance education; nearly 2.1 percentage points higher than an institution with 11-20% of its undergraduates enrolled in *all* distance education; and about 3.3 percentage points higher than an institution with more than 20% of its undergraduates enrolled in *all* distance education.

The descriptive statistics in this paper indicate that exclusive distance education is more prevalent at institutions with relatively low SAT scores, high Pell Grant recipients, low net price, and public institutions. These same types of institutions also have relatively lower retention rates. However, the regression estimates in this study find no clear evidence that these subsamples matter in terms of how retention is impacted by distance education, with one exception. The negative relationship between retention rates and distance education is particularly acute at universities that admit undergraduates with relatively low SAT scores. This finding may be because these students are likely to possess skills necessary to succeed in an exclusively online environment. Another important finding is that, regardless of the type of institution, a university's retention rate is adversely impacted when a sizeable proportion of its undergraduates are enrolled exclusively in distance education coursework.

Public and non-profit universities will almost certainly increase their reliance on distance education as a source of revenue in coming years. The results in this study indicate there may be an important tradeoff: increased enrollment through distance education yet lower retention.

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Renewal of the Teaching-Learning Process in the Bachelor of Sciences of Education at UAEH

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Abstract

The Network of Communities for the Renewal of Teaching - Learning in Higher Education (RECREA) began in 2017 in Mexico with a collaboration between public universities and higher normal schools as a strategy to interact with teachers of both institutions to renew jointly their teaching practices in order to achieve better learning outcomes in students. The project supported by the Secretariat of Public Education of Mexico seeks to promote a culture of collaboration among academics for innovation and improvement of their teaching practices. Taking as a theoretical basis the complex thinking, coined by Edgar Morin, the formation of communities and networks of academics oriented to the innovation of the teaching practices, centered in the learning of the students and in the collective construction of knowledge, is fostered. Following a methodological framework of action research, a monitoring and evaluation plan of the teaching-learning process and its results is established, which allows to relate innovations and the use of ICTs with learning outcomes, to subsequently document and analyze teaching innovation experiences. and its results. Working from tasks or projects that reflect real situations and problems with a complex thinking approach, linking the work of the student with the advances, methodologies and results of research in the disciplinary and professional fields and incorporating the use of ICTs as support tools for academic work and for interaction with and among students, it is possible to form communities of academics to design and share experiences on teaching transformation and innovation, documenting the teaching experience based on a research methodology in the action.

The paper documents the experiences and first results of the research process in a subject, called "Multicultural Mexico" in the case of a Mexican public university participating in the project and analyzes the active and collaborative participation in a community of teachers for the generation of teaching and learning proposals and methodologies for innovative learning.

Keywords: Teaching-learning process; complex thinking; action-research; higher education, teacher communities

1. Introduction

The educational challenges demanded for Higher Education in the 21st century, require the renewal of teaching practices, related to a constant reflection of the educational work in the classrooms. These renewals should allow to expose central problems that in the daily work remain unnoticed, creating a routinely teaching-learning process. Based on the above, epistemological ruptures have been generated that priorize innovation in the classroom, such as those presented by Edgar Morin (1999), considering the complexity of single aspects in relation to the whole as a fundamental element, in contrast to the paradigm of simplicity in relation to the obedience of the natural order and the relation of complex thinking to interdisciplinarity in opposition to the reality of the world. Other authors such as Porlán and García (2000), creators of the project IRES (School Research and Renewal, Investigación y Renovación Escolar), who consider very important to perfom a critical analysis of the social reality at schools for the renovation of pedagogy, through critical training and research for educational change.

In this sense, the Network of Communities for the Renewal of Teaching-Learning in Higher Education (RECREA as acronym for *Red de Comunidades para la Renovación de la Enseñanza –Aprendizaje en Educación Superior* in spanish), which began in 2017 in Mexico, seeks for collaboration between public universities and higher normal schools[10] as a strategy to join teachers and professors of both higher education institutions in interaction to renew their teaching practices together in order to achieve better learning results of their students according to their educational level.

2. Development

2.1 The RECREA -Project

The Autonomous University of the State of Hidalgo (UAEH, Universidad Autónoma del Estado de Hidalgo) is a Public Higher Education Institution, located in the center of Mexico, seeking for quality in educational practices as part of its policies. Particulary it has considered relevant the renovation of teaching practices that link the learning process to significant scenarios and where their graduates fulfill the educational and social demands that today refer to the challenges of the twenty-first century.

In this sense, an emergent problem is visualized in the development of teaching practices, which center their process on the daily and theoretical thinking. Emergent, urgent and recurrent tasks have displaced the fundamental task of the teaching practice, meaning a constant reflection on the context of school, classroom, teaching and learning environments, which allow renovation and innovation in the classroom.

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[10] The normal Mexican schools were born in the late nineteenth and early twentieth century, following the French model for the training of teachers dedicated to primary and secondary education. As a consequence of independence, it was necessary to train teachers whose philosophy was in line with that of an independent national life, consolidating the recent nation-state.

Based on the above, some Higher Education Institutions have generated projects that allow the transformation of these scenarios, such as the Network of Communities for the Renewal of Teaching-Learning in Higher Education (Red de Comunidades para la Renovación de la Enseñanza – Aprendizaje en Educación Superior, RECREA) which emerged in 2017, as an initiative of the Department of Higher Education at the Secretary of Public Education, coordinated by the Department of Higher Education for Professionals of Education and the General Office of Higher University Education (Jiménez Lomeli, 2018). It is worth mentioning that this project counts with the participation of seven Normal Schools and seven Public State Universities in Mexico, which are divided by regions: West with the participation of Guadalajara and Nuevo León; Northwest with Monterrey and Chihuahua; Southeast with Veracruz and Tabasco; and Center with Puebla, Hidalgo and State of Mexico. The intention is to generate a collaborative work between teachers of both institutions to jointly renew their teaching practices, which will generate significant learning for their students.

The main objective of the RECREA Project consists in forming communities and academic networks oriented towards the innovation of teaching practices, focused on student learning and the collective construction of knowledge. To achieve the above, it is necessary to promote a culture of collaboration among academics, oriented towards the improvement and innovation of teaching practice, based on the reflection of collegiate groups that exchange successful experiences and areas of improvement in the problems they face on a daily basis in the classrooms from different angles.

The complex thinking, coined by Edgar Morin (2012), is considered as a theoretical basis for the project, as well as the action research that leads to a plan for monitoring and evaluating the teaching-learning process and its results. This allows to relate innovations and the use of Information and Communication Technologies with the results of learning, in order to subsequently document and analyze teaching innovation experiences and their results. It is important that the analysis, reflection, planning and innovation of the educational processes are recovered as driving axes for analysis, from which new and more complex forms of teaching- learning are proposed that develop teaching and learning competencies for both teachers and students.

In the first place and consired as basic for the achievement of the objectives of the project, teachers are required to master the paradigm of complex thinking, which gives them alternatives to reflect and contrast pedagogical and epistemological aspects. The student is visualized as an integral human being, in which a cognitive uncertainty is generated, that takes him to a permanent search of the truth, and in which a critical, reflective and self-critical thinking can be developed.

The complex thinking implies that knowledge is considered as something that is never complete, that means, thought will be articulative, multidimensional and poietic, it is learned and relearned in the uncertainty of knowledge that develops in a spiral in the association dynamics of concepts. Therefore, this way of thinking postulates as most relevant principles a dialogic, recursion and holoscopic approach (Morin, Roger, &

Domingo 2002). Visualizing the educational actors under this conception of complex thinking, it will give them the possibility of approaching and solving problems of the educational reality from an integral and holistic vision. In this sense, it is fundamental to define the concept of complex thinking, which is seen as complexity in terms of the relationship with the whole, in contrast to the paradigm of simplicity in relation to the obedience of the natural order and the relation of complex thought with interdisciplinarity in opposition to the world reality (Morin 1995). Therefore, when talking about complex thinking, it is important to differentiate between "complex" and "complicated", which in many cases are taken as synonyms. But complexity is not a complication, since the second concept is considered as a simple dimension while complexity implies a number of elements, which as Morin, Roger and Domingo (2002) mention is "a framework of events, actions, interactions, feedback, determinations, hazards, which constitute our phenomenal world" (p.37) Therefore, when the complexity is retaken, it would have to refer to a series of conceptions, relationships and interdependencies obtained from a series of knowledge.

In the field of Higher Education, Morin (1999) makes the contribution of the document "The seven necessary knowledge for the education of the future", through UNESCO, where he exposes some central problems that remain completely ignored referring to teaching. He expresses some proposals for an education in terms of durability, public awareness and training for viability. For the RECREA project, complex thinking takes up knowledge as something tangled, in disorder, ambiguous, where the teacher is not the one who delivers knowledge as something already finished, fragmented and simplified, but the student is the one who, starting from the uncertainty and imprecision, articulates, understands and develops his own criticism through a strategic attitude. In addition, the essay is incorporated to identify not only what exists, but also what the student could and should know, in terms of what is required for his formation.

Action-Research in teaching is one of the major challenges that we face in educational institutions. Most teachers are not trained to perform a reflective practice of their daily task, which requires a methodical, regular and instrumental analysis, through intensive and voluntary training. In this sense Perrenoud (2001), considers that teaching practice is a reflective practice, which requires considering professionalization and pedagogical reason. The author proposes a reflective environment and an effort of decentralization and explicitness, through an analytical process of practice, that have as purpose the transformation of identity or mobilization in a dynamic of change. Ramón (2013) on the other hand, highlights the task of re-signifying the teaching practice, from the perspective of the reflective approach, because it gives the opportunity to reconstruct and redirect behavior hardened by routines.

Therefore it is necessary during the training process, the teacher realizes a permanent self-questioning, starting from his performance in the teaching practice, opening his way to action-research, where the significance and resignification of the teaching action in its different roles within the educational institution in a process of circular analysis between theory and practice is constructed (Massé and Juárez 2015). This means the recognition and reflection on the teaching practice itself, followed by the reconstruction and a new implementation in the classroom.

It is essential to introduce and promote the access to renewal in the teaching practice, to favor the professional competences of both teachers and students, focused on the levels of thought from the continuous reflection of the teaching practice in a daily thought, generating critical thinking and opening path to complex thinking, in order to achieve success in the renewal of reflective practice (Tagle 2011). In this sense, if someone wants to renew teaching, he needs a close, permanent relationship between teaching and research in educational processes. According to Jenkins, Healey and Zetter (2007), this link is essential for higher education, which should be built from the academic and disciplinary communities, considering the intellectual development of the student and the identity of the teaching staff, in order to benefit students' experiences and learning outcomes. This supposes an interdisciplinarity in the search and obtaining of new knowledge and its application for the solution of problems inherent to their training field from various methodological and scientific points of view.

It is worth mentioning that in order to improve the active education of the students of Higher Education, teachers must be motivated to achieve autonomous and critical thinking in their students, in order to act accordingly. Therefore, in philosophy it is highlighted that teaching practice doesn't mean only transmission of new knowledge, but the higher level teacher must transmit a way of being creative and doing so and assume that his function is not limited to teaching or transmitting certain content, but to generate open, flexible, critical and self-assessing attitudes.

The purpose of considering this element for the RECREA project is to perceive the way in which research participates in teaching in order to contribute that students receiving a better education with relevant and appropriate learning and knowledge, and to induce a form of learning that awakens creativity, intellectual independence, criticism, innovation and the empowerment of a complex thought within the students. To achieve the above, it is necessary that role of the teacher changes during a permanent reflection and the development of renewed teaching practices, which undoubtedly will require the teacher to be involved in research activities that allow him to think, reflect and make decisions about his educational practices.

The use of Information and Communication Technologies (ICT) are considered "tools, supports and channels that process, store, synthesize, recover and present information in many different ways" (Alcántara 2009, p.2). Nowadays, the use of ICTs contributes to student learning by generating spaces that develop knowledge, skills and aptitudes in relation to creativity, experimentation and manipulation of equipment; improves teaching methods for teachers and help facilitate the work of educational actors through participation and collaboration in virtual communities.

Linking education with technology is relevant because it allows to make better use of resources that are at our disposal, it increases the possibility of communicating and interacting in a horizontal and personalized way, it offers resources and multimedia learning environments and allows easy updating of content and enriches the forms of assessment. Therefore teachers must be able to develop computer skills, to include a didactic use of technology and production of digital resources, among others.

The impact of ICT in society has meant the modification of access and use to training and how to communicate, including communication skills such as speaking and writing, as well as the essential cognitive thinking. The benefit implies that today many people can have access to a world of information and in turn create and establish new social networks.

For the RECREA project, the use of ICT allows students to access information and develop critical thinking, examining, constructing, observing and reconstructing their own learning. It also allows them to exchange information, offer support, socialize and debate in a simultaneous with academic pairs in virtual communities. For the above, the teachers are required to develop the instructional design of their course including the selection, combination, application and monitoring of each of the technologies and monitoring and feedback to students on their learning processes.

This research recovers the RECREA project, which is based on the Van Merriënboer & Kirschner model (2010) who considers ten steps for complex learning, starting with a holistic instructional design integrated by four components that are learning tasks, support information, procedural and practical information on part of the tasks. In the case of Mexico, a strategy that guides the teacher to the continuous reflection of the teaching practice is considered, which finally allows the renewal of their practice.

2.2 The application of the RECREA-Project in a subject of the bachelor program in educational Sciences at UAEH

The Bachelor in Educational Sciences is one of the ten academic programs taught within the Institute of Social Sciences and Humanities (Instituto de Ciencias Sociales y Humanidades, ICSHu) of the Autonomous University of the State of Hidalgo (Universidad Autónoma del Estado de Hidalgo, UAEH). The Honorable University Council of the UAEH approved it in December 2000, and its first generation entered in January 2001. After more than a decade, in September 2014, its curricular redesign was approved, addressing the needs, not only of the state and national development but also on an international level, as well as those of the productive sector, of the service and social sector and of the labor field (UAEH 2014). The new curricula focuses its attention on problems that other careers at other HEIs had not considered, since Hidalgo as so far only had offered degrees that dealt with the training of teachers. The proposal of the UAEH was innovative in the sense that its fundamental objective consisted in entering the broad field of Education Sciences, and professional training based on attention to diversity, reflection and social commitment. The above aliened to the aim of training professionals in Educational Sciences able to analyze and transform the socio-educational context, appropriate the demands of their profession and enter the domain of competent educational practices.

The subject of Multicultural Mexico, is an institutional subject within the curricula of all degrees offered at the Autonomous University of the State of Hidalgo, and being institutional means that all students of all Bachelor's degrees, regardless of the disciplinary area, have to take the course at any time during their program. For this research, the subject is located in the second semester of the Bachelor's Degree in

Educational Sciences, and its main objective points towards the recognition of Mexico as a multicultural, biodiverse and multi-ethnic country, by analyzing the peculiarities and characteristics of its historical process, with a focus critical of the economic, social, political and cultural problems in order to value the richness of the cultural and natural heritage of Mexico (UAEH, Program of subject: Multicultural Mexico, 2014). The program consists of four units that contribute to the following themes:

• Culture: theoretical positions,

• Retrospective vision of multiculturalism,

• Socioeconomic and political problems of ethnic minorities

• Hidalgo: a multicultural state.

For the RECREA project, the intervention was localized in the fourth unit was considered: "Hidalgo: Multicultural State", dealing with the topic of national and foreign migrations (Oriental, Lebanese, English, Jewish). This unit has the purpose that the students can recognize the ethnic groups of Mexico and the state of Hidalgo, to assess the cultural expressions of ethnic groups, as well as to develop and apply intercultural competence for diversity. It should be noted that in the development of this topic the focus was on the renewal of the teaching-learning process, where the mechanisms for achieving a meaningful learning were innovated.

To accomplish the above, the following aspects and steps were developed:

1. Context of the unit of the subject, unit of competence and sub-competences.

It was important to consider the planning of the teaching-learning process in view of the renewal of these processes in the sense of innovation and creativity. The graduation profile was restated, the description of the relation of the subject to the graduation profile and the description of the exit competence of the subject, emphasizing aspects of complexity, research and use of ICT.

The curriculum of the Bachelor of Educational Sciences (UAEH 2014) establishes that the graduate will have a solid socio-humanist formation, the ability to identify, analyze, as well as to transform the economic, political, cultural and social context in which is education is performed. The graduate also will be able to design innovative alternatives, intervene in a creative way in the processes of research, management, evaluation and teaching, among others. Based on the foregoing, it was recognized that the course on Multicultural Mexico retakes knowledge, values and skills that impact the holistic and comprehensive education of students, especially related to the knowledge of indigenous peoples and recognition of diversity. This means, students can recognize Mexico as a multicultural, biodiverse and multi-ethnic country, analyze the peculiarities and characteristics of its historical process, with a critical approach to the economic, social, political and cultural issues in order to value the wealth of the cultural and natural heritage of Mexico. In addition, the units of competence were described and priorized, among which the recognition of diversity, teacher training and investigative or intervention competence stand out.

2. Tasks / projects of learning, classes of tasks, performance objectives.

In this step it is important to consider learning outcomes aimed at solving complex problems of professional reality. Therefore it is necessary to learn by competencies with tasks and projects that represent different situations and contexts, which means that the learning tasks for the subject were enunciated as well as the different strategies to develop a complex thought, a linkage with the investigation, and use of ICT. Finally the performances for each type of learning task were outlined.

Based on the above, the following tasks were planned with their respective performance objectives: first the students will identify the surnames of foreign origin in Pachuca, then investigate activities and products that foreigners brought to Hidalgo or Pachuca and reconstruct migratory flows, placing them in time so that in the end they deepen into the life history of a family or migrant person.

3. Supporting information (theoretical and strategic), procedural and practical part of the tasks.

This aspect considers the exit competences of the subject and the units of competence that are translated into actions and decisions meant to be carried out to solve the task or project and therefore help to carry out the analysis, the selection of additional information, procedural and practices that are necessary for the content of the course. For this purpose, the following actions, involving the use of ICT and representing an ascending degree of complexity, were proposed:

- search for sources of information (articles, newspapers, historical archive, informal interviews),
- compile the list of foreign surnames,
- relate the surnames with countries of origin and make a list,
- visit to the nearby town of Real del Monte[11], including a tour in the English cemetery and a visit to the "Paste Museum",
- investigate in historical archive the causes and moments of migration,
- prepare a map with the migratory flows,
- elaborate a timeline indicating the moments of migration,
- identify a family or migrant person and establish the rapport for the interview,
- elaborate an interview script,
- record the interview about the family history and the details of the migration

and finally as a task of greater complexity analyze the data based on causes, process and effect of migration.

4. Scaffolding the homework / learning project.

At this point the mediation that the teacher can offer is important regarding the difficulty of the tasks / projects that are being solved, as well as the supports that he provides to model and facilitate a transit

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[11] Real del Monte is a little silver mining village in the mountains, close to Pachuca, the capital of the state of Hidalgo, where the first english migrants from Cornwall during the XVIII century. Those miners left as part of their cultural heritage a typical Cornish food, the now called pastes (Mexican version of the english word pasty) and of course, the soccer game.

of levels of difficulties. Therefore the motivation must be present with the students in the learning. The students were guided in the realization of the different tasks ranging from the simplest to the more complex, and were asked the following deliverables or products: a field journal, photo album, research cards, world map, timeline, quotation and script for interview, and finally a matrix of migratory aspects or Ishikawa diagram, which involved the development of a complex thinking, where diverse elements, gathered together by the student throughout all the activities, converged.

5. Evaluation of the resolution / execution of the task / learning project.

The evaluation must correspond to the performances expected of the students, so it is necessary to explore methods and instruments of evaluation that provide the evidence to allow the inference if the competition has been achieved. In this sense, several rubrics were elaborated, corresponding to the various products that were asked from the students. Each rubric clearly explained what was expected of each one of them, such as the research competition rubrics, comprehension rubrics and rubrics for the analysis of migratory flow and complexity and finally a rubric on the performance of the use of Technologies.

6. Presentation to the students of the task (s) / project (s) of learning.

It is necessary that the teacher explains and presents the instructional design to the students of of the course, so that they know the purposes and sequence that implies the revision of this topic and that goes from the beginning to the end of the teaching - learning process.

3. Conclusion

The implementation of the RECREA methodology in the mentioned example of the learning unit on foreign migrations to the Pachuca region in Hidalgo, Mexico as part of the theme "Hidalgo: multicultural state", left a series of learnings and reflections from both the teachers and the students:

The RECREA methodology means a very close interaction of the teacher with the subject to be taught, that is to say a broad preparation of the instruments, activities and rubrics of evaluation, which implies a considerable investment in time and effort during the preparation of the classes. The instructional design may seem rigid and contradictory with the postulate of complex thinking, which must have a relationship with the context and the uncertainty that exists in it, that is, chaos, and therefore be flexible in its application. This makes the repetition, implementation and application of instructional designs for teachers not trained in the RECREA methodology quite difficult.

Students who participated in the activities and tasks of the learning unit evaluated the activities that they developed in a positive way. They recognized that the fieldwork allowed them to contextualize far better what they had learned previously in class and to value the cultural contributions of other countries and other cultural groups. The students expressed their vision of the experience in the following words: "[...] we learned many things, all this doing field work; since of what we already had been investigated in the Multicultural Mexico class, by going to Real del Monte we confirmed and reaffirmed some things, for

example everything that foreigners left us, of which we appropriated ourselves. So by investigating further we could contextualize many more things, as well as see the impact that migration makes or how it has an impact on the society "(quote taken from student assessment sheets).

In conclusion, the renewal of the teaching and learning process, requires a permanent work of reflection and constant research in the educational process, where traditional paradigms are broken which actually work in schools. But this process is not easy having executing teaching practices that have worked in authoritarian models for a lifetime. in addition collaborative work is required in which the logical signification of the materials that is used throughout the course is recovered, as well as the psychological significance of the material in which the student develop complex thinking. Finally it is necessary to count with a favorable attitude of the student, including emotional and attitudinal dispositions towards learning.

6. Acknowledgement

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Photosensitizer Using Visible Light: An Undergraduate Laboratory Experiment Utilizing an Affordable Photocatalytic Reactor

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Abstract

In this experiment, the visible light reactive photosensitizer (PS) derived from chlorophyllin sodium copper salt has been synthesized via a simple synthetic route. The enhanced photocatalytic activity for the decomposition of the pharmaceutical compound Diclofenac Potassium available as Voltfast sachets under visible light irradiation was demonstrated by comparing the photocatalytic decomposition of Diclofenac Potassium in the presence and absence of the new synthesized visible light photosensitizer under the same photocatalytic conditions. Based on the experimental results, higher activity was achieved for the sample composed of the new synthesized visible light photosensitizer. The photosensitized sample using the new derivative of chlorophyllin sodium copper salt exhibited approximately 21 times higher rate when compared with that of Chlorophyllin sodium copper salt sample. This photocatalytic activity can be attributed to the enhanced visible light harvesting of the new derivative of Chlorophyllin sodium copper salt.

Keywords: Diclofenac Potassium; visible light; photosensitizer (PS); Chlorophyllin sodium copper salt

1. Introduction

Over the past few decades, photocatalysis has received much attention due to the ability of photocatalysts to generate hydrogen from water splitting[1] and the elimination of hazardous pollutants.[2,3] To date, TiO_2 and TiO_2-based catalysts have been the most extensively studied photocatalysts.[4,5] TiO_2 is only active under UV light irradiation due to its wide bandgap of ~3.20 eV. [6] Ultraviolet (UV) light occupies only ~ 4% of the entire solar spectrum, whereas visible light occupies ~ 45% of the solar energy. Therefore, the development of visible-light responsive photocatalysts is necessary requirement to tune the band gap and enhance the photocatalytic activity of the such photocatalysts. Aside from TiO_2, many other single-phase multicomponent oxides were introduced, and were found to be active for degradation of organic pollutants and water splitting under visible light irradiation.[7]

Solar energy is free, most abundant among all renewable energy sources. Energy from the sun reaches the earth surface at a rate of 1.2×10^5 TW by far, exceeding the current world energy consumption of 17 TW $(1TW = 10^{12}$ J/s).[8] In plants, chlorophyll, a highly abundant tetrapyrrolic compound, plays an important role in harvesting light energy and conserve it as ATP and NADPH through photosynthesis.[9,10]

There have been a few reports on the utilization of chlorophyll as a photosensitizer as an alternative for different photocatalytic materials i.e. chlorophyll-modified Pt/KTa(Zr)O₃ and chlorophyll-Cu modified ZrO₂ have been shown to enhance water splitting over pure semiconductor counterpart.[11,12] Moreover, chlorophyll modified MCM-41 and ZnO have been shown to accelerate dye degradations under UV–vis irradiation.[13,14]

Chlorophyllin sodium copper salt ($C_{34}H_{31}CuN_4Na_3O_6$; Figure 1), a water-soluble bright green color pigment derived from chlorophyll has been found to have antimutagenic activity as well an antioxidative properties which attributed to its highly delocalized electron system with the ability to act as a radical scavenger.[15-17] Moreover, the photochemical behaviour of chlorophyllin sodium copper salt have been studied using organic photovoltaics and optical spectroscopy.[18-22] Nonetheless, the utilization of SCC as a photosensitizer in organic reactions has yet to be investigated thoroughly.[23,24]

A drawback of using chlorophyll as photosensitizer is its instability under thermally or photochemically conditions. There are many reports that show the thermal and photochemical instability of chlorophylls and isolation/characterization of their degradation pathways/products.[25-29] The structural similarity of chlorophyllin sodium copper salt to chlorophyll makes its vulnerable when subject to either thermal or photochemical conditions. Furthermore, photobleaching of chlorophyllin was investigated[30] as well as that of chlorophyllin sodium copper salt which was found to be temperature dependent.[31]

The purpose of this experiment is to use derivative of chlorophyllin sodium copper salt photosensitizer[32] shown in Figure 2 as a thermally and photochemical stable substitute of commercially available chlorophyllin sodium copper salt for the decomposition of diclofenac potassium as a model pharmaceutical contaminant present in water.
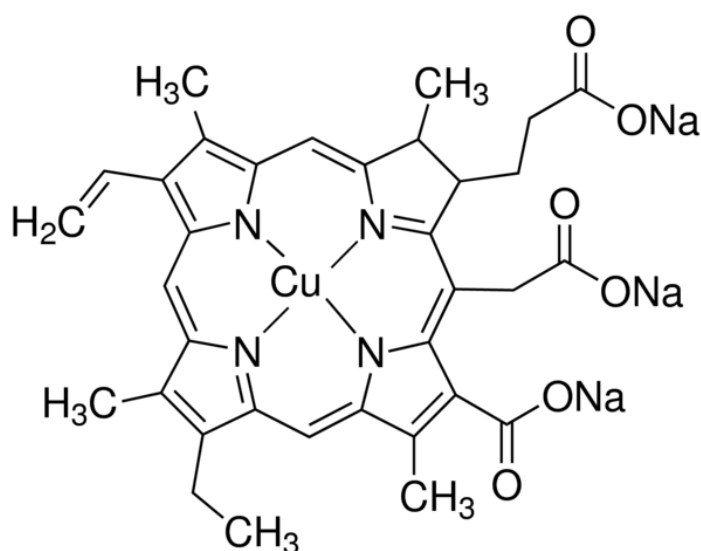

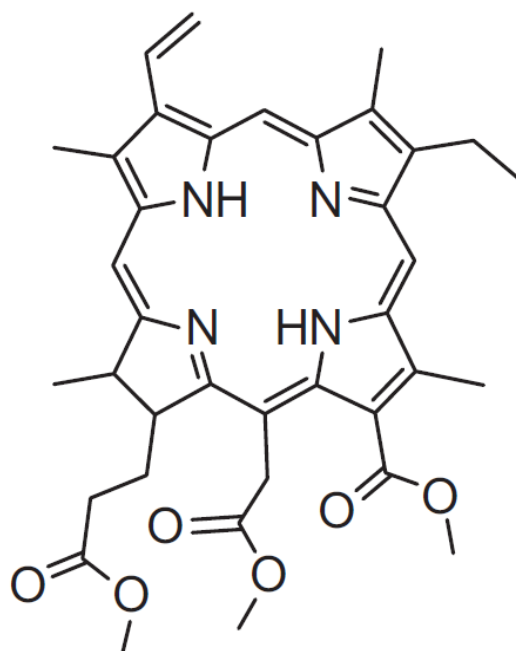Figure 1. Chlorophyllin sodium copper salt

Figure 2. Derivative of copper-chlorophyllin as photosensitizers

2. Experimental

2.1. Materials

All chemicals were purchased from Sigma Aldrich and were used as received without any further purification. Diclofenac Potassium commercially known as Voltfast was purchased from local drug store. Aqueous solutions were prepared using doubly distilled water passed through a Milli-Q apparatus.

2.2. Preparation of the photosensitizer

1 g of chlorophyllin sodium copper salt was dissolved in a 100mL solution of 37% HCl and absolute methanol (50% each v/v). The mixture allowed to stir for 4 hours at room temperature. To monitor the progress of the reaction, thin-layer chromatography was performed to identify the new photosensitizer product formed. The mixture then was purified by column chromatography using silica gel and eluted with Dichloromethane (DCM)/Methanol (MeOH) = 10:1 (v/v). Eluted solution was then removed using rotary evaporator.[32]

2.3. Photocatalytic activities

The photocatalytic activity was evaluated by measuring the rate of decomposition of Diclofenac Potassium (commercially available as Voltfast sachet) as a model pharmaceutical compound from aqueous solution at neutral pH. The photocatalytic experiments were carried out using 200 mL (0.8×10^{-4} M) solution placed in a 500 mL round bottom flask irradiated from the side (10 cm from the radiation source) with visible light using 500 W Halogen lamp (OSRAM HALOLINE) with wavelength range 380-780 nm. The round-bottom flask was attached to condenser open from the top to the atmosphere. In all experiments, an optimized amount of 25 mg/100 mL of the photocatalyst dispersed in 300 mL of DI water. The irradiation was performed under magnetic stirring at room temperature. Sample aliquots (3 ml) were taken at the desired

time and then filtered to separate the solid photocatalyst. The experimental setup is shown in Figure 3. The decomposition efficiency of the samples was defined in terms of the C/C_0 ratio, where C_0 and C represent the initial and final concentrations of the Diclofenac Potassium at t_0 and t respectively. Moreover, solution of chlorophyllin sodium copper salt (5 X 10^{-5} M) was also prepared, tested with and without adding Diclofenac Potassium in order to compare the efficiency of chlorophyllin sodium copper salt with the new synthesized photosensitizer derivative of chlorophyllin sodium copper salt.
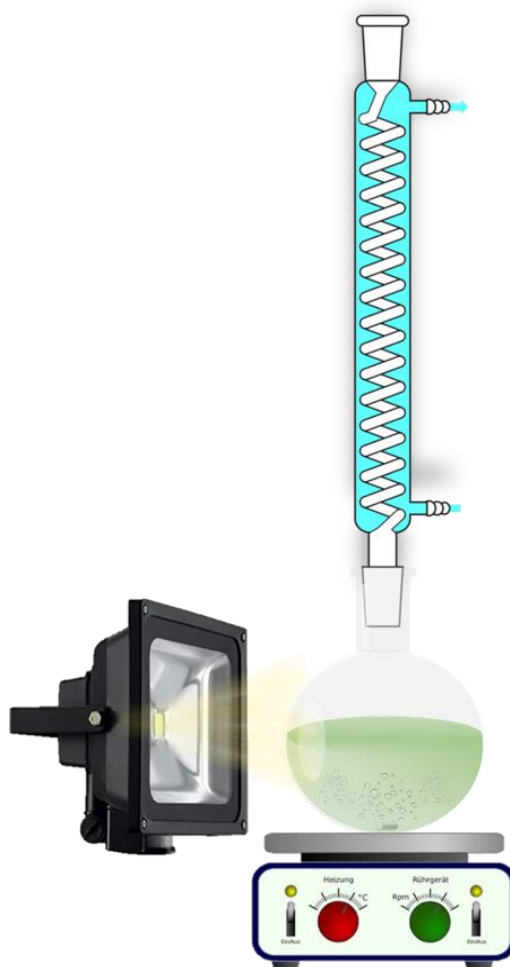
Figure 3. Photoreactor setup

3. Results and discussion

Photocatalytic instability of chlorophyllin sodium copper salt was studied by analyzing its decomposition rate under UV-Visible irradiation in aqueous medium. Figure 4 shows the UV-Vis absorption spectra for decomposition of chlorophyllin sodium copper salt. As shown, results indicate that chlorophyllin sodium copper salt decomposes rapidly over time. For a period of 3 hours, the Q band appeared around 360 nm of chlorophyllin sodium copper salt is almost completely decomposed with calculated rate of 4.9 x 10^{-3} min^{-1} as shown in Figure 11. Therefore, light harvesting capability of chlorophyllin sodium copper salt under photochemical or thermal condition is limited. Although, we attempt to test the decomposition of Diclofenac Potassium in presence of chlorophyllin sodium copper salt solution, results are shown in Figure

6 demonstrating a lower observed rate when compared to the new synthesized chlorophyllin sodium copper salt derivative photosensitizer i.e. 0.002 min^{-1} relative to 0.0042 min^{-1}. Furthermore, as a control experiment, Diclofenac Potassium decomposition rate (Figure 5) was analyzed in the absence of the new synthesized photosensitizer, the decomposition rate constant found to be 0.0017 min^{-1}. In contrast, decomposition of Diclofenac Potassium in presence of the new chlorophyllin sodium copper salt derivative photosensitizer exhibits higher photocatalytic activities (Figure 7) compared to that of chlorophyllin sodium copper salt with a rate constant of $4.2 \times 10^{-3} \, min^{-1}$. Figures 8 and 9 present the graph of C/C_0 vs. time by which the variation of the concentration of observed for the different photosensitizers as well as control
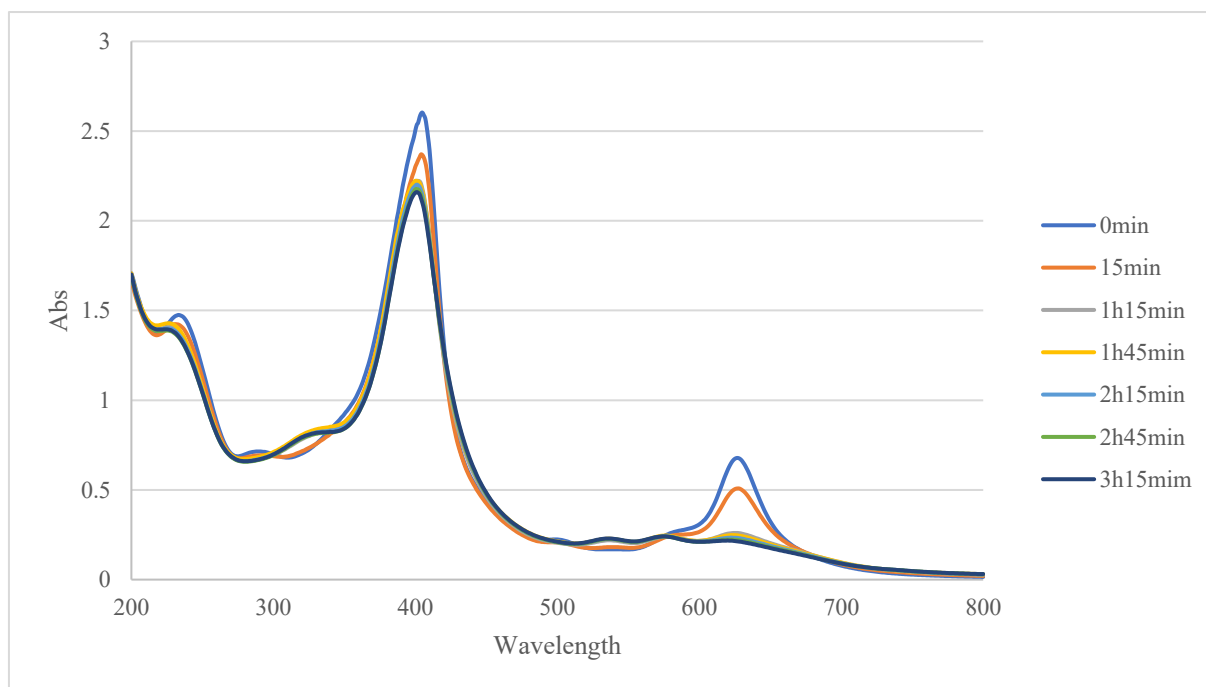
Figure 4. Decomposition of chlorophyllin sodium copper complex under visible light irradiation
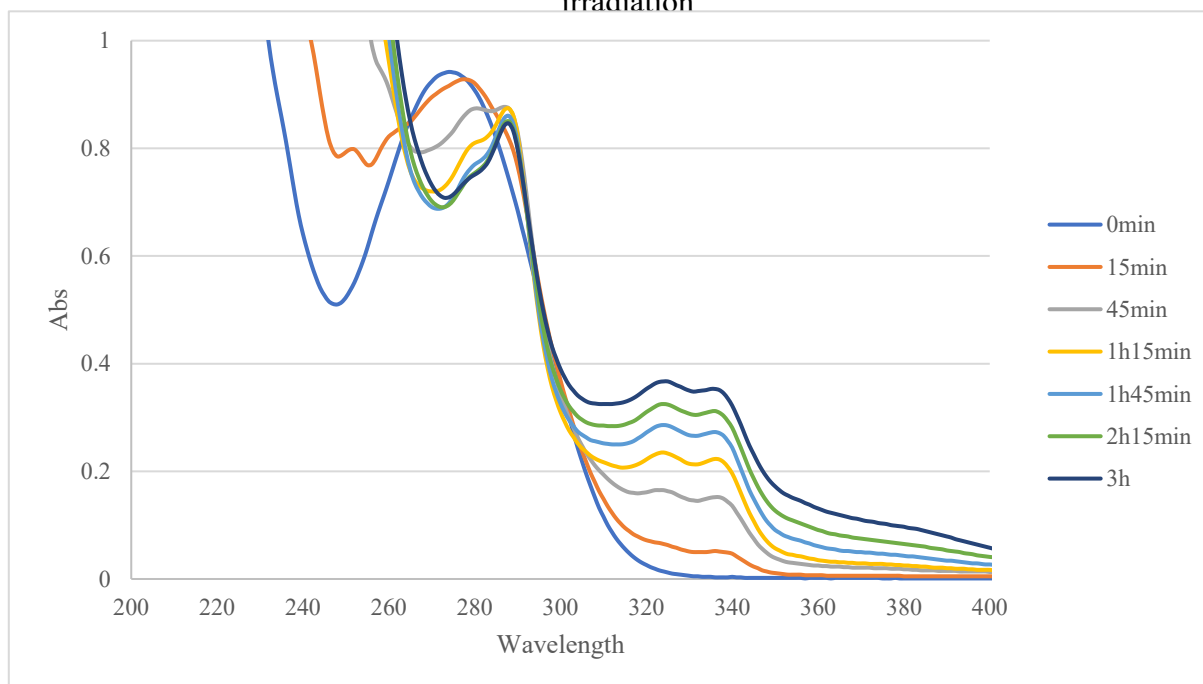
Figure 5. Decomposition of diclofenac under visible light irradiation
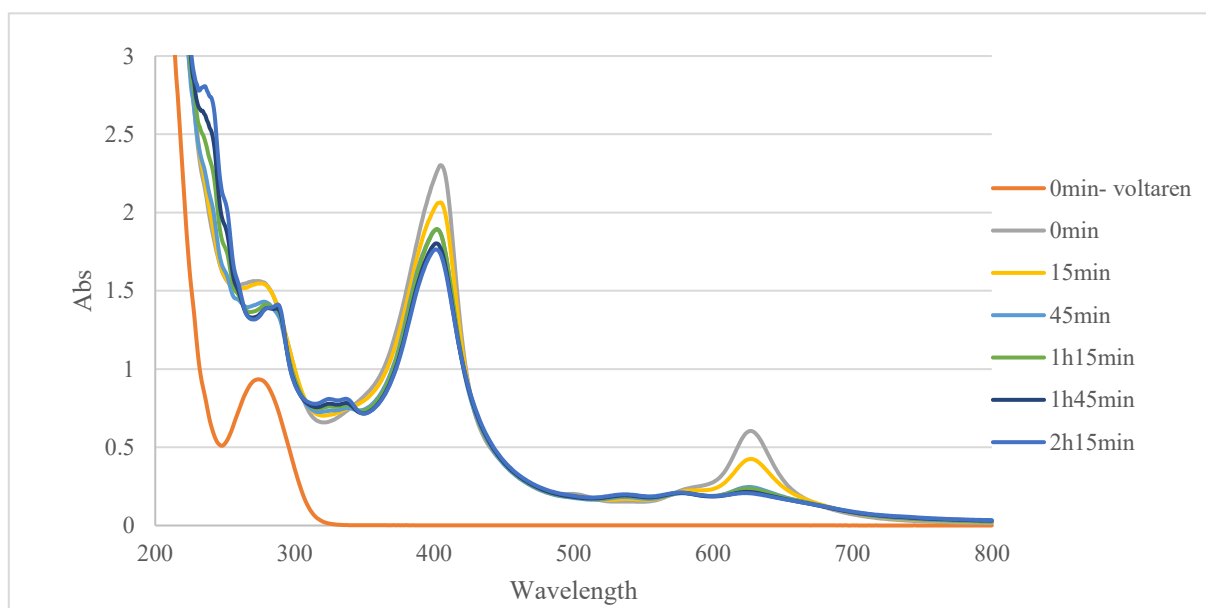
Figure 6. Decomposition of diclofenac in chlorophyllin sodium copper solution under visible light irradiation
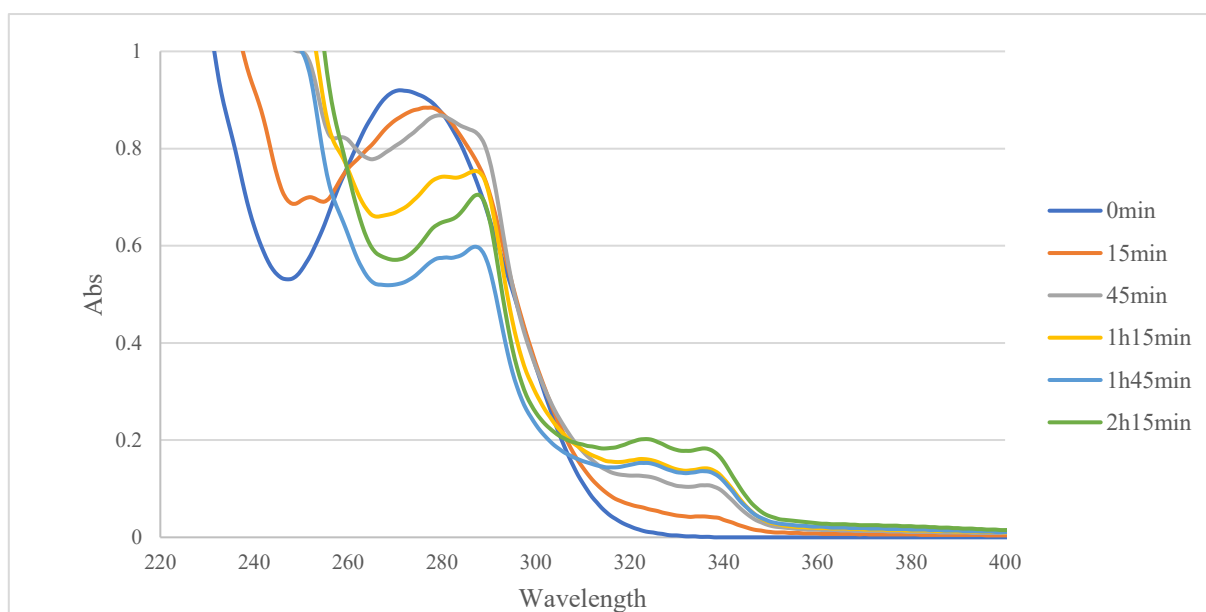
Figure 7. Decomposition of diclofenac under visible light irradiation in the presence of copper-chlorophyllin derivative.
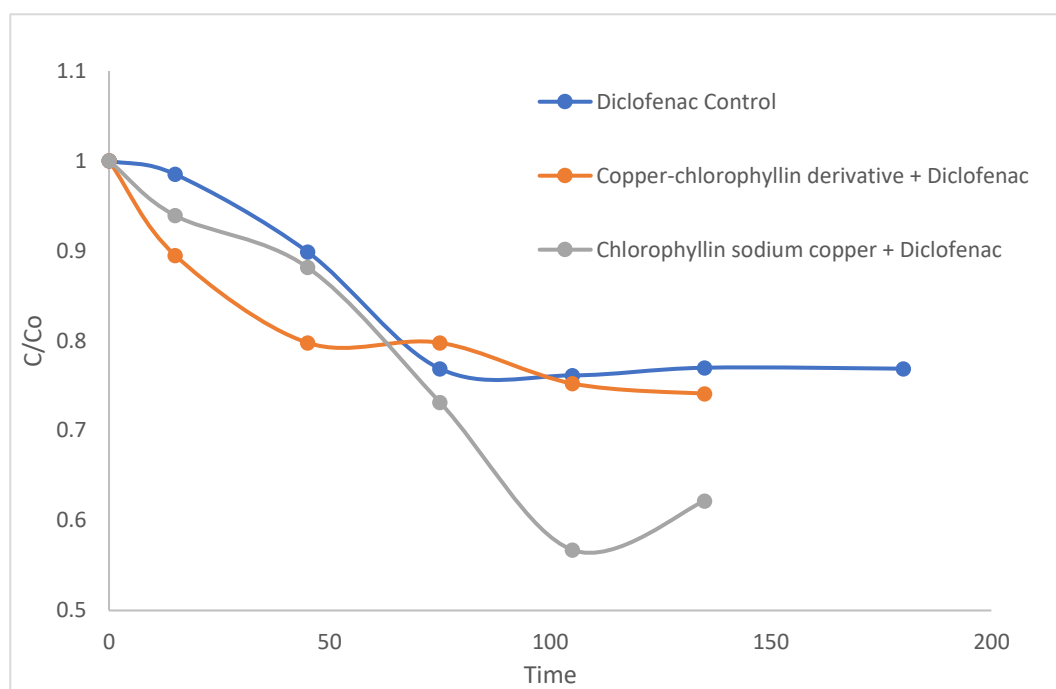
Figure 8. Variation of concentration of diclofenac over time under visible irradiation
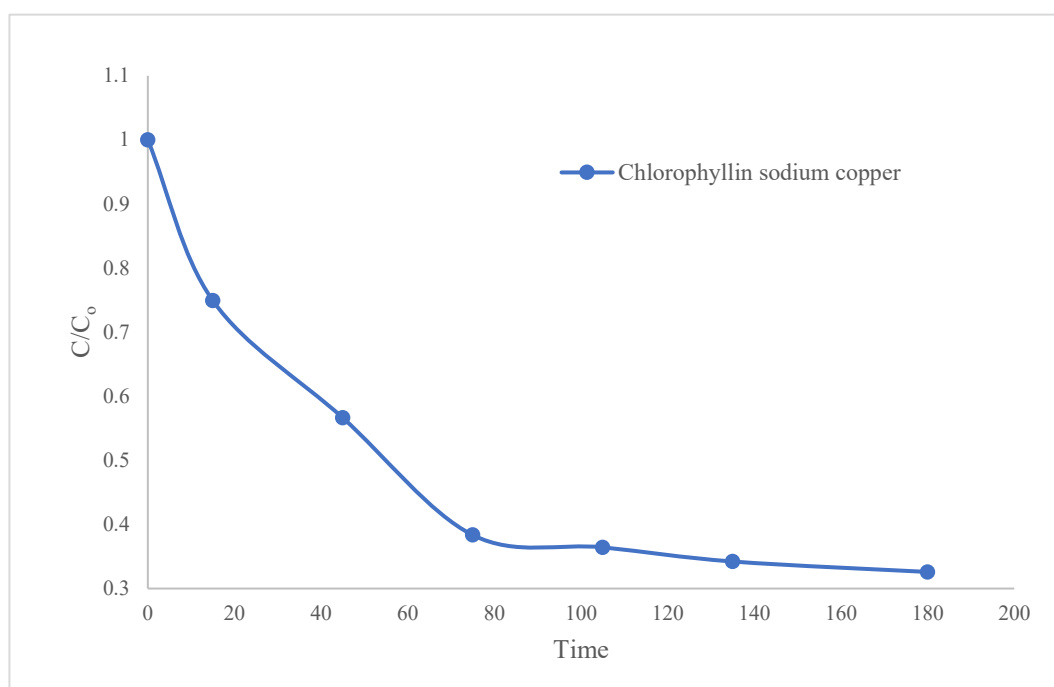
Figure 9. Variation of concentration of chlorophyllin sodium copper complex over time under Vis irradiation
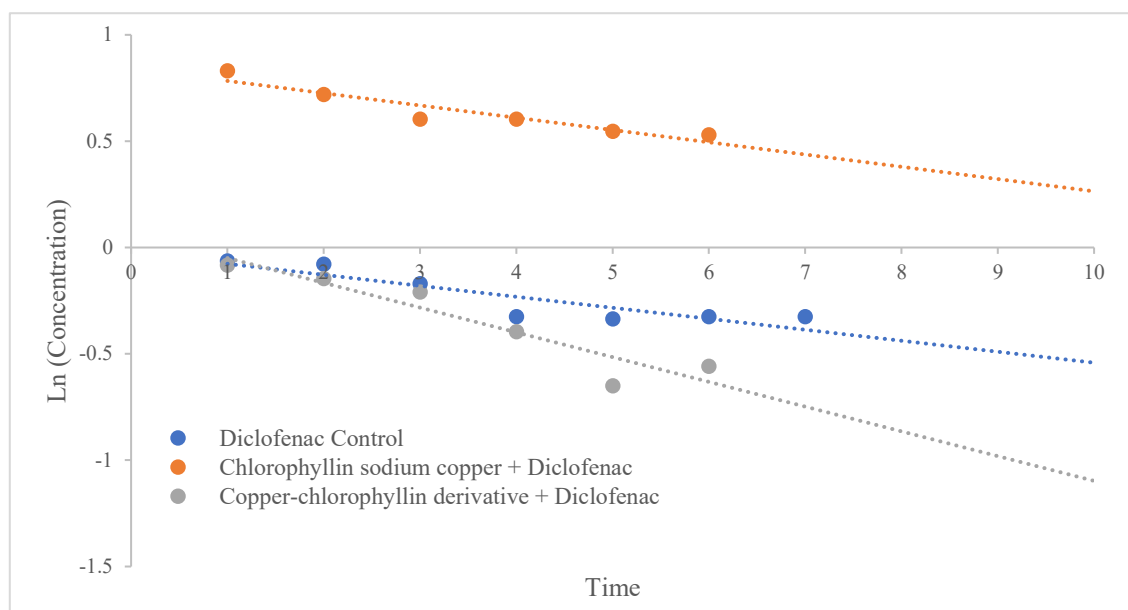
Figure 10. Kinetic plot of (Ln (Concentration)) over time for the disappearance of diclofenac.
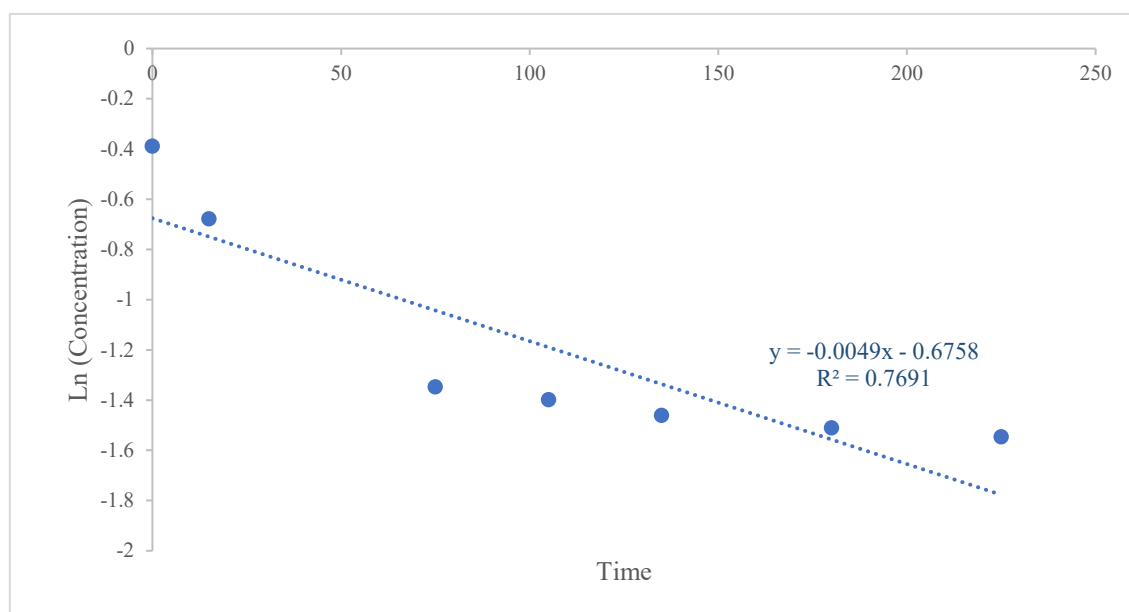
Figure 11. Kinetic plot of (Ln (Concentration)) over time for the decomposition of chlorophyllin sodium copper complex under visible irradiation.

experiments under visible light irradiation with time up to almost 3 hours. The variation in -ln (C_o/C) as a function of irradiation time was reported in Figures 10 and 11 by which the rate constants were calculated. The observed photocatalytic activity follows the order depicted in Figure 12.
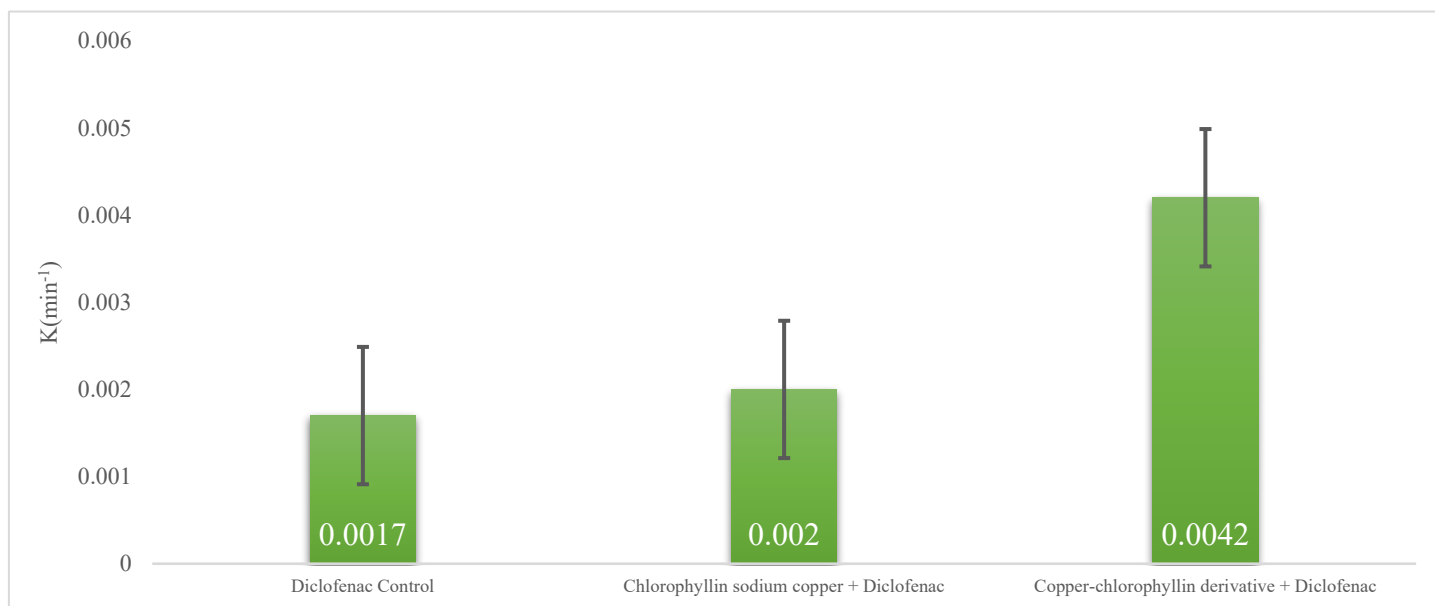
Figure 12. Rate constant for kinetic study

Conclusion

New chlorophyllin copper complex derivative photosensitizer was synthesized using affordable commercially available copper-chlorophyllin as a starting material and a simple chemical method. The activity of the new photosensitizer was measured using model pharmaceutical Diclofenac Potassium in aqueous medium. The enhanced photocatalytic activity of the new synthesized photosensitizer is attributed to its stability under photochemical conditions when compared to chlorophyllin copper complex. The newly developed photosensitizer can be used as light harvesting in combination with photocatalyst which can be applied in photocatalytic energy relevant processes such as water splitting and carbon dioxide reduction.

Acknowledgments

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A Smooth Transition: A Phenomenological Approach to Understanding the Experiences of First-Time, Full-Time, Provisionally Accepted Black Male Students

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Abstract

This article is the result of research conducted provisionally admitted Black make students enrolled at four different public universities in the Southeast. The researcher sought to answer the following research question: What are the lived experiences of provisionally accepted first-time, full-time Black male students within their first year at a state college and state university?

Participants were selected based on having the highest and lowest Expected Family Contribution scores of the eligible population. The researcher utilized a phenomenological approach and multiple methods of data collection. This resulted in rich data that has been categorized into themes. The article concludes with implications for college and university faculty and administrators, as well as for future research on provisionally admitted Black male college students.

Keywords: Black Male College Students, provisional acceptance, student persistence, socio-economic status, phenomenology

1. Introduction

Students arrive on college campuses with varying levels of academic preparedness. While most admitted students meet admissions requirements, some students do not fully meet the requirements and are admitted on a conditional or provisional basis. These students may not have a high enough Grade Point Average (GPA), high school class rank, and/or standardized test scores (Adebayo, 2008; Palmer & Davis, 2012). As provisionally admitted students are particularly at risk for non-degree completion (Adebayo, 2008; Nora & Crisp, 2012), many colleges and universities have established conditions for the population to meet in order to gain full admission status. These include provisions such as remedial coursework for which college credit is not earned, GPA requirements, mandatory tutoring, and supplemental academic advising (Heaney & Fisher, 2011). These conditions, coupled with the socioeconomic factors, precollege experiences, and self-efficacy, may have an additional impact on provisionally accepted Black male students' social and academic experience within the higher education setting (Harper, 2012).

According to the university system where the research was conducted, 37% of the student population at two-year state colleges and 18% of the student population at four-year state universities require

remediation. There is only a 5% completion rate difference for learning support courses between two and four-year state institutions. More specifically, in comparison, two-year state colleges have a 93% loss of provisionally accepted students because only 7% of them graduate within 3 years; whereas, four-year state universities have a 75% loss of provisionally accepted students as only 25% of them graduate within 6 years (University System of Georgia, 2016). Each of the state two and four-year institutions provide remediation courses for provisionally accepted students.

State colleges and state universities are responsible for the most significant increase in graduation rates over the past ten years because of their accessibility nationwide (Doyle, 2010). State institutions provide admission and learning opportunities for students who otherwise would not be eligible to apply for admission to select university system four-year research and comprehensive universities. Both research and comprehensive universities do not fully admit students who do not meet their admission requirements. Minimum admission requirements include acceptable scores on standardized tests such as the SAT and ACT and a minimum high school GPA (University System of Georgia, 2016).

2. Literature Review

2.1 Key Literature on Black Male College Students

Harper's (2012) qualitative study, "The National Black Male College Achievement Study," focused on Black, undergraduate men. This study was conducted at 42 different college sites with 219 participants. His participants were Black males who had been successful in postsecondary education. Harper discussed the many factors influencing the academic success, retention, and graduation of Black males categorized in three areas: precollege socialization readiness (family support, K-12 experiences, and college preparatory resources), college achievement (classroom experiences, engagement outside of class, and supplemental educational experiences), and post-college success (enrollment in graduate schools and career readiness). He found less than 50% of Black males graduate on time compared to nearly 80% of White males. With graduation rates at the lowest, the graduation rate of Black males was less than 4% in 2009, nearly the same rate as in 1976 (Harper, 2012). Moreover, Harper (2012) suggested financial stress is a major factor hindering academic success for black males, as 47% of them withdrew for financial reasons.

Understanding the lived experiences of this unique yet growing population of students, who will ultimately transition into the general population of students, warrants close scrutiny through the lens of qualitative research. In this case, the research may provide useful information for improving the social, instructional, and educational environment of provisionally accepted students. Capturing the unique personal experiences of first-time, full-time, provisionally accepted Black male students within the context of these institutions during their first academic year will provide insight for the development of more inclusive strategies for assisting and retaining provisionally accepted Black male students.

Further, Superville (2015) asserted there was an increasing graduation rate gap between Black and Caucasian students by nearly 20 points from 2009-2010 and 2012-2013, nationally. In 2012, the national

graduation rate for Black males was 59% and 80% for White males (Superville, 2015). Superville noted of the 48 reporting states, 35 states reported Black male, high school graduation rates were the lowest of all races and ethnicities (20%). This research provides insight on pre-college factors and missed opportunities to learn like the excessiveness of Black male students identified as special needs and out-of-school suspension. These factors may have a direct effect on this group of students' college readiness as only 16-20% graduate from college in Georgia (Superville, 2015).

According to Jenson (2011), there are several factors influencing student retention on an individual level (educational achievement, assertiveness, and contentment), institutional (academic commitment), and social and external level (social and familial support). These factors illustrate the multi-layered obstacles students encounter as they try to matriculate and successfully adjust academically and socially. These factors also influence student success (Jenson, 2011). Jenson suggested students' ability to integrate and immerse themselves in a new environment is based on the students' individual past experiences such as their academic performance in high school, characteristics, social skills, and study habits. Black male students often struggle with this transitional and integrative experience (Jenson, 2011).

2.2 Conceptual Framework

To gain an in-depth understanding of the lived-experiences of first-time, full-time, provisionally accepted Black male students, it is essential to also discover the essence of those experiences by analyzing relevant literature and reputable research. For this study, the researcher focused on the participants' pre-college experiences and self-efficacy through the lens of Pascarella's General Causal Model (Pascarella, 1985). According to the model, there is a significant relationship between the organization, its environment, and student retention.

There are many factors that influence student persistence and academic success. These factors include student retention, engagement, motivation, and ultimately their lived-experiences (Pascarella, 1985). To apply the General Causal Model to the lived experiences of the researched population, one must first consider precollege experiences and characteristics such as student demographics, academic success, and preparation. The next consideration in the model is student self-efficacy. These include motivations, emotional and behavioral responses, and overall resiliency. Finally, student engagement is applied to the model. This can be environmental, such as academic or social activities, or individual, such as cognitive development or student perception. All of these factors, when considered together, can be indicators of students' ability to persist and achieve academic success.

3. Methods

The researcher explored the lived experiences of first-time, full-time, provisionally accepted, Black male students at state colleges and state universities to address the following research question: *What are the lived experiences of provisionally accepted, first-time, full-time, Black male students within their first academic year at state colleges and state universities?*

The researcher examined the phenomenon of first-time, full-time, provisionally accepted, Black male students in a comprehensive manner and provided an awareness of their lived experiences. By allowing participants to reflect on their experiences, the researcher gained an understanding of their lived experiences as a participant of the phenomenon.

Potential participants were selected based on having the highest and the lowest Expected Family Contribution (EFC) scores. EFC was a determining factor because the researcher believed that participants with the highest and lowest EFCs would provide varying perspectives of how socioeconomic status may play a role in their pre-college experiences and how those experiences influence their ability to succeed at state colleges and state universities. From this group, a total of eight students self-selected to participate in this study.

The present study was limited by the participants' degree of comfort and ease conveying personal experiences and their perception and feelings during the interviews and focus groups. The study involved four institutions within the state: two state colleges and two state universities. The findings are not generalized to all state colleges and state universities.

Participants were asked to reflect on their lived experiences with the phenomenon. The researcher examined individuals' experiences through the exhaustive accounts of each participant through interviews and focus groups. To achieve the goals of this research, a purposeful, inductive approach was used to identify similarities of responses within the emerging data and to identify relationships between the participants and their personal experiences and the context in which they both exist. Data was collected using 90-minute in-person interviews, a Skype follow-up interview, and 90-minute Skype focus group. The richness of data from the in-person interviews helped construct the questions for the follow-up Skype interview and focus group.

Data was transcribed, coded, and categorized and then the researcher determined connections, established categories, and analyzed them according to patterns of similarity, frequency, causation, and sequence, also known as classification reasoning (Strauss, 1987). The following results provide an overview of student perceptions and describe themes associated with the researched question.

4. Results

Two overarching themes emerged from the data: "now and then" as well as "intervention and prevention."

4.1 Now and Then

One of the most prevalent findings was students were actively engaged in their academic success both presently and precollege. All of the participants struggled with mathematics in high school, there was a deficiency in their skill level in mathematics in college. According to the participants, because they wanted to build on their math skill set, they took every opportunity to seek assistance by attending after-school

tutorial programs in high school and in college. Both low EFC and high EFC students partook in after-school tutorial assistance. This study's findings support existing literature that reported pre-college characteristics and experiences, socioeconomic status, self-efficacy, student engagement, and social network systems are important to the academic success of Black male students (Harper, 2012; Wood & Williams, 2013).

The participants began to consider college at an early age. The most consistent response to the question "When did you first begin to think about college?" was between sixth and eighth grade. Due to the influence, support, and early exposure of what college could offer from their parents and middle school teachers, both groups considered college early. Preparation for SAT and ACT started as early as the ninth grade for both groups. After comparing the data between low EFC and high EFC, the data was also compared between state college participants and state university participants to identify similarities and differences between the two groups.

Each EFC group's precollege behaviors and characteristics were found to be consistent. Low EFC participants were found to have higher GPAs in high school and college, regardless of their enrollment in a state college or state university, than High EFC participants. Low EFC participants perceived their academic success in high school and college was due to their participation in after-school tutorials, on-campus tutorials, and working closely with their teachers and professors. High EFC participants described their participation in after-school support services and on-campus support services as limited or not at all. Participants were asked if they sought after-school assistance in high school and what on-campus resources they utilized for assistance with their writing and math. One participant stated, "I go to tutorial for help because I have always needed help. It wasn't something I had to train myself to do." Another participant stated, "Because I knew I had to do better than high school, I knew something different had to be done." Much like after-school tutorial sessions sponsored by the high schools, the on-campus tutorial and academic services were also free, readily available, and sponsored by the institutions. Tutors were best described as individuals who are knowledgeable, interesting, and fun. One participant stated, "It's easier to understand my math assignments in the [tutoring center] because the student helping also took the professor I was taking at the time."

All participants shared their interactions with their professors both inside and outside of the classrooms. These interactions were described as much needed and the encounters were encouraged by the professors. One participant stated, "Interacting with your professors is important." Another participant said, "The professors here are helpful. I like sitting with them and talking with them in their office more so [than] in class though." These sentiments were described by both low EFC and high EFC participants.

Despite the participants' EFC status or institution type, advisors played a significant role in student success. The participants spoke highly of their academic advisors. Their responses were often accompanied by a smile or grin. Each of the participants, according to the responses from the interviews and Skype focus

groups, have a continuous and helpful relationship with their academic advisors. One participant compared the assistance he received from his academic advisor to that of the assistance from his high school guidance counselor as he stated, "My advisor reminds me so much of my guidance counselor. She is always checking on me if she doesn't hear from me in a while."

The advisor-student relationship was also compared to a mother-son relationship. One participants stated, "My advisor is like a mother to me. Whenever I pitch an idea to her or let her know I need help with a class or something, she never lets me down." There was only one participant who had a male advisor, and their relationship ended at the end of his first term. The participant did not care to express why.

For many participants, the support of their academic advisors mimicked the support of their family. The participants' family supported them 100% as they pursued their college dreams. Most of the participants grew up in single parent households with mothers who attended or recently enrolled in college. Three participants had mothers who either did not attempt or graduate college. So, the "mother figure" the participants are drawn to are their female academic advisors.

Though the socio-economic status of the two groups were diverse, their precollege academic engagement and characteristics and lived experiences during their first academic year were so similar, differences were nearly missed. A repeated review of the data was necessary to find that both groups: low EFC students and high EFC students were equipped with the skills for academic success. What worked to help students succeed (participants had varying definition of success) in high school transposed itself into their habit for pursuing success at the college level despite skill level deficiency, behavior issues, socioeconomics, or parental level of education. Moreover, despite their institution type, the students found support in their academic advisors and social support services on campus.

4.1.1 Intervention and Prevention

All of the participants described their admissions process as a smooth transition. One participant noted, "I had stopped considering college until I went to a Black College Expo with a friend, and I met the admission recruiter from the school. We talked for a while. Before I left, he helped me with FAFSA and my admission application." Another participant stated, "Adjusting to college wasn't as bad as I thought it was going to be. I had to learn that I can't just call. Face-to-face communication works best." Despite their provisional admission, precollege experiences, and college level deficiencies, the participants were able to transition and integrate themselves to both two-year state colleges and four-year state universities.

Six of the eight participants, four from state colleges and two from state universities, regardless of being identified as high EFC or low EFC, were Pell recipients. These participants represented 75% of the participants in this study. One participant described his transition from student-athlete to student after losing his scholarship. He explained he lost his scholarship immediately after quitting the team. He later described having to "balance work and school to pay for school expenses and to help my mother pay bills."

Another participant was a dependent of two military parents: one active duty and one retired. When asked if he received Veteran's Affairs benefits, he stated "I didn't know there was an office on campus that helps with that." He stated, "I didn't want to be a burden to my family, so I work to help them out."

Despite SES status, six of the eights participants (four low EFC and two high EFC) expressed their concerns about their financial aid counselors when they were asked to "describe important characteristics you look for in a financial aid counselor?" One participant stated, "They need to be on top of it. If they need to fire and hire new staff then they need to do that." Another participant suggested, "I feel like they should be better…umm…proactive to resolve some of the issues up front while explaining to students this stuff not at the end of the term when they add balances to people's account. It's never a fun experience." Not all of the participants' experiences were bad. One participant reported, "If you complete FAFSA on time, there will be no problem." Another participant stated, "If there is something wrong with my account, I can go to my financial aid counselor, and they show me how to find other means for paying for school." Six of the eight participants suggested they have or know someone who has encountered an issue with financial aid. The participants were asked "Have you encountered a bad experience with financial aid?" One student said, "A lot of people's classes get dropped here in the beginning." There was a concern with financial aid because students collectively felt they were not seen as students, but as a number. One participant stated, "No matter who you talk to in financial aid, they [are] either rushing, rushing you, or have an attitude for some strange reason. No matter how patient I try to be." Another participant said "No one explained to me telling me the difference in my financial aid options. I think one day talking to my advisor she explained to me the difference between subsidized and unsubsidized loans. This was way after I took them both out."

Low EFC participants graduated from high school with a B average, but did not attain standardized test scores high enough for full admission to their respective institutions. They did not have any precollege behavioral issues. Contrarily, participants with high EFC scores were found to have had precollege behavior problems and a slightly lower GPA. Combined, two participants were suspended 25 times in middle and high school. One participant stated "I was suspended twenty times in high school." When asked, "What were the reasons for your suspension?" one participant stated, "I was trying to be like my friends." Another participant stated, "I was doing what I saw others do in my neighborhood. I took home to school with me." Participants with low EFC scores did not have a history of high school or middle school suspensions. High EFC participants were found to have spent more time out of class in middle and high school due to their high in-school and out-of-school suspension rate compared to Low EFC participants.

One High EFC participant stated, "I have grown since high school. I monitor who I include in my circle now." Another participant stated, "I can't do what I did in high school. School is a more serious than high school." The students' precollege experiences and characteristics have not defined who they have become as a college student. The participant with the highest suspension rate was a New Student Orientation leader and has not had any disciplinary issues. According to the data, provisionally accepted Black male students

are involved and engaged with their professors in and out of the class and they seek academic support for intervention and prevention to improve their deficiencies.

5. Discussion

State colleges and state universities are responsible for the most significant increase in graduation rates over the past ten years because of their accessibility nationwide (Doyle, 2010). State institutions offer admission and learning opportunities for students who otherwise would not be eligible for admission to select four-year institutions. In Harper's (2012) qualitative study, he discussed the many factors influencing the academic success, retention, and graduation of Black males. He categorized these factors in three areas: precollege socialization readiness, college achievement, and post college success. According to Harper (2012), college achievement was influenced by classroom experiences, engagement outside of the classroom, and supplemental educational experiences. Post-college success included enrollment in graduate school and career readiness.

Understanding the lived experiences of this unique yet growing population of students, who will ultimately transition into the general population of students, warrants close scrutiny through the lens of qualitative research. In this case, the participants' analyzed data provided useful information for improving the social, instructional, and educational environment of provisionally accepted students. Capturing the unique, personal experiences of first-time, full-time, provisionally accepted Black male students during their first academic year provided fundamental data for the development of more inclusive strategies for assisting and retaining these students.

5.1 Making a Connection with Success

The participants in this study were age 20 or younger. On average, these participants have only been out of high school three years. Three of the participants from the low EFC group graduated high school with a B average and one graduated with a C average, although none had standardized test scores high enough for full admittance. Their parents were, and still are, actively involved in their academics. These participants also utilized high school tutorial services without it being mandated by their teachers. Much like their high school experiences, these participants struggled significantly in math. One participant stated "I had to retake college algebra one summer in high school."

The participants with high EFC scores had slightly lower grades in high school. Of the four, three graduated with high school with a C average and one graduated with a B average. Like the low EFC group, none scored high enough on standardized tests to be fully admitted to college. Each of the participants expressed their frustration with math and sought after-school assistance to improve their deficiency level in mathematics. One participant stated, "Math is something I have never been good at." The participants credited their parents for the push and the support services on campus, like writing and tutoring centers, for helping them bridge the skill gap for mathematics and writing.

Each of the eight participants passed their remedial course on their first attempt, during their first semester. Only 37% of the student population at state colleges and 18% of the student population at state universities require remediation (University System of [Blinded] State, 2016). Of that population, 7% graduate from state colleges within three years and 25% graduate from the state universities in 6 years. When asked "Are you on track to graduate on time?" each of the participants responded "Yes." The findings from this study reflect Jenson's (2011) assertion that there are several factors that impact student success, including assertiveness, academic commitment, and social and familial support.

In the present study, it was determined precollege experiences and characteristics impacted students' lived experiences during their first academic year. The results of this study support Pascarella's (1985) argument there are many factors that influence student persistence and academic success: student retention, engagement, motivation, and ultimately their lived-experiences. The results of this study indicate the participants shared similar academic success and preparation. Most students had B averages and sought academic support.

Additionally, the findings from this study support Jenson's (2011) assertion that students' ability to integrate and immerse themselves in a new environment is based on the students' individual past experiences. These experiences include their academic performance in high school, characteristics, social skills, and study habits. According to previous research on the population, Black male students often struggle with social integration and maintaining study habits (Jenson, 2011). The findings in this study contradict that trend because each of the participants asserted they were actively engaged in their academic success. It is imperative to understand the dynamics influencing the academic success of Black males and develop strategies for assisting and retaining provisionally accepted students.

Each of the participants stated they were not assigned mentors by their institutions. Four of the eight participants have mentors who were from their neighborhood or someone from school. The findings from this study indicate there is a need for peer or faculty/staff mentorship on campus because these participants initiated their mentor relationship. When asked, "Would you like to have a mentor on campus?" one participant stated, "I wanted one, so I asked my advisor to be my mentor. She agreed, but she is helping me to find a male mentor also." Ehrich, Hansford, and Tennent (2004) concluded mentoring programs increase students' confidence, thereby diminishing the likelihood of cognitive dissonance. Moreover, there are three ways to counter cognitive dissonance: change the disposition of the individual or group, familiarize oneself with a variety of resources, and eliminate or diminish the level of importance of unrelated ideas (McLeod, 2008). It is essential for this group of students to make a connection with an on-campus mentor. Mentors provide students with a tangible resource for both academic and emotional support necessary for their academic success.

On-campus support from academic advisors was a critical factor influencing academic success for this group of students. This type of support reflects their family support. One student asserted "My advisor is

the go-to person to help me with everything. When I was struggling in my remedial math course, she helped me find a tutor and feel better about myself." Another participant stated, "My advisor is like my mom. She supports me without judging me." This study affirms Bandura's (1994) research which discussed advisors promoting student through development of positive self-efficacy.

5.2 At-risk for Success

Researchers concluded Black male students enrolled in college face multiple factors influencing their ability to persist (Harper, 2012; Wood & Williams, 2013). Students who were identified as low EFC were found to have a higher academic performance than those who were identified as high EFC. The present study found that these students had what Zimmerman (2000) described as increased motivation and increased autonomy for learning. Their increased motivation did not begin once they were admitted; their drive for success preceded their enrollment. This habit played a significant role for improving their academic motivation.

The common thread between students who were identified as low EFC and high EFC attending state college or state university is that they were automatically viewed as at-risk. Despite the participants' differences in school enrollment and EFC score, this study found each of the participants' efficacy beliefs impacted their emotional reactions, individualized efforts, and time spent preparing for academic success, the length of time the participants persevered during difficulties, and their resiliency (academic, social, or environmental) (Pajares, 1996). Each of the participants asserted their high school provided "Free after-school tutorial." One participant stated, "I was surprised to see my principal teaching my after-school math session."

The participants' sense of self-efficacy was influenced by what Dewey (1938) called their continuous and interactive learning experiences. Their continuity in terms of lived, real world experiences and believed knowledge is the outcome of their enhanced prior learning experiences. Hence, one participant stated, "I have never been good in math. That was my only weakest subject. When my sister went to college for less than a year and came home, it was my motivation to do what I had to do to be better." Most of the, the participants began to think about college in middle school. They were actively engaged in preparing for the SAT and ACT. One participant stated, "I bought my own SAT prep book and did the practice examples from it over and over." Another participant stated, "I was involved in TRIO (Federally funded student services and outreach programs) and every Saturday we practice test taking skills."

The participants' precollege experiences and characteristics paralleled Hibbs (2012) self-efficacy strategies that influence Black male students, their mastery experiences, and most importantly, their overall academic achievement. The average GPA for low EFC participants was 2.28. The highest GPA for this group was 2.6. The average GPA for high EFC participants was 1.95. The highest GPA for this group was 2.43. There was a variance in majors to be considered. The majors ranged from Engineering to Marine Science.

6. Recommendations

6.1 Recommendations for Professionals

The findings from this study indicate that the socioeconomic status of Black male students does not predict academic success at state colleges or state universities. Institutions should assess students' individualized self-efficacy to build understandings of the internal, self-existing, self-perceived competence of provisionally accepted Black male students. Creating increased opportunities for student engagement will allow provisionally accepted Black male students to participate in a smooth transition into their college experience, countering potential pre-college characteristics developed in K-12.

Administrators at both state colleges and state universities should encourage faculty to become more engaged with their students, both inside and outside of the classroom to establish lasting relationships and mentorship. Peer mentoring programs could help first-time, full-time, provisionally accepted Black male students transition successfully as well. The participants have mentors, but they are not campus faculty. One participant asked his advisor to be his mentor. Further, both administrators and faculty should help the students' become engaged on campus. An assessment of students' interest is needed to evaluate the needs for clubs and organizations offered on both state colleges and state universities. This supports both Harper's (2012) concept of Black male college achievement and Jenson's (2011) factors influencing retention.

6.2 Recommendations for Future Research

Given the increasing population of students requiring remediation at state colleges and state universities, college administrators need to learn more about students' common precollege experiences and characteristics and perceptions during their first academic year. One recommendation is to study Pascarella's (1985) General Causal Model, because it provided a formative understanding of how students' pre-college experiences affect their ability to transition, integrate, persist, and succeed academically in post-secondary education. Secondly, there is a need for research that explores various assessments of student interests for implementing on-campus clubs and organizations. Student involvement and engagement is also a measurement of academic success, integration, and progress. A third recommendation is to replicate this study at the same four institutions in three to four years to determine if any modifications have been made to improve the experience, retention, and graduation rates of Black male students. The final recommendation is to reproduce this study in a different setting such as two other state colleges and state universities within the system or in a different state to determine the impact of participants' precollege characteristics and experiences on academic success.

7. Conclusion

The findings of this study support the need for assessing institutional programs, clubs, and organizations to attract the interest of a diverse student body. Additionally, it would be fitting to consider all of the social support services discussed in this study, for example: academic guidance and advising, student success

courses, learning communities, informed financial aid support, and social networks. One of the most prominent findings was participants wanted to engage and interact with their faculty both inside and outside of the classroom. It is imperative for administrators to require faculty to implement activities and assignments that facilitate engagement between themselves and their students. Mentorship should also be considered a significant entity for student involvement and engagement with faculty and staff apart from their academic advisors. Precollege experiences and characteristics influence students' behavior and tendencies during their first academic year. College level deficiencies can continue to be improved if programs like TRIO and after-school tutorials are offered. Students engaged in these programs are most likely to seek academic support during the first of year of college. State colleges and state universities that provide holistic social support programs for first-time, full-time, provisionally accepted students will continue to have increased retention, matriculation, and graduation rates of this population and of all students.

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Design and Analysis of Project-driven Flipping Classroom Teaching Cases

--Take the "Web Design and Production" course as an example

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Abstract

"Web Design and Production" is a strong practical computer science foundation course. The concept, ideas and techniques of web front-end development have an important impact on the follow-up courses. The paper compares and analyzes the reform in current teaching methods of the course, and proposes a project-driven flipping classroom teaching method, which rationally decomposes and reorganizes the curriculum knowledge system, and divides the curriculum content into several modules. Meanwhile, each module is driven by a project, mixing problem-based teaching methods, task-driven methods and flipping classroom teaching methods. The paper clarifies pre-class, in-class, and after-school tasks. Knowing the project tasks before class, understanding the knowledge and skills needed for the design project, using the micro-curriculum resources to learn and practice knowledge autonomously; detecting the learning effect of knowledge in the class, solving the problems in the self-learning, and apply the learned knowledge to the actual project development by the way of group collaboration in order to promote internalization and application of knowledge, when encountering new problems, teachers not only explain new knowledge to help students continue to implement the project, but also promptly recorded the completion of the project of the group collaboration; After class, teachers summarize questions, build a knowledge system, and guide students to complete extended design of project. In this way, students' practical application ability, project development ability, self-learning ability and creative ability can be improved. This article also provides specific instructional design cases based on the "Web Page Layout and Beautification" module and provides specific teaching design cases.

Keywords: project-driven; flipping classroom; instructional design; case;

1. Background of the study Heading

The "Web Design and Production" course is an important professional foundation course for undergraduate computer majors, and it is also a theoretical and practical course [1]. With the rapid development of Internet technology, new platforms such as mobile Internet have grown, and the development concept and technology of web front-end have undergone major changes [2]. In order to comply with the development of technology, close to the needs of enterprises for talent quality, the content of the course must be kept up to date, and the objectives of the course should be upgraded to a website that meets the W3C norms, has commercial development characteristics, and achieves enterprise-level application level. In order to accomplish the teaching objectives in the same class, the curriculum reform is imperative.

2. Putting forward a question

Using the knowledge network search keyword such as "web design" or "web front-end development" or "web front-end development", there are a large number of articles related to educational reform. At present, there are several popular teaching methods, for example, problem-based teaching methods, task-driven methods, and project-driven methods. The task-driven teaching model is based on constructivist learning theory and diversified learning theory, making students to be driven by tasks to continuously explore and solve tasks and ensure the diversified development of students. The task-driven approach is mainly based on the task-oriented, teacher-led, student-centered teaching model [3]. The PBL (Problem-Based) pedagogy focuses on "problems" and "learners" and combines various teaching concepts such as "self-learning", "inquiring learning", "cooperative learning", and "group discussion" [4]. The project-driven teaching method is a type of teaching activities based on the project, which is implemented to combines students' learning activities with actual projects and make teachers and students jointly study and implement a specific project. And it is a teaching model that encourages students to actively participate, collaborate and innovate [5].

These three methods have received certain teaching effects, which emphasize that teachers should improve students' ability of self-learning and solving practical problems in the actual operation, but they also have the following problems:

2.1 Limitations of the method

The three methods have different focuses on the solution of knowledge points in teaching, and cannot solve all the problems encountered in teaching. For example, project-driven teaching is suitable for the case of multiple knowledge points. A project is divided into several sub-projects, which are completed by the group students, but each sub-project can be driven by questions or by task. For example, in the project of designing a pure HTML5 video player, it is complicated in the steps to setting the appearance of the player for a beginner. But it is easy to understand, and it can be completed by the students themselves by the way of task-driven method; However, the player's custom control bar needs to be set using JavaScript's pause() and play() methods, currentTime and volume attributes. It is necessary to organize the teaching based on PBL.

2.2 The depth and breadth of knowledge

In the implementation process of the three teaching methods, the teachers speak relatively little, that is, at the beginning of the class, some new knowledge points or relevant resources will be explained according to the requirements for the students to self-learn, which aims to help students carry out follow-up self-investigation and left most of the time to students to practice, which leads to the improvement of students' knowledge and practical ability. However, it is difficult for students to have a deep understanding of the knowledge. At the same time, in order to complete a problem, task or project, most of the non-coherent knowledge content is taught in units, which is easy to fragment the knowledge points and lack knowledge relevance. It is impossible to achieve systematic and in-depth study, and subsequent learning practices are difficult to implement effectively.

2.3 Teaching efficiency and teaching effect

All three methods require students to have high information literacy, thoughtful thinking and self-

consciousness in learning. It is easy to get lost when students are finding resources. At the same time, there are problems such as discarding the false information and retaining the true information and effect verification, which will lead to that teaching and learning task may not be completed in a limited class. At the same time, task-driven or project-based teaching will fragment knowledge and not cover all knowledge. Students just complete tasks, and innovative applications will not be discussed.

In response to the above problems, the "Web Design and Production" course can use the project-driven flip classroom teaching method, and make full use of the three time periods -before, during and after the class, to effectively combine a variety of teaching methods to solve problems.

3. Research methods

3.1 Literature law

Reading, analyzing, and collating relevant literature materials on topics such as flipping classrooms, blended learning, and"project-driven"in China Knowledge Network, providing argumentation basis and research methods for research topics, and clarifying the research direction of the research.

3.2 Action Research

Guided by constructivist learning theory and humanistic learning theory, it uses a variety of research methods and techniques to construct a project-driven flip classroom teaching model.

3.3 Practice method

The teaching model will be constructed using practical teaching to find out the shortcomings and correct them.

4. Purposes of research

Investigate and improve the project-driven flip classroom teaching design model, and provide teaching reform demonstration cases for the practical courses in the computer major.

5. Process of research

5.1 Project-driven flip classroom teaching method

The flipping classroom is a teaching method of "student learning first, teacher after teaching", including three stages before class, during class and after class. The first stage is self-learning of pre-class knowledge, the second stage is to solve problems in class, to promote the internalization and application of knowledge, and the third stage is the evaluation and expansion of knowledge. [6]

The project-driven method is a project-based teaching activity which is implemented by providing a complete project. [7] The teacher arranges the project tasks, the students understand the project and learn new knowledge, the teacher explains some difficult content, and the student cooperates in groups to complete the project. This teaching method can combine theory with practice, fully explore the creative potential of students, and improve students' comprehensive ability to solve practical problems.

The project-driven flip classroom teaching method is to mix the project-driven method with the flip

classroom teaching, that is, in the whole process of course teaching, the project-driven method is used. In the process of project implementation, the task or problem-driven is mixed to the improve students' ability of knowledge exploration and practice ; In order to ensure the deep breadth and systemicity of the basic knowledge, the use of the flip classroom teaching method not only plays a leading role in guiding, inspiring and monitoring the teaching process, but also fully reflects the initiative, enthusiasm and creativity of the students as the main body of the learning process, which can promote effective teaching and effective learning. [8]

5.2 Update and reorganization of the course content

In order to meet the needs of the current talent development system for web front-end development related enterprises, this course teaching system is composed of three modules: HTML, CSS and JavaScript. It needs to be extended to HTML5, CSS3, JavaScript, Jquery and other core technologies and combine with responsive layout. Taking the "Web Design and Production Online Course" website design project as the main line, the course content is divided into nine major modules and 17 projects, including plain text web design, graphic display web design, form web design, canvas web design, audio and video web design, web page layout, responsive web page layout, and design of web pages based on the Bootstrap framework, each project contains the core knowledge points of the course, and the teaching hours are 64 hours.

The following is an example of the "Webpage Appreciation Page" design project in the "Webpage Layout and Beautification" module to explore how to implement a project-driven flip classroom teaching design.

5.3 Analysis of students

The learning objects of the curriculum are 28 students from the second year of the digital media technology major at our university, who have learned one-and-a-half-year professional courses. Therefore, these students have a certain understanding of the courses involved in the major, certain programming skills and preliminary project development capabilities.

The "Web Page Appreciation Page" design project is the course of the eighth week. In the first seven weeks, students have learned the basics knowledge of HTML5 and CSS3 and have carried out some project practices. They have mastered the way of setting tags and properties of HTML5 text, list, image, hyperlink, form, audio and video. Student can also use CSS3 to beautify page elements and rich content of web pages. Meanwhile, students have adapted to the project-driven flipping classroom teaching method, and have clarified the importance of the web front-end course for digital media technology major students. Thus, the purpose of learning is strong, and most of students have strong self-learning ability, interaction and collaboration ability.

5.4 Design of project-driven flip classroom teaching cases

The project-driven flip classroom teaching mode is divided into three stages: pre-class, in-class and after-class. The specific design of the case is as follows.

5.4.1 Before classes

Teachers' and students' activity process before classes is shown below:
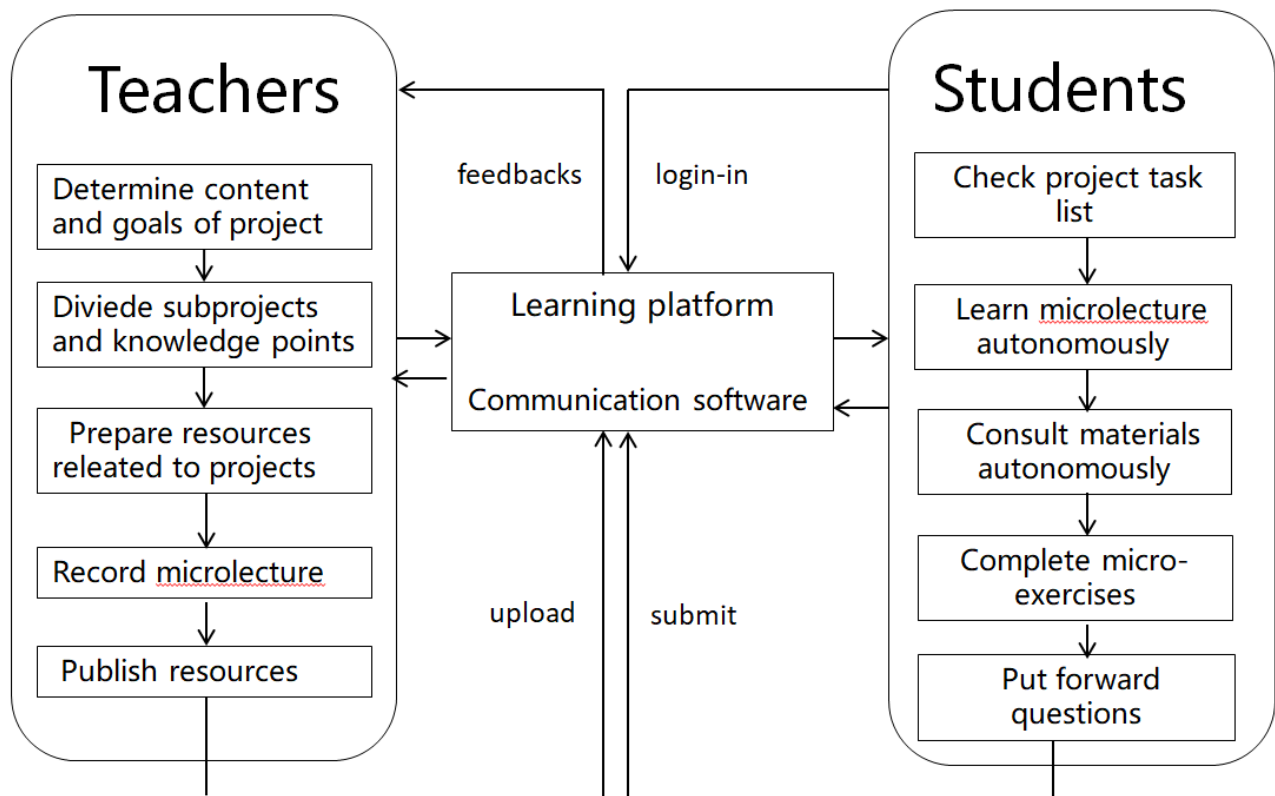
Figure 1. Pre-class teacher and student activity process diagram

1)Determine contents of projects and aims of curriculum

The project of "Web Page Appreciation Page" is the first project in the module of "Web Page Layout and Beautification", whose main goal is to complete the graphics and texts layout design. The teaching objectives for this project based on the three-dimensional[9] objectives are shown in the following table:

Table 1. three-dimensional objectives

Aims of knowledge	Master the respective characteristics of the two box models; Use properties of the display to flexibly set inline elements and block elements; Flexibly use div and span to build the HTML part of the webpage; Master the use of "left" and remove floating methods in float; Master the use of "relative" and "absolute" in position; Ability to use float and position to layout pages.
Aims of process and methods	Using the flipping classroom, students learn micro-videos before class. In the class, students work with students and teachers to solve problems. Apply knowledge learned comprehensively to complete the design of the project of "Web Page Appreciation Page" .
Aims of attitudes and value	Cultivate students' ability of communication and collaboration, analyzing and resolving problems. Strengthen students' ability to develop projects and enhance students' self-learning ability and professionalism.

2) Divide sub-projects and knowledge points, select teaching methods

The project is comprehensive and first decomposed into two sub-projects, that is, completing the addition of elements in HTML and the design of mixed layout of graphics and texts. Each sub-project corresponds to multiple knowledge points, each of which corresponds to a different teaching method, such as task-driven, or problem-solving. Its sub-project decomposition, knowledge points and teaching methods are as follows:

Table 2. sub-project decomposition, knowledge points and teaching methods

Name of sub-projects	Knowledge point involved	teaching methods of microlecture
Add elements of web-pages	Standard document flow	Problem-Based Methods
	Box model	Problem- Based Methods
	div and span	Task-driven methods
Layout of mixed graphics and texts	float	Task-driven methods
	position	Task-driven methods

3) Prepare resources relevant to projects

Description of the project task, through the task description, makes the students aware of the effects that the web design must achieve in this project. It can be represented by video or screenshot. Concept map of project knowledge decomposition, analyzes the main knowledge points and skills that must be possessed to achieve this web page effect; microlecture task list, include learning objectives, learning content, self-learning methods, learning reference resource addresses, etc., while leaving space in the task list, students can record the confusion encountered during study or practice on it; micro-video and courseware, according to the knowledge to make teaching micro-video; micro-questions, students can use the questionnaire star[], Storyline, etc. to develop micro-study questions, which is convenient for students to do questions and teachers to evaluate in time; semi-structured resources of the project can provide some codes to students. Students write additional code based on project requirements.

4) Recording micro lessons and uploading micro lessons

Produced courseware and recording micro-courses according to the instructional design and uploaded these materials to the learning platform.

5) Students learn independently and summarize questions before class

Students view project task descriptions, clarify project tasks, and know the knowledge points and skills required. According to the learning method in the study task list, learn micro-video autonomously. If a certain part of the micro-course cannot be understood, you can consult relevant resources to supplement the learning, or fill in the confusion encountered in the task list to be submitted to the teacher; the self-learning effect is detected through micro-questions. Through self-learning and testing, the absorption and digestion of learning content is initially completed. The teacher refines the problems discussed and solved in the classroom according to the completion of the micro-questions and the confusion raised by the students in the study task list.

5.4.2 In class

The project-driven flipping classroom is a two-way interactive process consisting of students' learning and teachers' teaching.If merely emphasize the self-study of students and neglect the teacher's teaching, the learning effect is not guaranteed.[10] Because the most beneficial changes to student learning are still in class activities, therefore, it is necessary to carefully design classroom teaching activities, including effects check, communication, explanation - guidance, inquiry, supervision, and answering questions.

The process of activities of teacher and students in the lesson is shown below:
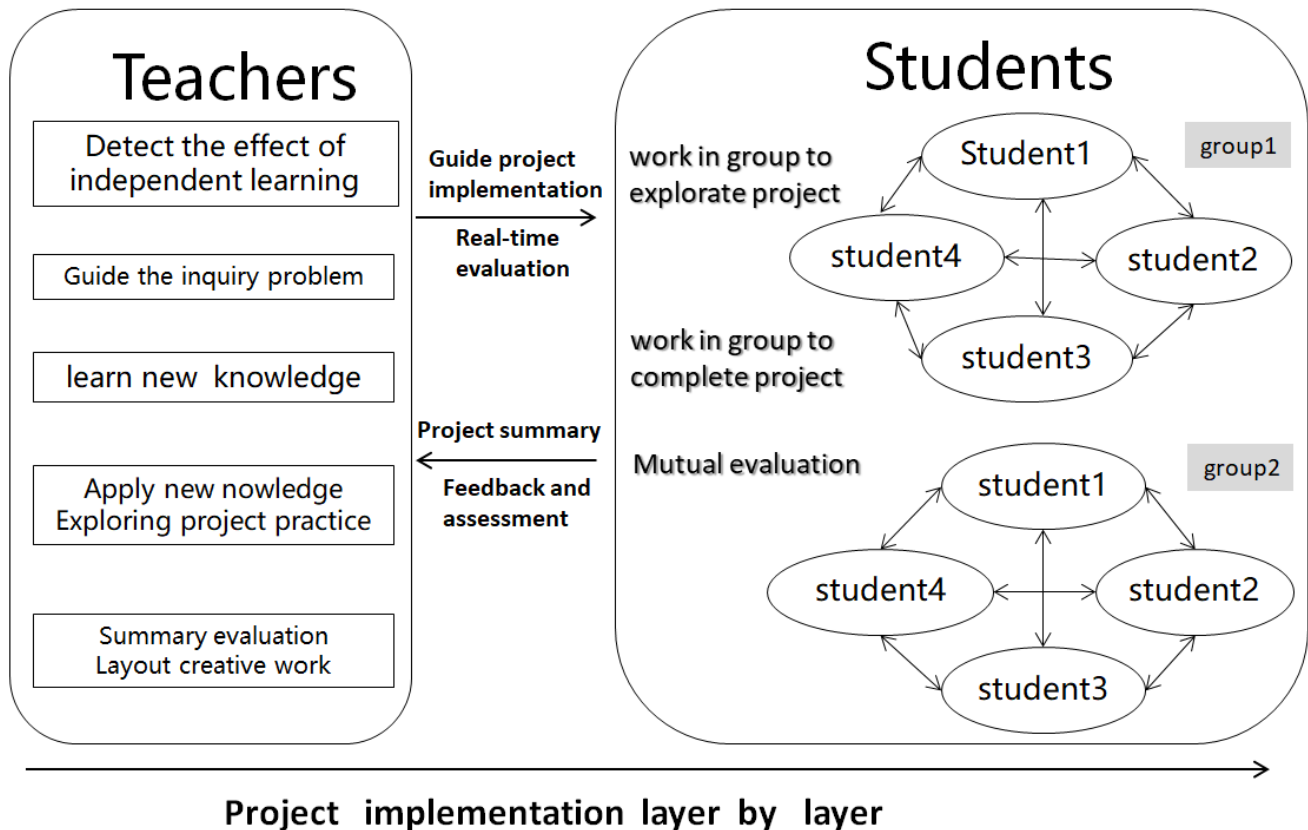
Figure 2. In-class teacher and student activity process diagram

1) Detection of learning effect and problem exploration

In the classroom, students are required to sort out the basic knowledge in the microlecture in the form of concept maps, and ask questions to strengthen students' understanding of design concepts and grammar rules. According to the description of the project task, initially determine the project implementation plan and report it to the teacher for review; the teacher summarizes the confusion that the student feed back in the study task list and the answer to the micro-questions, proposes common problems, organizes student inquiry based on the implementation of the sub-project, and promotes the internalization of knowledge.

2) Learn new knowledge and conduct project practice

In the implementation process of the sub-project, new problems will arise. For example, in this project, it is needed to design a list-based web page rendering area with a border effect, however it is found that the border effect is not achieved after add statements that border: 2px solid #8f8f70; according to the existing knowledge. Therefore, it is necessary to explain new knowledge and analyze the reason using problem-

driven methods. Because it is affected by the floating of the child element, the parent element without the height cannot adapt to the height of the child element, it becomes a straight line;then provide a solution, use the overflow attribute to clear the float, that is, set the parent element overflow attribute value to auto or hidden, then can solve the problem. By this way we can guide students to deep and comprehensively think about problems and broaden the breadth of knowledge.

3) Real-time recording and evaluation

The teacher checks the implementation at regular intervals and forms a file recorded in real time. After the students submit the homework in the classroom, the group will conduct mutual evaluation. Each group of responsible student will demonstrate the characteristics of the group project, list the puzzles. If the problems have been solved, students should share the solutions, and if the problems are unsolved, students should discuss them in the class. Finally, the teacher summarizes and reviews and arranges creative work.

5.4.3 After classes

Teachers gather questions after class and build a knowledge and skills application system. The teacher will conduct a detailed examination of the project assignment submitted by the student, and answer the common problems existing in the voice or screen recording in WeChat or QQ group. When individual students or groups are not doing well, teachers should provide supplementary study tasks and urge them to study again and complete the project as required. At the same time, according to the characteristics of each student or each group of webpage design, the task of expanding the target is proposed, and finally the effect of each characteristic project webpage is formed.

6. Summary and thinking

After the "Web Design and Production" course of digital media of grade 2017 is implemented based on the project-driven flip classroom teaching reform, the students' project development ability, communication and collaboration ability, self-learning ability and innovation ability are obviously stronger than other classes that have not implemented the teaching reform, especially in some platform development competition such as the computer design competition of national college students, students can use the existing web front-end project development experience to design smart and exquisite pages, adding a lot of points for the development of the entire platform.

However, reform is a complex and systematic innovation project. It requires support from advanced teaching theory and technological practice that keeps pace with the times. And teachers need to spend more energy and make more efforts. When designing micro-courses, teachers must skillfully design the content and activities of microlectures to enhance the efficiency of students' self-learning. At the same time, they should not rely too much on certain platforms,classroom teaching is still the core, and all kinds of teaching activities must be carefully designed. Teachers properly set doubts, processes of teaching should be progressive; effective guidance and organization, real-time communication and evaluation are necessary; expansion tasks should be set up cleverly, this is the only way to truly promote the internalization and application of students' knowledge, and promote the effective learning of students.

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THE WORKPLACE: AN IDEAL PRIORITY SETTING FOR HEALTH PROMOTION AND DISEASE PREVENTION

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ABSTRACT

The workplace has been established as one of the priority settings for health promotion and disease prevention in the 21st century. The workplace directly influences the physical, mental, economic and social wellbeing of workers and in turn the health of their families, communities and the society. This paper therefore is of the opinion that the workplace is an ideal priority setting for health promotion because of the approaches, benefits, and the fact that a healthy qualified and motivated workforce future success in a globalizing market place can be achieved with a healthy, qualified and motivated workplace. This paper explains the concepts of the workplace, health promotion and disease prevention approaches and benefits. Conclusion and recommendation were made to enhance the use of health promotion in the workplace because better health produces better people and better performance.

Keywords: Workplace, Health Promotion, Health Promotion, Disease Prevention, Priority Setting.

INTRODUCTION

A workplace is the location where you are employed and where you go to work every day and the workplace is located in a variety of settings including offices, manufacturing facilities or factories, stores, farms, out of doors, and in any location where work is performed (Humanresources.about.com). Promoting good health and preventing disease focus on making people stay healthy. While health promotion engages and empower people to adopt healthy behaviours and make behavioural changes that reduces the risk of developing chronic diseases especially those associated with sedentary lifestyle and other morbidities. And we have several theories and models supporting the practice of health promotion and disease prevention especially in the workplace. These theories and models such as the ecological, the health belief, relapse prevention, stages of model change, social cognitive and reasoned action are used in programme planning to understand and explain health behaviour and guide the identification of strategies for health promotion and disease prevention programmes.

Any definition of a healthy workplace must encompass the World Health Organization (WHO) definition of health, as a state of complete health, physical, mentally and social well-being and not merely the absence of disease or infirmity.

Health promotion has been defined as the process of enabling people to increase control over their health and its determinants and thereby improving their health (World Health Organization, 2005). While workplace health promotion has been defined as the combined efforts of employers, employees and society to improve their health and well-being and offers an ideal setting and infrastructure to support the promotion of health of a large audience like the workplace.

Regrettably, the concept that the workplace is an important arena for health campaigns and as well as basic occupational health and safety programme is not yet widely accepted. Meanwhile, the health of workers is also affected by non-work related factors. Workplace places emphasis on improving the work organization and working environment, increasing workers participation in shaping the working environment and encouraging personal skills and professional development. It suggest tools for maintaining a National healthy workplace initiative such as award system, as an incentive for participating and creation of health workplace network. And to be successful, workplace health promotion has to involve the participation of employees, management and the stakeholders. While some health promotion activities in the workplace tend to focus on a single illness or risk factors (for instance, prevention of cardiovascular diseases). There is growing appreciation that there are multiple determinants of workers health. In addition to person focused intervention, workplace health promotion initiatives have moved towards a more comprehensive approach which acknowledges the combined influence of personal environment, organizational community and society factors on employees well-being. A health promoting workplace recognises that a healthy workplace is essential and integrates polices, systems and practices conducive to health at all levels of the organization rather than a series of projects, workplace health promotion should be an ongoing process for improving work and health.

Effective health promotion assists employers to adopt appropriate administrative procedures and workers to use safe working practices and occupational health enable them to implement it as a part of their occupational health practice.

Experience in workplace health promotion has shown that competition and award are valuable in engaging enterprises in occupational health and safety activities.

The benefits of a healthy workplace reach beyond the individual workers and can also influence the health of families, communities and yield social and economic benefits. A healthy workplace reduces sick leave and turnover and increases productivity and participation. Workplace health promotion means more than simply meeting the legal requirements on health and safety, it also means employers activity helping their staff improve their own general health and well-being. Within this process it is essential to involve employees and to take into account their needs and views on how to organize work and the workplace. By making workers feel better and healthier, workplace health promotion leads to many positive consequences like reduced turnover and absenteeism, enhanced motivation, improved productivity as well as improving the employer's image as a positive and caring organization.

Work place health programmes are a coordinated and comprehensive se of health promotion and protection strategies implemented at the workplace that includes programme policies, benefits, environmental support and links to the surrounding communities designed to encourage the health and safety of all employees. It is therefore vital for all overall workplace health programmes to contain a

combination of individual and organizational strategies and intervention to influence health. The purpose of this study was to look at the workplace as an ideal priority setting where health promotion can be carried out.

WORKPLACE HEALTH PROMOTION

The following are the aspect of workplace health promotion;

- Participation of employees in the process of improving work organization.
- Mental health promotion, that is offering courses for managers on how to deal with stress and tension within their team and providing anonymous psychological consultancy for all employees.
- Exercise and physical activities, such as offering sports courses, promoting an active and health culture at work.
- Health monitoring through check ups for blood pressure and cholesterol levels and others.
- Raising the topic of healthy eating at work, giving information on nutrition as well as offering healthy canteen food or facilities for employers to prepare their own food.

In promoting health in the workplace specific health risk should also be addressed, alcohol and drug awareness, stress conditions like obesity, musco-skeletal disorders, cancer, arthritis, dental health and sexual health. According to Sanjiv and Preetha (2012), Health promotion is more relevant today than ever in addressing public health problems. The term "Health promotion" was carried in 1947 by Henry E. Sigerist, the great medical historian who defined the four major tasks of medicine as promotion of health prevention of illness, restoration of the sick and rehabilitation. According to his statement was promoted by providing labour conditions, education, means of rest and recreation requires coordinated efforts. These were reflected in the obtaining charter for health promotion. Healthy workplaces and healthy working environments translate to better health outcomes for the employee and better business outcomes for the organization (WHO, 2011).

APPROACHES TO WORKPLACE HEALTH PROMOTION

Health promotion efforts can be directed toward priority health conditions involving a large population and promoting multiple interventions (Sanjiu and Preetha, 2012). This issue based approach will work best if complemented by setting based designs. The setting based designs can be implemented in schools, workplaces to address priority health problems. Setting based design also facilitates integration of health promotion actions into the social activities with consideration for existing local situations (WHO, 2008). The setting approach is built on the principles of community participation empowerment, and equity which replaces the over reliance on the individual and an approach to integrate action across risk factors. The healthy cities programme launched by WHO in 1986 was soon followed up by similar initiatives in smaller settings such as schools, villages, hospitals, offices (WHO, 2011).

Models provide a way of thinking about approaches that can be used when promoting health and each will have merits and demerits to be effective. In health promotion we need to use a variety of

approaches. We have medical approach, behavioural change, lifestyle approach, educational approach, empowerment approach and societal change approach.

Education Approach

This is to enable people make informed choice about their health behaviour by providing the knowledge and information and helping them to develop the necessary skills that is giving information to people about the effects of smoking, helping explore their values, attributes and come to a decision. It does not try to persuade or motivate change in one direction and outcome is peoples voluntary choice, which may be different from the one preferred by health providers, it assumes that increase in knowledge will lead to change in attitude and behaviour. The aim is for them to understand the effects of smoking on health and then make a decision whether to smoke or not and act on the decision. The aspect of learning are;

   i.   **Cognitive Aspect:** This is the provision of information about the causes and effect of health related behaviour through the provision of leaflets, pamphlet, booklets, visual display and one on one advice.

  ii.   **Affective Aspect:** This is the provision of opportunities for workers to share and explore their attitude and feelings through one on one counselling and group discussion.

 iii.   **Behavioural Aspect:** This is helping workers to develop decision making skills required for healthy living.

These various methods of health education are effective in improving knowledge; however knowledge is rarely translated into behaviour. These approaches help workers to understand the effects of smoking on health and then make a decisionwhether to smoke or not and act on the decision. This can be achieved through these activities;

   -   Giving information to workers or clients about the effects of smoking, HIV/AIDS, maternal mortality.

   -   Helping them explore their values and attributes and then make a decision.

   -   Helping them to stop smoking if they want to.

Empowerment Approach

This is also known as client centred approach, it has to do with the values of empowerment. It helps people to identify their own concern and gain the skills and confidence necessary to act upon them. This is the only approach that uses a bottom up rather than top down approach. Health promotion plays the role of a facilitator rather than that of an expert. Clients are seen as equals and have the right to set their own agenda. In line with health promotion as defined in the Ottawa Charter (WHO, 1986) enabling people to gain control over their lives may involve empowerment of both the individuals and the entire communities. For people to be empowered they must recognise the following;

   -   Understand their powerlessness

   -   Feel strongly enough about their situation to want to change it.

   -   Feel capable of changing the situation by having information, support and life skills.

Usually empowerment is a long arm process, difficult to conclude that changes are due to the intervention rather than some other factors and the results are hard to quantify compared with other approaches.

Medical Approach

The aim of this approach is to reduce morbidity and premature mortality. You target a whole population or high risk group then you promote medical intervention that can prevent or reduce ill health. Medical approach is popular in these areas;

- Using scientific method, like epidemiology.
- Prevention and early detection of diseases is cheaper than treatment in other words prevention is better than cure.
- Top down approach, this is done by experts, it reinforces authority of health professional who are reviewed as having necessary knowledge in order to achieve results.

Medical approach has demerits, it is based on medical definition of health, it focuses on the absence of disease rather than promoting positive health and it removes health decisions from the people concern. The medical approach relies on having infrastructure capable of delivering, screening or an immunization programme. It has to do with primary prevention, that prevention of disease through immunization, or encouraging healthy life style, secondary prevention, that is preventing the progression of disease through screening and tertiary prevention, that is reducing further disability and suffering in those already ill through rehabilitation, patient education and palliative care. It encourages people to seek early detection and treatment of any disorders.

Behavioural Change Approach

This is also known as lifestyle approach because it encourages the individual to adopt healthy behaviour which improves health. It sees health as the property of the individual, that is people can make real improvement to their health by choosing to change their lifestyles. It involves a change in an attitude followed by a change in behaviour and this can be done through these methods;

- Enlightenment campaign to persuade people to observe personal hygiene
- To drink wisely
- To adopt a healthy diet or eating habits
- To undertake regular exercise.

Change may only become apparent after a long period and that is difficult to determine if behaviour change was due to health promotion intervention. It uses persuasive education to prevent non-smokers from starting and smokers to stop smoking.

Societal Change Approach

This is a kind of radical change approach, the aim is to change the society and not the behaviour of the individual and to produce physical and social environment. It is targeted towards groups and population. It needs the support of the public, therefore the public needs to be informed of the importance. Health promoter are involved in lobbying, policy planning, negotiating and implementation.

The outcome of this approach may include;
- Changes in laws and regulations, for example, banning smoking, food labelling, applying taxes and paying subsidies on certain types of food.
- Improvement in the profile of health issues on common agenda.

Maybe difficult to prove link with health promotion interventions because changes is usually a lengthy process.

Benefits of Health Promotion in the Workplace

According to WHO (2009), proper attention to workers health and safety has extensive benefits;
- Healthy workers are productive and raise healthy families, therefore health workforce is a key strategy for overcoming poverty.
- Safe workplace contributes to sustainable development which is the key to poverty reduction.
- The processes of protecting workers and environment for future generations have important common elements such as in pollution control and the reduction of exposure.
- Must pollution and environmental exposures that are hazardous to health arise from industrial processes that maybe influenced by occupational health and safety programme.
- Occupational safety and health can contribute to improving the employability of workers through workplace maintenance of a healthy and safe work environment, training and retraining, assessment of work demands, medical diagnosis, healthy screening and assessment function capacities.
- Environmental health is fundamental to public health, major disease like heart diseases, HIV/AIDS need workplace programme as part of disease control strategy.

Organization	Employee
A well managed health and safety programme.	A safe and healthy work environment
A positive and caring image.	Enhanced self esteem
Improved staff morale	Reduced stress
Reduced Staff turnover	Improved morale
Reduced absenteeism	Increased job satisfaction
Reduced risk of fires and litigation.	Improved sense of well being

In promoting health at work, the employers and employees benefit alot. Having healthy and well motivated staff can reduce sickness, and absence from work, improve productivity and help to create a healthy and safe working environment. Workplace health promotion aspects are;
- Participation of employees in the process of improving work environment.
- Mental health promotion through offering of courses for managers on how to deal with stress and tension and providing anonymous psychological consultancy for all employees.
- Exercise and physical activity by offering sports courses, encouraging physical activities, promoting an active and healthy culture at work.

- Health monitoring through offering medical checks such as blood pressure, cholesterol and blood sugar level etc.
- Raising the topic of healthy eating at work, giving information on nutrition as well as healthy canteen food or facilities to prepare own food.
- Better health, better people and better performance. Promoting health at work through; alcohol and drug awareness, chronic illness, healthy eating, mental health and well-being, dental health, physical activities, healthy weight, sexual health, tobacco awareness, travel health, work positive.

Interventions available are health related programme that involves change or maintaining health behaviours, health related policies that are designed to protect or promote employees health and environmental support.

CONCLUSION AND RECOMMENDATION

At every stage in life, preventive health services hold the promise of improving lives, making them longer, healthier and more productive. Adults with multiple risk factors for diseases such as high blood pressure, smoking and sedentary habits are likely to be of a high cost for the employee in terms of health care due to absenteeism, disability and overall productivity. Therefore health promotion in the work place will help to improve the employee's physical strength, stamina and general well-being, it will improve their focus at work, it will also increase job satisfaction by fostering a positive outlook on life and better relationship amongst workers. The different approaches will therefore lead to reduction on employees health risk, it was recommended that health promotion in the workplace should be given a great attention or priority because of the positive benefits.

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SCIENTIFIC TECHNOLOGICAL PARKS IN BRAZIL AND THEIR INTER-RELATIONS IN UNIVERSITY TRAINING

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ABSTRACT

This study makes a systematic review of scientific publications of research, on the theme Technology Park in Brazil. It seeks to identify and analyze the scope of Science and Technology Parks at the national level, in order to understand the trends and interrelations between university education. The mapping was the basis for knowing and discussing the results of the scientific production of different areas, considering the different times and places, in what form and under what conditions they were produced. For its construction, searches were carried out on the subject in the Capes, Bdtd, Anped and Ibict databases from 2006 to 2017, looking for similarity with a set of descriptors. The survey was performed after selection in the directories that indicate PCT as the subject of study. We retrieved 574 scientific research productions, being selected for reading the abstract 132 works, we observed that only 18 productions are preponderant in relation to the area of education. For the analysis, the following variables were considered: objective, methodology and conclusions pointed out, with the interest concentrated in university formation, scientific initiation, social impact, case study. To analyze the data, the following categories emerged: PCT and the relationship between university, business and government; PCT and Public policies; PCT and technological and economic development; PCT and management model and finally, PCT and the relationship with initiation. The analysis shows that researchers need to follow a planning and scientific strategy that allows them to present different levels of relationships between park and technology, innovation, economics, research, government, business, development and university. The result of the analysis of the categories on methodologies, indicated indications that are the methods and the technical instruments that order

the systematized thought, organizing in a organized way the way of proceeding throughout the investigation to reach the proposed objective.

Keywords: University Education. Technology Parks. Scientific Research.

INTRODUCTION

The present study makes a systematic review of the scientific production of research, on the theme Technology Park in Brazil. It seeks to identify and analyze the scope of the national PCT in the period 2006 to 2017, in order to understand the trends and the interrelation with university education. The systematic review of the literature is commonly used to support research in education, also known as state of the art, state of knowledge, literature review, is a form of research that uses the published literature on themes of any area of knowledge.

The present study makes a systematic review of the scientific production of research, on the theme Technology Park in Brazil. It seeks to identify and analyze the scope of the national PCT in the period 2006 to 2017, in order to understand the trends and the interrelation with university education. The systematic review of the literature is commonly used to support research in education, also known as state of the art, state of knowledge, literature review, is a form of research that uses the published literature on themes of any area of knowledge.

> [...] to examine the emphases and themes covered in the research; the theoretical references that subsidized the research; the relationship between the researcher and the pedagogical practice; the suggestions and propositions presented by the researchers; the contributions of research to change and innovation [...]; the contribution of teachers / researchers in the definition of field trends [...]. Nascimento (2016, apud, ROMANOWSKI; ENS, 2006 p. 39).

In considering these aspects, the article is organized in three parts; the first presents a brief history about PCT in Brazil and its operation; then we describe the methodological course presenting a synthesis of the scientific productions recovered in the repositories with the inclusion and exclusion criteria. In a third topic we propose an analysis of the data, considering the following characteristics: subjects addressed; theoretical references; the relation of the researcher and the pedagogical practice; the methodology, strategies and instruments of research, the results with suggestions and propositions of the researchers and, finally, we present our considerations.

TECHNOLOGICAL PARKS: interaction between university, business and government

In Brazil the first incentives to foster the development of innovation habitats at the national level began in the 1980s with the creation of the Brazilian Program of Technological Parks by the National Council for Scientific and Technological Development (CNPq), which aimed to modify the economic reality of the

country (PLONSKI, 2010) through a resource allocation and efforts in the improvement and generation of technologies (BRASIL, 2014).

PCTs, in addition to providing space for knowledge-based businesses, can house centers for scientific research, technological development, innovation and incubation, training, prospecting, as well as infrastructure for fairs, exhibitions and marketing development. They are formally linked and usually close to centers of technological excellence, universities and / or research centers. (UNESCO and IASP).

With the creation of development agencies, CNPq and FINEP, the federal government has managed over the past 60 years to create a system of scientific research that has placed Brazil among the top 15 science producing countries in the world. However, scientific growth has not yet been enough to place our country in a prominent position in the development of innovative products, processes and services (BRAZIL, 2014). The federal government started, a little more than 20 years ago, a consistent process of public policies and financial investments aimed at the creation and consolidation of PCTs in all regions of the national territory (BRASIL, 2014), distributed in Figure 1.

Figure 1: Technology Park in different stages of development and deployment
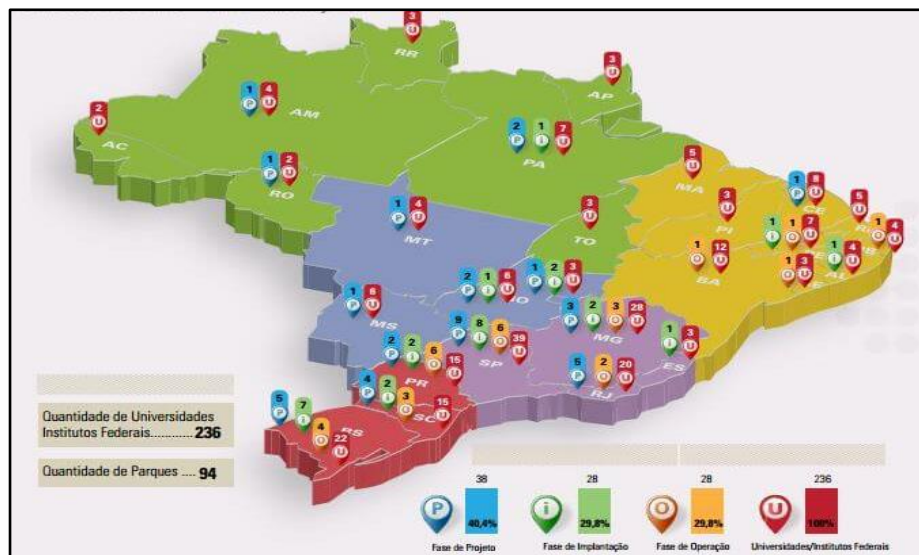
Source: CDT/Unb (2014).

Figure 1 shows the map of Brazil with the quantitative distribution of the initiatives of science and technology parks in their various stages of development, as well as the universities and federal institutes in the states of the Federation. Of the 94 PCTs, 38 are in the Projects phase, corresponding to 40,4%, in the Implantation phase 28 corresponding to 29.8% and in Operation 28, corresponding to 29,8%.

It is important to note that, after analyzing the 94 types of PCT initiatives registered by the research, the geographical distribution of innovation habitats is concentrated in the Southeast region with 39 (41,5%) initiatives and in the region South, 35 (37,2%), which together offer 78,7% of the total installed parks in Brazil. In this way, almost 4 of 5 initiatives of science and technology parks are in these regions. In the central-west region we have 8 (8,5%) park initiatives, 7 (7,5%) in the Northeast region and 5 (5,3%) in the

North region, it is worth mentioning that of the 7 parks in the Northeast region , 1 Technological Park in Operation is located in Sergipe.

According to the study carried out by the Brazilian Agency for Industrial Development (BAD) and ANPROTEC, in 2000, it identified about 10 projects of technology parks. In 2008, 74 park initiatives were identified in 2013, through the "Project Study of High Complexity - Indicators of Technological Parks", carried out by MCTI in partnership with the Technological Development Support Center of the University of Brasilia (CDT / UnB), 94 initiatives were implemented to implement parks, demonstrating a constant evolution in the number of habitats of innovation in Brazil (BRAZIL, 2014).

It should be noted that the evolution of 27% of the park initiatives between 2008 and 2013 comes mainly from the 64,7% increase in the number of parks under development. Next, the parks in the project stage with 18,8%, and lastly, parks in the operating stage had a more modest growth of 12%. It is worth mentioning that in this evolution of PCT, the Northeast region stands out due to the fact that it has nine states, six of which have parks initiatives in several stages. As shown in Table 1 below.

Table 1: Initiative of parks by development phase of the Northeast region

State	Project	Implantation	Operation	Total by State
Pernambuco	-	1	1	2
Sergipe	-	-	1	1
Alagoas	-	1	0	1
Bahia	-	-	1	1
Paraíba	-	-	1	1
Ceará	1	-	-	1
Rio Grande do Norte	-	-	-	-
Piauí	-	-	-	-
Maranhão	-	-	-	-
Total per Phase	1	2	4	
Percent by Phase	14%	29%	57%	
Grand Total				7

Sourse: CDT/UnB (2014).

The table above shows the significant increase in the northeast region from 2008 to 2013 of 57% of PCT in operation, above the national average of 18.8% growth. Since the state of Pernambuco has two initiatives of parks Parqtel and Porto Digital - Recife, one in project of implantation and another in operation with more than 600 companies installed. The State draws attention to having 7 federal universities / institutes, the second largest concentration of researchers, masters and doctors in the Northeast. The state

of Bahia has a PCT initiative in operation stage at TECNOVIA - it has the largest number of universities / federal institutes, with a contingent of 25,500 researchers, masters and doctors. The state of Paraíba has a park in the PaqTcPB operation stage, and the number of researchers, masters and doctors is approximately 14,100. The State of Sergipe stands out because it is the smallest state in the federation, it has a TCP in the SergipeTec operating stage with several companies installed and a Technological Vocational Center, although it presents the smallest indicators of the Northeast region in several items, such as universities and institutes.

According to Paula (et al, 2008, apud, BASTOS, SILVA, 2017), there is a significant increase in PCTs at the design, implementation and operation stage in the last six years, between higher education institutions, private sector and government is still small and to reduce distancing, some measures have been taken by the government and universities to promote an increase in the flow of knowledge exchange, such as the parks have links to research centers or education.

The interaction of PCT with research centers was an innovation model developed in the 1990s by Henry Etzkovitz (2003) based on the relationship of the triple helix - government, educational institution and industry. The triple is a model that attracted attention, since it was only through the interaction of the three players that the possibility of creating sustainable innovation system with durability in the economic scenario of knowledge.

In the economic scenario, according to Etzkovitz (2003), each of the actors has a fundamental role for the result to be positive, with the triple industry operates as a production space, government as source of contractual relations that guarantee stable relations and exchange , and the university as a space for innovation in scientific and technological knowledge, the general principle of the knowledge-based economy.

In the same view,

"Indicate that each component of the propeller has specific competencies and responsibilities. The university has the task of promoting economic and social development through new organizational structures, such as interdisciplinary centers. Abdalla, Calvosa e Batista (2004, apud. NETO, GALINDO E CRUZ, 2009)".

These structures allow the generation of new disciplines, laboratories, which originate research that becomes theses, publications and patents, the result of interaction with the productive sector. Abdalla et al. (2009) have developed a framework that presents the individual responsibilities and limitations of each actor, which facilitates understanding of the performance of each actor in the triple helix. See table 1.

Table 1. Responsibilities and Limitations of each actor of the triple propeller.

Actor	Responsibilities	Limitations
Government	Promote economic and social development through new organizational structures; Possess political plans with clear governmental goals	Excessive bureaucratization and lack of flexibility to implement partnership projects;

	focused on innovation and knowledge; Interact among the various policy areas; Promote benefits to the population.	Need for professional and participatory public management.
Private initiative	Develop innovative products and services; promote interaction with the technology transfer centers of the scientific community and lead the processes of change.científica e liderar os processos de mudança.	Little capacity for investments in innovation and technology development; Unprepared academic and technological to conduct research.
University	Creating sources of new knowledge and technologies; Establish relationships with companies and governments; Create new areas of action; Leading the processes of change.	Dependence of development agencies for conducting research; Myopic vision of professional qualification and training of labor; Weak links with society and private initiative.

Source: Adapted of Abdalla et al. (2009, apud, BASTOS, SILVA, 2017).

The above chart clearly describes the role of each actor, with government responsible for promoting economic and social development through new organizational structures, private initiative to develop innovative products and services, and university to create sources of new knowledge and technologies. This interaction between the triple helix helps to improve each other's performance, where collaboration occurs through their traditional roles involved in innovation, Faria and Ribeiro (2016, apud ETZKOWITZ, 2009).

Still on the triple, Abdalla et al. (2009) argue that diverse relationships between industries, governments and universities are emerging in countries with different stages of development, socioeconomic systems and cultural values. As regions seek to create a dynamic of economic development based on the generation of specialized knowledge, the three institutional spheres begin to take on internal transformations, and new relationships are established across institutional boundaries, creating hybrid organizations such as technology centers and virtual incubators.

To mediate interaction between the triad, ANPROTEC, headquartered in Brasília / DF, and an institution that congregates and supports entities that act in the creation, development or operation of enterprises to encourage innovation and entrepreneurship, including Business Incubators, Accelerators of Business, Parks and Scientific, Technological and Innovation Poles, Tecnopoles and the like, aiming at the social, economic, scientific and technological development of Brazil.

For this association,

> "A technological park is a complex industrial and service-based scientific and technological base, planned, of a formal, concentrated and cooperative nature, which aggregates companies whose production is based on technological research developed in R & D centers linked to PCTs. It is an enterprise that promotes the culture of innovation, competitiveness, increased business capacity building, based on the transfer of knowledge and technology, with the aim of increasing the wealth production of a region." (ANPROTEC, 2017).

PCTs, besides offering services with high added value to companies, help in the flow of knowledge and technology, enabling the generation of qualified jobs, increasing the culture and the entrepreneurial activity, facilitate the communication between the actors, favor local competitiveness, besides promote innovation, accelerate business growth.

METHODOLOGICAL STUDY: Systematized Review Practice

The study of Systematic Review as a methodological strategy in the scientific community linked to the educational sciences, must approximate the paths already covered by the medical sciences in which the Systematic Review has revealed profound influence on the results of the studies where it is applied (CONTANDRIOPOULOS et al. 2010) and (SAMPAIO RF, MANCINI MC, 2007).

Because of the above, it is a type of research with characteristics of a qualitative and descriptive nature, the methodological course generally systematizes some criteria such as: (1) to establish inclusion and exclusion criteria for the selection of the material that compose the corpus of research; (2) definition of the descriptors to direct the information search; (3); set the location of the search bank; (4) collection of research material; (4) reading of scientific productions, with elaboration of syntheses; and (5) analysis and preparation of preliminary findings. As a methodological procedure, we applied content analysis (BARDIN, 2016, page 38).

Following the pre-established criteria, the data available in the repositories make clear a summary of all the studies on the researched subject. The revisions allow us to incorporate a larger spectrum of relevant results as well as the possibility of analysis of the consistency and generalization of the results among the findings, such as the specificity and variations of the data. It is worth remembering that it is a type of study with retrospective and secondary vision, that is, the review is usually drawn and conducted after the publications of empirical studies on a certain theme.

Authors point out that,

> [...] systematic reviews with meta-analysis are different from other reviews for their metanalytic component [...] is the analysis of the analysis, ie it is a literature review study in which the results of several independent studies are combined and synthesized through procedures quantitative, qualitative or mixed, in order to produce a single estimate or index that characterizes the effect (SAMPAIO e. MANCINI, 2007, Apud. AKOBENG, 2005).

Within the panorama of the searches for research works in the databases and following the methodological criteria, it was necessary to create a systematized script that aims to meet the research objective. Below table 2, it presents the criteria of "inclusion and exclusion" of the investigation, as a way of delimiting the object studied (SAMPAIO and MANCINI, 2007).

Table 2 - Inclusion and Exclusion Criteria

Inclusion	Exclusion
Empirical studies	Experimental study
In-class Higher Education	Distance Higher Education
PhD Theses	Scientific articles
Master's Dissertations	Magazines
Scientific outputs evaluated by peers	Course Completion Works
Publications of the last 15 years	Off-period publications

Sourse: Prepared by the authors (2018).

The above table justifies the exclusion of an experimental study by establishing a cause and effect relationship between variables; Higher Distance Education because it is not a scientific research production; Scientific articles and journals, due to their majority being part of the results of the thesis and dissertations of master's and doctoral programs of several areas of knowledge.

In the first moment giving the methodological procedure of the study, a general survey of the identification and location of the Institutions of database like Coordination of Improvement of Personnel of Superior Level - CAPES; National Association of Post-Graduation and Research in Education - ANPED; Digital Library of Theses and Dissertations - BDTD; and Brazilian Institute of Information in Science and Technology - IBICT with the combination of sets of word descriptors. The searches in the BDTD with the terms "PT AND Formación Universitária" and "PT AND Iniciação Cientifica" begin, no registration; then "PT and Scientific Production", recovered 131 records; finally, with the term "Technological Park" located 295 theses and dissertations. Already the searches in CAPES with the terms "PT AND" University Training "and" PT AND Scientific Initiation ", no records found, for the term PT AND Scientific Production" recovered 1 record; finally, with the term "Technology Park" recovered 147 records.

Having as sources the data collected on the theme "Technological Park and its relationship with university education", object of study of this investigation, started for floating reading of the titles of 574, being selected for reading the abstract 132 papers. After analysis, 18 productions are preponderant in relation to the education area, which represent the copus of the research, being the interest concentrated in university formation, scientific initiation, scientific production of research and case study. Of these works, 9 theses and 9 dissertations from several areas of knowledge are listed in Table 3.

Table 3: Dimension of the specification of the Research Corpus

TITLE	YEAR	INSTITUTION OF HIGHER EDUCATION	PRODUCTION	TECHNOLOGIC PARK
Cooperation between university, business and government in the promotion of innovation	2013	UNISINOS	Thesis	Tecnosinos (Brazil) and Tanguspark (Portugal)

environments: A study in Science and Technology Parks in Brazil and Portugal.				
The Relationship of the Legal Framework of Sapiens Parque S / A with the Process of Innovation	2015	Federal University of Santa Catarina	Dissertation	Sapiens Park
Potentialities and Limits for Economic and Innovative Local Development: A comparative analysis in technological parks of the Northeast region.	2010	Federal University of Paraiba	Dissertation	Nutec, Digital Port, ParqTel, PaqTcPB and SergipeTec.
1-LOCAL INNOVATIVE SYSTEMS, INNOVATION AND COMPETITIVENESS: The contributions of the State in the expansion of the competitiveness of micro and small enterprises: the case of the Parque Tecnológico Porto Digital	2013	Federal University of Bahia - Ufba	Thesis	Porto Digital Technology Park
Technological Park Funding Prospects: A Comparative Study	2007	Faculty of Economics - University of São Paulo.	Dissertation	Tecnopuc, Sapiens Parque-Brasil; Biocant Park Taguspark-Portugal; Technological Park of Cartuja 93-Spain.
Conceptual Model of Technology Park: Proposal Based on Economic, Social and Environmental Sustainability	2016	UNIMEP	Thesis	Triple Helix and Triple Bottom Line
Construction of Organizational Identity and Reciprocal Influences with Personal Identity: A Study in Technology Parks.	2014	University of Sao Paulo	Thesis	Damha Eco Technology Park, - Sao Jose dos Campos Technological Park of Sorocaba.
InHab-Read - IHR Environment Reading Methodology for Innovation Habitats	2017	Federal University of Santa Catarina - Ufsc	Thesis	Orion Park Sapiens Park
Lights and Shadows of the urban requalification Oriented for the New Technologies: the case of the Digital Port	2006	Federal University of Pernambuco	Thesis	Digital Port
SCIENTIFIC INITIATION IN COLLABORATIVE NETWORKS AND UNIVERSITY QUALITY TRAINING: the egress perspective (2007-2013)	2016	Pontifical Catholic University of	Thesis	Technology and Research (ITP) Tecnopuc and SergipeTec

		Rio Grande do Sul		
Model Governance for Science and Technology Parks in Brazil	2011	Federal University of Santa Catarina	Thesis	Did not mention
THE ROLE OF TECHNOLOGICAL PARKS IN THE STIMULATION AND CREATION OF ACADEMIC SPIN-OFFS	2014	Univ. Fed. Of São Carlos	Dissertation	São Carlos Science Park Damha-São Carlos Eco Tech Park
The Impact of Technology Park Management on Regional Development: A Case Study in Northeastern Brazil	2016	Federal University of Sergipe	Dissertation	Northeast Region Technology Parks
The development of the absorptive capacity in technological projects between university and company: a case study of the cooperation UNISINOS - HT Micron	2012	UNISINOS	Dissertation	Northeast Parks
The challenges of innovation environments for the development of sustainable tourism - a case study of the Itaipu technology park - Brazil	2014	University of Brasilia	Dissertation	Itaipu Technological Park Brazil (PTI)
Structure of knowledge services in Science and Technology Parks - increasing the company-university relationship - research centers	2009	Federal University of São Paulo	Thesis	Did not mention
Knowledge flow between University and Company: an analysis of companies installed in TECNOPUC.	2015	Catholic University of Rio Grande do Sul	Dissertation	TECNOPUC
Characterization of the university-company relationship in technological parks. Case study on the technological park of Rio	2013	Federal University of Rio de Janeiro	Dissertation	REINC - Network of Incubators, Technology Parks and Poles of Rio de Janeiro

Sourse: Survey carried out by the authors on the website of higher education institutions. (2018).

The previous table is a synthesis of the systematized review, in which the data were treated according to the methodology of content analysis proposed by Bardin (2016), in front of the 18 scientific productions under study of the last eleven years, 9 were presented in the years of 2013, 2014 and 2016, which represent 50% of the works analyzed.

OUTCOME OF THE ANALYSIS: objectives, methodologies and results

This subsection aims to discuss the perspective of the new on the topic PTCs of Capes and Bdtd research productions from the relationship between government, universities and companies, as well as

policies to technological innovation, the central factor of a knowledge-based economy. It should be remembered that an innovative environment tends to be concentrated in a space of proximity, linked to educational institutions and research centers, generally supported by the interconnected productive public sectors, constituting an innovative productive arrangement in its location (CORREIA, 2010, p.18).

In view of the 18 productions under study, sub-categories emerged to analyze the proposed objectives. For the development of any study, it is important to delimit or specify the general purpose for the purpose of describing, analyzing and clarifying in clearer terms what can be observed in the research.

Table 4 - General Objectives of the production under study

SUB-CATEGORIES	OBJECTIVES OF STUDIES ON PCTs IN BRAZIL
PCTs AND THE RELATIONSHIP UNIVERSITY, COMPANY AND GOVERNMENT	To propose a conceptual scheme that makes possible to understand the elements involved in the promotion of innovation environments in science and technology parks, based on the dynamics of cooperation between university, business and government.
	To verify how the presence of a technological park stimulates the creation and development of academic spin-offs in the city of São Carlos - SP
	to explain the process of development of the absorptive capacity by a university in the context of a technological collaborative project
	Analyze the knowledge flow in joint projects between university and companies installed in a technological park - environment conducive to this type of interaction.
	To analyze the experience of the Rio Technological Park -UFRJ and its companies regarding the interaction established with laboratories and researchers of UFRJ. We identify the reasons that led the companies to settle in the park and the nature of the interactions developed with the university's laboratories.
	Understand the connection between university-business-government as well as leadership in PCTs under the perception of leaders.
	To present the context of technological parks in Brazilian deployment / operation.
PCTs AND PUBLIC POLICIES	To expose the challenges related to the implantation of Scientific and Technological Parks, Brazilian public policies of incentives;
	Raise the financing perspectives used in the stages mentioned in the Technological Parks
PCT AND THE RELATIONSHIP WITH SCIENTIFIC INICATION	To analyze the impact of scientific initiation (CI) on the training of fellows / volunteers who were participants in collaborative research networks, considering the perspective of citizenship, scientific and professional inclusion, as well as the proposal of quality indicators in higher education

Source: Authors from the publications Capes and Bdtd (2006-2017).

Faced with the emerging subcategories, "PCTs and the University, Company and Government relationship", the authors propose to explain the most diverse types of cooperation relations established

between educational institutions, private companies and the government, this triangulation stimulates the exchange of information and knowledge.

As far as the relationship between PCTs and Public Policies is concerned, the authors Silva (2013) and Figlioli (2007) bring in their investigation that the parks have consolidated as one of the main development strategies of the country to position as a competitive, innovative and globalized globally, that the park initiative has a public policy dimension focused on local / regional development and national politics in general.

As for the subcategory relationship between Parks, Technological and Economic Development, the authors, Bichara (2013) and Correia (2010) make a comparative analysis of the potentialities and limits for economic development in technology parks in local and national region, presenting concepts and business competitiveness in the various areas of activity.

The authors Schirrmeister (2014); Giugliani (2011) and Feitosa (2016) draw an approach regarding the management and governance model that this type of initiative has, as well as the management strategies that condition the development process of the region. For the author the experiences implanted and evaluated, diverse management models emerge:

> [...] a) management is unique and centralized; b) based on advice; c) based on market executives; d) based on international experience, from a non-profit corporation; e) mixed and other effective models (GIUGLIANI, 2011).

In his research, Schirmeister (2014) emphasizes that PCTs have a unique, complex and innovative organizational identity, either through the interaction of shared processes and values, or through the brand and strength it reflects in the governance structure.

The studies of Nascimento (2016) analyzed the impact of the scientific initiation of fellows who participated in collaborative research networks such as Tecnopuc, SergipeTec and ITP, considering the perspective of citizenship, scientific and professional inclusion, as well as the proposal of quality indicators in higher education. It establishes a direct relationship of PCTs, Scientific Initiation of scholars in a context of collaborative network and higher education. It analyzes the impact of the scientific initiation and university formation from the Vallaey conception. Cruz and Sasia (2009) on the social responsibility of universities that permeates the impacts that Higher Education Institutions generate in their environment, namely: the organizational impact; educational impact; cognitive impact and social impact.

After the synthesis of the 18 productions under study, the subcategories for analysis of the methods proposed by the authors emerged. The scientific method consists of the tools that order the beginning of systems thinking, systematically map the researcher's way of proceeding along a path to reach the goal.

The purpose of any research research is to find answer to questions by applying scientific method. Most of the researchers used in their work a diversity of interconnected interpretive practices to reach a better understanding of the investigated phenomenon. Below the table with the synthesis by groups of qualitative, quantitative, mixed nature (quanti-quali).

Table 5 - Nature of data collection of the research under study

SUB-CATEGORIES	RESEARCH METHODOLOGIES ON PCTs IN BRAZIL
QUALITATIVE METHOD	Exploratory, qualitative study, multiple case study.
	Theoretical Research; Qualitative research; Interviews.
	Descriptive, qualitative research, case study, documentary research and in-depth interview.
	Qualitative, exploratory and interpretive research
	Qualitative, exploratory, descriptive and causal (or explanatory) research of the case study type.
	Case study; document review; qualitative methods.
	Bibliographical and documentary review, qualitative study, case study research, descriptive exploratory.
	Research of qualitative nature, exploratory, multiple case study Bibliographic review, Comparative analysis.
	The method of the case study uses a qualitative approach, the technique of semistructured interviews
	Qualitative research, with a descriptive character, case study, semi-structured interviews and consultation with secondary sources.
MIXED METHOD (QUANTI-QUALI)	Exploratory study, mixed method (quanti and quali), with the strategy to study multiple cases, collected primary and secondary data that were analyzed by the categorical content analysis technique.
	Quantitative-qualitative research (mixed methods) conducted in the light of the dialectical method.
	Quantitative and qualitative nature, documentary analysis; direct observation; and semi-structured and structured interviews.
	Case study, qualitative and quantitative research, exploratory with application of interview and questionnaire, bibliographic survey.
QUANTITATIVE METHOD	_____
DID NOT IDENTIFY	Exploratory research in the perspective of action research, questionnaire application.
	Qualitative research, of descriptive character, based on the phenomenological method proposed by Taylor and Bogdan (1987), through the use of the in-depth interview.
	Empirical research, conceptual schema design, multiple case study strategies, interviews.
	The case study method, semi-structured interviews, interviews.

Source: Author from the publications of Capes and Bdtd (2006-2017).

Table 5 presents a variety of methodological procedures used for the composition of the investigated studies. In this way, we present an explanation of the classification of the research, the nature and sources of data, as well as the research techniques and data collection instruments. For the development of the framework, sub-categories emerged to identify the nature of the data used and the techniques applied in scientific production. Figure 1 below shows the nature of the data that most prevailed to achieve the objective proposed by the researcher.
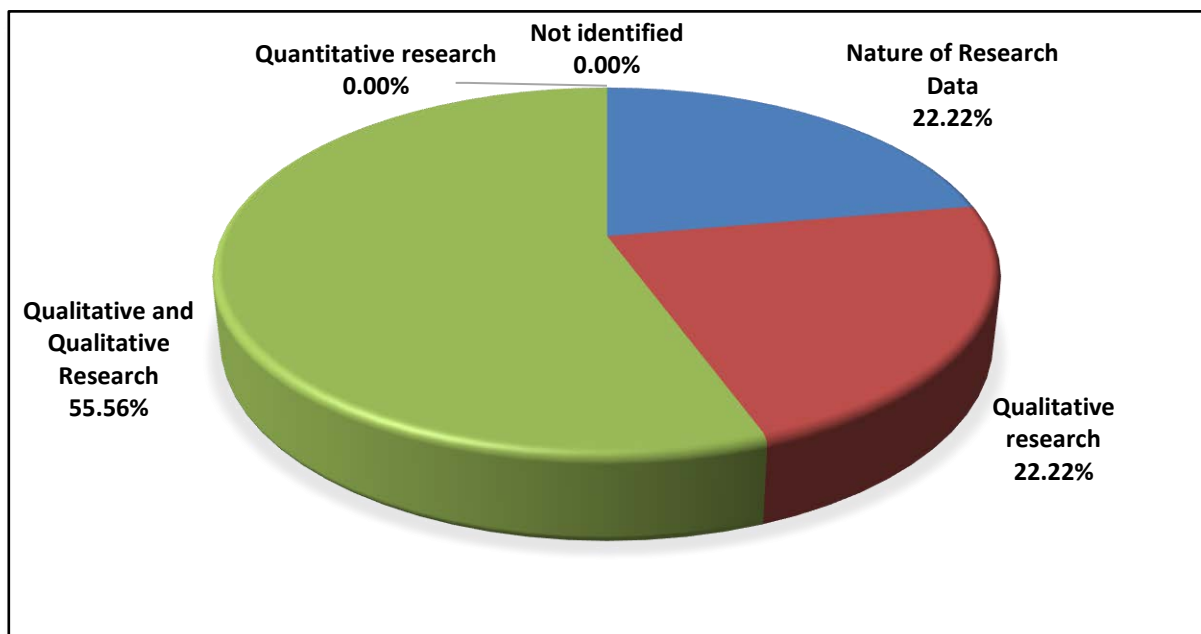
GRAPH 1 - Nature of Data Collection of CAPES / BDTD Research Productions
Source: Authors from the publications Capes and Bdtd (2006-2017).

In order to answer the guiding questions and achieve the objectives proposed in their research, the researchers propose the methodological approach based on the qualitative approach or the mixed approach (quanti-quali). Graph 2 presents 56% of the research productions, the researchers used the approach of the qualitative research method, which corresponds to 10 works; still according to the graph 22% presents the use of the mixed method which corresponds 4 works; being that 22% of the investigators do not present the type of method used, which corresponds to 4 studies and, finally, of the 18 papers analyzed, none present use of the quantitative method.

As for qualitative research, considering that there is a dynamic relationship between the real world and the subject, an inextricable link between the objective world and the subjectivity of the subject, in brief, is a type of research that seeks to understand in detail the meanings and the (Richardson et al., 2007). In this paper, we present the results of the present study. Being the nature of collecting qualitative data regarding the objectives, they can employ procedures of a project that arises from personal experiences in a natural environment (CRESWELL, 2007).

As for the mixed method, the chart points out that 22% of research productions researchers do adoption in their research. This happens when problem variables need to be explained from more than one

data source. The exploratory findings need to be generalized and a second method helps for an in-depth theoretical analysis (CRESWELL, 2007).

Still in relation to analysis of the methods, it is worth mentioning a point that draws attention to the technical procedures of the scientific productions. Of the 18 analyzed works 12 are characterized by the authors as being a case study, the other productions are distributed as follows: 1 phenomenological method; 1 theoretical investigation, 1 dialectical method, 1 exploratory in the perspective of the action research and finally, 2 works does not make clear its technical procedure.

The relevant factor in the case study as a research strategy is a comprehensive one, carried out through an empirical investigation of a phenomenon inserted in a given context, which is based on several sources of evidence to converge in a given result and which benefits from existing theories for the collection and analysis of data (YIN, 2001, 32). As a research effort, the case study unequivocally contributes to our understanding of individual, organizational, social, and political phenomena (YIN, 2001, 22) and can "explain, describe, evaluate, and explore contexts".

And when considering the case study as a research strategy, it is important to emphasize that the researcher should outline the basic method and instruments such as: (visits, interviews and questionnaires), and secondary ones such as: (documents, laws, projects, contracts and covenants) that order the systematized thinking, arranging in an organized way the way of proceeding throughout the investigation to reach the proposed objective.

The investigators characterized the research as being a case study, which were inserted in the subcategories of the qualitative method or the mixed method (quanti-quali), are types of research approach that are better suited to interpret about the phenomenon PCTs and the relationship with the triple helix. Being that, the mixed method research allows the investigator to collect and analyze the data, integrates the findings and extracts inferences in a single case.

Another point that stands out are the results of the researches pointed out by the researchers from the proposed objectives. Like the research productions analyzed in relation to the sub-categories of objectives, it can be said that the relationship between PCT, university, business and government, researcher Amaral (2014) realized that the presence of this type of initiative alone is not sufficient to stimulate the creation of academic spin-offs and those that were created suggest through process effusion of technologies from the academy to the business environment, for him parks offer only physical spaces.

Silva (2015) pointed out that the financial viability of a PCT requires an effort by the State, acting as a catalyst and supporters of investments, as well as the need to strengthen the union between government, educational institution and research and companies, that is, the triple propeller.

Regarding the subcategory between Parks and technological and economic development, the researcher Yamamoto (2016) points out the need for PCTs to develop actions and actions with a view to the sustainable growth of the park itself, the participating companies, the community involved and of the inserted region, so that they contribute to the formation of an entrepreneurial culture stimulated by technological development and innovation, with social, economic and environmental responsibility.

Another sub-category also relevant and treated by researchers was the relationship between the park and the management model that, because they are not legally constituted, the management model rests

largely on the management bodies that respond to the park to which they are responsible and although the identity of the technology park is particular and imposes challenges due to its complexity of managing.

Finally, the researcher Nascimento (2016), the subcategory of the PCT relationship and scientific initiation, reveals that the collaborative networks are instruments of interlocution between graduates, researchers and society, being a relevant space for the formation of scientific spirit, not only by the threefold propeller of technological parks and technology and research centers, by stimulating social progress and innovation.

This context denotes that the initiative of scientific and technological parks is in the face of design, implementation or in operation in partnership with the triad, university, government and company, are vectors and protagonists of innovation idealized to promote and strengthen economic sectors, leading scientific and technological development for Brazilian society.

FINAL CONSIDERATIONS

Understanding how to develop a systematic review helps the researcher in the task of constructing research that are important facts for scientific advances, but is still a methodological strategy little adopted in research of the science of education. In this context, the study considers the systematic review as a methodological strategy that made it possible to identify, record and categorize information that leads to reflection and meta-analysis with the purpose of identifying and analyzing the scientific publications of research, on the topic Technology Park in Brazil with a view to understand the interrelationships between university institutions in the last 12 years, retrieved in the databases of Capes and Bdtd. With the systematic review, it sought to identify the scope of the Scientific and Technological Parks from the 18 research productions. To this end, the subcategories emerged to analyze the objectives, methodologies and results proposed by the researchers in the studies.

The analysis of the categories on the objectives generally shows that researchers to reach the goal proposed in their research must follow a planning and scientific strategy that allow different levels of relationship between park and technology, economy, research, government, company, development and university.

Another subcategory that allowed for further study was the nature of the methods and technical procedures used by the researchers, in which 56% of the research productions used the qualitative research method approach and 22% addressed the use of the mixed method (quanti-quali). In the technical procedures, the basic instruments used were (visits, interviews and questionnaires), and secondary ones such as: (documents, laws, projects, contracts and covenants) that order systematized thinking, arranging in an organized way the way of proceeding research to achieve the proposed goal. This sub-category allowed us to understand that the researcher can make use of the simultaneous methods by implementing qualitative and quantitative elements during the same face of the research process in contemporary context.

Based on the information collected and analyzed, the result indicates that the initiative of scientific and technological parks is in the face of design, implementation or in operation are vectors and protagonists of innovation idealized to promote and strengthen economic sectors, leading local scientific and technological development / regional, as well as the synergy in the interrelationship with teaching, research

and business institutions. The triple propeller is also called between government, company and university, a unique model that calls attention, since it is only through the interaction of the three actors that the possibility of creating sustainable innovation system with durability in the economic scenario of knowledge.

Regarding the interrelationship between the PCT and the academic environment, the experiences studied allowed us to perceive that both are sources of new scientific and technological knowledge, create new areas of action, lead the processes of social and economic change, generate works and brings development to parents. Another example of the direct relationship between the park and the university is the work of theses and dissertations of masters and doctoral programs of several areas of knowledge that show a panorama of the national scenario of parks initiative.

As a suggestion for future work, it proposes an analysis in the areas of knowledge of master's and doctoral programs that are producing research work on Science and Technology Parks.

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Significance, causes and effects of obesity in childhood and adolescence

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Abstract

Body weight is influenced by the motor and eating habits of every human being and by a biological or genetic predisposition, the effect of which cannot be quantified with accuracy. Obesity occurs as an expression of a positive energy balance or as a consequence of the absence of a balanced diet. Obesity is an acknowledged and important risk factor for a range of conditions, especially diabetes, hypertension and cardiovascular diseases. The purpose of this study was to approach, analyse and ultimately examine the significance, causes and effects of obesity on children and adolescents. The method adopted for the study was a review of the relevant literature. Based on this study, we discover that, due to people's changing living conditions, the spread of overweight and obesity in industrialized countries has greatly increased, therefore rapid action is needed. Overweight and obesity have always existed. However, the voluptuous body, that formerly was considered a sign of wealth or a survival strategy, is now stigmatized. Overweight people not only have a higher risk for their health in the form of cardiovascular diseases, diabetes mellitus or premature bone and joint damage, but they do not correspond to today's ideal beauty. The causes of obesity are due to many interdependent factors. It is therefore difficult to formulate therapeutic proposals that have general validity. In summary, we can say that for the increasing number of overweight and obese children and adolescents the medical factors are less important. The causes should be sought in the social conditions and behaviours of certain social groups. It is important that children and young people are permanently involved in the subject of nutrition and movement, and that this engagement accompanies them throughout their development. Even if the politics supports, doctors encourage, health funds, kindergartens and schools raise awareness, sport clubs motivate, the media inform, parents recognize and offer incentives, the hardest part of the job should be done by the target group in order to achieve personal success; that is to remain or become "healthy".

Key words: Obesity, Overweight, Childhood and Adolescence

1. Introduction

Obesity is considered a chronic condition, resulting in limited quality of life and high risk of morbidity and mortality. Especially in children and young people this condition has negative effects on almost all organ systems. Thus, overweight is considered an important risk factor for the occurrence of sugar disease and high blood pressure. There are also signs of blood vessel inflammation in overweight children, which may result in blockage of the vessels and therefore in heart attack or myocardial infarction. Also, the tendons, joints, muscles, the entire spine and the motor system are over-stressed, resulting in low back pains and

other orthopaedic conditions. The list of negative health effects is still very long. Western industrialized countries are currently spending large sums on health to treat obesity and its consequences. In America, obesity, and consequent diseases, is the second cause of death among adults. Today, obesity is considered a chronic disease with widespread consequences for the sufferer, due to consequent diseases and social contempt, as well as for society, due to the increasing cost of treatment. Thus, obese children have a higher risk of developing cancer than lean adults. With the increase in body mass index, children have elevated blood pressure values and early lesions of the internal organs appear prematurely, as well as increased muscle mass of heart's left ventricular. In both girls and boys, systolic blood pressure and left ventricular muscle mass index are related to the body mass index. This is why early damage to the heart and blood vessels occurs. Surveys show that these are not individual exceptions, but obesity is a widespread and ever-increasing disease, especially in western industrialized nations. Firstly, a definition of obesity is given, which corresponds to the generally recognized current knowledge.

2. Methodology

The present research is a bibliographic review study, presenting the critical points of the existing knowledge about the significance, causes and effects of obesity on children and adolescents. There is no specialized and comprehensive work on this subject in the relevant international literature. This work endeavours to cover this gap, and will perhaps also be a useful aid for those who in the future will attempt similar efforts. The main aim of the bibliographic review is to frame the study within the "body" of the relevant literature. The review of the current study concerns clearly formulated questions and uses systematic and explicit criteria for critically analysing a body of published papers by summarizing, sorting, grouping and comparing.

Bibliographic review study

3. Definition and classification of obesity
Definition of overweight

Excess body weight, which is not uniformly defined. Usually we are talking about overweight if the weight is 15 - 20% above the value stated in the tables of normal values depending on age, body structure, height and gender. Overweight strains the body's motor system, especially joints and lower back. Overweight is not identical with obesity. Due to the fact that the specific weight of the muscles is greater than that of fat, athletes may for example be overweight, although their fat reserves are not higher (KENT, 1998).

Definition of obesity

Excessive fat storage, mainly under the skin as well as around the internal organs. Obesity occurs as an expression of a positive energy balance or as a consequence of the absence of a balanced diet. Obesity is an acknowledged and important risk factor for a number of diseases, especially diabetes, hypertension and cardiovascular diseases (KENT, 1998). Excess weight can be defined by different measurement methods.

Previously it was measured with the help of the Broca index. This index accepts that the normal weight should correspond to the height in centimetres, minus 100 (in kilograms).

From life insurance tables, the so-called ideal weight was calculated, deducting additionally from the normal weight 10% for men and 15% for women. This ideal weight is no longer valid today, in terms of health, because it has resulted from an interpretive error. A measurement system that has been established in the meantime is the body mass index (BMI). BMI is calculated by the fraction of a person's weight in kilograms, divided by height in meters squared:

$$BMI = \frac{\text{Body weight in kg}}{(\text{Height in m})^2}$$

In the case of very tall and very short people it is more accurate than the Broca index in terms of total fat (BENECKE & VOGEL, 2003). BMI serves for the classification of weight groups, because with the use of this fraction the percentage of body fat is more accurately characterized. According to the World Health Organization (1998) guidelines, overweight in adults is defined as BMI $\geq$25. Obesity begins with BMI $\geq$30. There are three different degrees of obesity.

Name	BMI (kg/m^2)
Normal weight	18,5 - 24,9
Overweight	25,0 – 29,9
Class I obesity	30,0 – 34,9
Class II obesity	35,0 – 39,9
Class III extreme obesity	$\geq$ 40

Table 1: Classification of body mass index (WHO, 1998)

In the case of children and young people, when calculating BMI, age and gender should be taken into account, because BMI, depending on the physiological changes of the body fat percentage in children and adolescents, is affected by important age and gender specificities. International Obesity Task Force (IOTF) special scientists are therefore recommending the use of BMI percentile (percentages of the age group with a BMI below the corresponding value).

The *Obesity in Childhood and Adolescence* working group suggests in its guidelines the use of the 90th or 97th percentile as a limit value for the definition of overweight or obesity. Although this is a purely statistical definition of limit values, in the adult age there is an almost continuous shift to the fixed limit values.

Percentiles for the body mass index of boys and girls aged 1 to 18 years BMI = weight / height²; kg/m²					
	Boys			**Girls**		
Age (in years)	50º percentile	90º percentile	97º percentile	50º percentile	90º percentile	97º percentile
1	16,8	18,7	19,8	16,4	18,3	19,2
2	16,1	18,0	19,1	15,9	17,9	19,0
3	15,6	17,6	18,8	15,5	17,6	18,8
4	15,5	17,5	18,8	15,3	17,5	18,9
5	15,4	17,6	19,0	15,3	17,7	19,2
6	15,5	17,9	19,4	15,4	18,0	19,7
7	15,7	18,3	20,2	15,6	18,5	20,4
8	16,0	19,0	21,1	16,0	19,3	21,5
9	16,4	19,8	22,2	16,5	20,0	22,5
10	16,9	20,6	23,4	16,9	20,1	23,5
11	17,4	21,4	24,5	17,5	21,6	24,5
12	15,0	22,2	25,4	18,2	22,5	25,5
13	16,6	23,1	26,3	19,0	23,4	26,4
14	19,3	23,7	26,9	19,7	24,0	27,0
15	19,9	24,4	27,5	20,3	24,6	27,5
16	20,5	24,9	28,0	20,7	24,9	27,7
17	21,0	25,4	28,4	21,0	25,1	27,7
18	21,6	25,9	28,8	21,3	25,3	27,8

Table 2: Percentiles for the body mass index of boys and girls
(KROMEYER-HAUSCHILD et. al., 2001)

3.1 Social significance of obesity

The significance of obesity as a condition in childhood and adolescence arises from functional and individual constraints as well as psychosocial negative influences. On the one hand, children and young people suffering from obesity have higher co-morbidity (appearance of two or more diseases in the same individual) than those with a normal weight and, moreover, have a significantly increased risk of morbidity (morbidity = incidence of the disease in a certain population) and the mortality risk (mortality = percentage of deaths, percentage of individuals of a certain population dying within a certain time period) of adults. With regard to adults health risks due to obesity are scientifically well documented, when it occurs already in childhood there is an additional negative influence irrespective of co-morbidity. Increased morbidity as a consequence of obesity is already documented in childhood (disorders of fat and glucose metabolism, orthopaedic problems and increased blood pressure). Obese children and obese young people are

stigmatized because of the ideal of the lean body that is generally advertised. Thus, obese children and obese young people develop a low sense of self-esteem, which in turn is a risk factor for psychosocial development as well as eating disorders (WABITSCH & KUNZE, 2003).

3.2 Economic significance of obesity

With the increased occurrence of obesity, congestion in healthcare facilities and increased healthcare costs are expected. The US healthcare system spends $ 45 billion a year, that is 8% of the national health expenditure, to treat obesity and related illnesses. And in Austria, the cost of treating obesity is also up to 8%. The corresponding calculations for Germany accept that if the spread of obesity among adults does not increase, by 2030 total costs of early obesity will increase by about 50% including co-morbidity (TROSCHKE & STOESSEL, 2012).

Although motivated by other reasons, food industry and fast food enterprises have recognized the significant issue of the overweight population with an increasing tendency to obesity. Extremely overweight customers do not fit to the advertisement image characterized by a beauty model lean and athletic. It also means total tangible profit losses if the dietary behaviour of the population develops to the detriment of the food companies groups. In the USA, they are seriously considering the threat of lawsuits, as was the case with damages actions against the tobacco industry. Two American women have accused the American company McDonald's of misleading advertising to persuade customers into consuming fast food and thus promote obesity, especially among children and young people. Although after the initial court decisions there was a feeling of complacency, because the lawsuits were dismissed, the food business groups are getting prepared and devise their new strategy. McDonald's and Burger King fast-food chains have had great success offering healthy new products such as salads and low-fat foods with the label *fitness*, and meanwhile a large part of their turnover comes from those products. The same will apply to other branches of the *fitness* industry, from sports manufacturers to the *lifestyle* industry. If these developments continue, businesses will lose some of the clientele they are targeting (GELINSKI, 2003).

In the meantime, obesity is considered a chronic disease and not just a biological variation. In the USA, about 280,000 deaths a year are attributed to obesity and its consequent diseases. This is the second cause of death among adults after smoking. Therefore, the spread of obesity as early as childhood is one of the most important health policy challenges in the context of general health promotion (WABITSCH & KUNZE, 2003).

3.3 Obesity – Basic principals

As mentioned before, the spread of obesity worldwide is increasing in all industrialized countries. In Germany, 10-20% of all school children and young people are overweight. Studies also show that the degree of obesity has increased significantly and therefore the number of extremely obese. The causes of this are not attributed only to inappropriate diet, but also to the change in living conditions and to a large number of other factors. Excessive intake of food rich in calories and fat, as well as lack of physical activity, which act based on a genetic predisposition, lead to increased body fat. Causes must also be sought in the psycho-social field, such as lack of communication (WABITSCH & KUNZE, 2003).

3.3.1 Causes of obesity

Individual motor and nutritional conditions are constantly determined by environmental and social peculiarities. Over time, physical activity has been reduced due to increasing modernization (excessive use of television and computer games) and the increasing use of machines. In many families, nutrition and dietary behaviour have changed radically due to the almost unlimited supply of tasty but energy-damaging foods as well as the uncontrolled composition of prepared foods. Both the food industry and the media promote this behaviour with advertising, which is targeted mainly at children. For this reason, the World Health Organization calls on all governments to ensure that the advertising of food and beverages does not exploit children's naivety.

It is doubtful whether children and young people have the ability to control on their own determination their motor and nutritional behaviour under unfavourable environmental conditions so that they can maintain their weight constantly. All-day schools with pre-cooked meals, prepared food products as a basis for family meals, life in large cities without sufficient physical activity and journeys to school by bus or car; these are environmental factors that cannot be determined by a child or a young person with a strong predisposition (a person's tendency to develop a certain attribute, for example, a disease in the course of his life) to obesity (PUDEL, 2003).

3.3.1.1. Genetic predisposition

Often overweight people or their relatives attribute the weight problem to innate body structure and a genetic or medical predisposition. While it does not seem unlikely that there has been a change in genetic predisposition over the last 20 years, studies show that overweight children and adolescents are becoming heavier and that the weight of lean children and young people is not changing at all. This is made clear by the changing distribution of BMI percentiles: the level of the 3rd, 10th and 50th percentiles did not change at all, but there was a significant increase in the 90th and 97th percentile. This implies a biological or genetic predisposition for the target group. Obviously this does not directly affect body weight, but rather the regulation of energy balance is more vulnerable to disorder magnitudes such as changing environmental factors (DGE, 2003).

In fact, obesity belongs to the diseases that, in addition to genetic factors, are also affected by environmental conditions, which play a role in the expression of the phenotype (external appearance) in terms of existence and course. Almost throughout the history of humanity the most advantageous gene variants were those that led to a higher percentage of body fat. Through evolution from the primate form through humanoids to Homo sapiens, humans learned to eat all the substances they can digest (HOLLER, 2002). They are omnivorous. In the "thrifty genotype" theory it is mentioned that the populations who were able to better store the food they received (= fat storage) had an advantage in terms of their survival, and therefore could survive better in deprivation seasons. Today all of these factors often have a negative effect, because these individuals in the current life conditions become sooner overweight or obese (HEBEBRAND et al., 2003). Basically, genes that can cause obesity are divided into recessive and dominant. A recessive gene is typically covered by a dominant gene (the dominant attributes always appear). However, if both parents

carry a recessive disease, there is the possibility for each child to inherit both of the recessive genes or none of the two. In addition, the child can pass the recessive gene to one of his/her offspring.

Until now, we know four monogenic autosomal recessive forms of obesity for humans. To an early observed and excessive obesity lead the leptin mutants, leptin receptors, convertase regulators -I-PC-I- and proopiomelanocortin. A common feature of these individuals is hyperphagia (abnormally increased food intake). These four forms appear very rarely and cannot explain the significant percentage of obesity cases. Predominant forms of obesity include mutations (change of the hereditary material of an organism) to receptor 4 of melanocortin (MC4R). Until today, more than 40 different MC4R mutations have been identified, which in most cases result in partial or complete loss of receptor function. About 2-4% of the children with extreme obesity have such mutations. Also in most human chromosomes there are areas that are most likely to contain one or more genes that are involved in the appearance of obesity. Philippe Froguel of the Imperial College in London has identified such a gene and mentions that the GAD2 gene is more active in some people than in most of the people and therefore causes unlimited appetite. We hope that in the future doctors will be able to identify the children who are predisposed to excessive food intake, so that new treatment options may arise (HEBEBRAND et al., 2003).

3.3.1.2 Eating disorders

Excessive and uncontrolled eating can be a sign of an eating disorder, resulting in overweight and obesity. Today, in particular, two forms are linked to obesity: ***Binge Eating Disorder*** and ***Night Eating Syndrome***. They are described in detail below.

In the ***Binge Eating Disorder*** form there are constantly recurrent bulimia outbreaks. A large amount of food is taken, which is definitely greater than the amount that other people would eat at the same time. In this outburst, people lose control of what and how much they eat. The ***BED*** is associated with at least three of the following characteristics:

- *Eating faster as if it were something normal.*
- *Eating until one is unpleasantly full.*
- *Eating a very large quantity even if one is not hungry.*
- *Eating alone because one is ashamed of how much one eats.*
- *After eating, feeling disgusted, oppressed or guilty* (GRILO, 2002).

There is considerable despair due to BED. These incidents occur on average two days a week for at least six months. In these, the people involved - mostly women - do not compensate for calorie intake with vomiting, physical exercise, beauty treatments, etc., like bulimics.

Night Eating Syndrome can also lead to obesity. Clinical investigations show that this eating disorder appears disproportionately often in obese people at times of major crises, in order to achieve an anxiety reduction. Night eating syndrome seems to be a special response to anxiety for some obese people, depending on the pace of the day (STUNKARD, 2002).

People that suffer from this condition have sleep disorders and try to compensate with night food. Surveys have found that people suffering from the Night Eating Syndrome consume 37% of their daily food before 18:00. The remaining 63% they consume it during the time period between 6 in the afternoon and 6 in the morning. The sufferers stay awake at night. About one in two adults will end up eating. Unlike in the ***Binge Eating Disorder***, here they do not consume too much food. The portions have a normal size, averaging 271 kcal. But the percentage of carbohydrates in these meals is very high. The ratio of carbohydrate to albumin is about 7: 1. This diet pattern increases the concentration of tryptophan, which is transferred to the brain and converted to serotonin there. Serotonin in turn strengthens sleep and helps the patients to fall asleep - until they wake up again (STUNKARD, 2002).

3.3.1.3 Endocrine disorders

In very rare cases, obesity occurs due to glandular disorders. That may well be what many obese people claim, but the incidence of reported cases is very low. In less than one in 100 severe overweight people, physical disease is the cause of obesity. Here some hereditary diseases are included, innate or acquired functional disorders of the pituitary, thyroid or adrenal glands. A type of endocrine disease is Cushing's syndrome. At this case, too many hormones of the type called glucocorticoids are produced in the adrenal cortex. A typical type of obesity is created, which mainly concerns the body trunk and less the extremities. The main fatness, often associated with stretch marks, is located in the abdomen. Typical for this is diabetes disease due to glucocorticoids (BIRCH, 2002).

3.3.1.4 Medicines

Some drugs can cause obesity. Most known is the weight gain due to long-term treatment with cortisone. Significant changes in appearance are noted: moon face, stiff neck, weight gain, and gaining trunk fat (fat limited in the trunk area). All of these cases are summarized under the term Cushing Syndrome, which is similar to Morbus Cushing's disease, which is due to over-production of cortisol by the body itself. Other medicines (insulin, neuroleptics, etc.) result in weight gain as a side effect. Most of the time weight gain by a few pounds is kept within the limits and does not lead to severe obesity that needs to be taken seriously (BIRCH, 2002).

3.3.1.5 Prenatal and postnatal incorrect diet

The tendency for obesity may occur even in the foetus or in a new born baby still in the cradle. Thus, children whose mother has diabetes, even new born infants who are overfed, but even those who are malnourished, are at a significantly higher risk of suffering from illnesses such as obesity, diabetes and hypertension later in life. The cause is the increased insulin and cortisone levels in the late stages of pregnancy and during the first few days of the new born. The increased concentration of these two substances at this early stage results in life-long incorrect programming of brain regulatory centres for hunger and saturation. More specifically this means: Excessive weight increases insulin production. As a consequence, children grow disproportionately to the mother's body. A chain reaction begins, which can no longer be stopped. Increased growth leads to incorrect brain programming. The hypothalamic (pituitary)

centres, which regulate the feeling of saturation and inhibition of insulin, diminish, while areas that regulate hunger and insulin secretion are of normal size. This insulin overproduction, that the body gets accustomed to, remains for a lifetime and causes increased appetite, overweight, elevated blood insulin levels and impaired glucose tolerance. These are all factors that increase the risk of obesity, cardiovascular and sugar diseases. Postnatal overfeeding in the early stages causes too high insulin values and thus results in a predisposition for obesity that is not primarily due to genital causes, but is rather acquired during the development of the baby and then remains for life. This explains the transfer of this acquired disorder to several generations, when the affected female progeny become pregnant. A tendency for obesity and diabetes can therefore be created, with no genetic predisposition. But also intrauterine (in the mother's body), a developmental delay, which can be caused, for example, by anxiety or mother's inadequate nutrition or by consuming alcohol and nicotine, can lead to a wrong programming of the child's brain. Under these conditions, more cortisone is secreted, which in turn results in greater insulin production. The brain is programmed very early in the direction of "too much food" and the children who at first were small and malnourished later have the same weight problems as the overfed ones (PLAGEMANN, 2000).

3.3.1.6 Family configuration

A purely genetic predisposition or diseases that occur very rarely, as described earlier, are not sufficient to explain the spread of obesity, which is increasing. Genes play a role of only 30-50%. Overweight also occurs due to the wrong diet of the family: fast food and junk food, the minimum amount of time dedicated to the child and a compensation for this lack with sweet treats or because grandparents wrongly express their affection in the form of sweets offered. Small fat children grow up and become fat adults, who in turn often have fat children. Diet is a matter of education because eating behaviour is passed on from parents to children. This includes eating schedule choices, cooking manner, the frequency of meals as well as rewarding habits (for example, sweets as a reward for good grades or help offered). Therefore, the incorrect diet is transferred from generation to generation. Starting from birth, nature, with breast milk, provides the ideal nutrition for infants. In the following years they have to adapt to a diet consisting of solid and liquid food. In this development, parents play a great role. They have a decisive influence on the shaping of the subsequent nutritional preferences of children and young people. This starts with the parents' decision as to whether the baby will be fed on breast milk or ready-made baby food. Once the transition to solid food has taken place, parents have the opportunity to shape the children's nutritional patterns by deciding what foods they will accept and what not, when and in what amount the food will be offered to the child, and in what social occasions it takes place. For children, eating is a social event during which other people at the table act as role models. Thus, children whose parents are overweight or obese have a greater risk of becoming overweight because they adopt their parents' eating patterns. So it's not surprising when in a family there is more than one overweight member (BIRCH, 2002).

3.3.1.7 Social environment

Parents' social status seems to be a risk factor for the spread of obesity. Thus, a study in the state of Brandenburg showed that the percentage of obesity in children of a lower social level is three times higher

than that in children of a higher social level. Based on this, we can assume that families of higher social status have different dietary patterns than those of a lower social status. Such differences are important for the design of prevention measures. This theory is also supported by a study by the State Health Agency (LGA) in Brandenburg, which measured obesity rates in some areas. Here, it is striking that in some remote areas of Berlin, where mostly families of lower social status reside, the number of obese school children in the first grade is higher than those residing in areas directly next to Berlin (ELLSAESSER et al., 2002).

In a study by DORDEL and KLEINE (2003), residential areas are also mentioned, and from those it follows that social status is a risk factor for obesity. Thus, according to the survey, children attending school in Cologne show significantly higher overweight rates than school children in rural areas. This is substantiated by the fact that, in this study, pupils in cities most often belong to the lower and middle classes, while pupils in rural schools can be ranked mainly in the middle and partly in the upper class. Thus socio-ecological and socio-economic influences are mixed. We also accept that in the countryside more value is given to more favourable conditions for the motor development of children, so the area of residency has a positive effect on body weight. By accepting that children in the countryside have better opportunities to realize their desire for physical activity than the children in the cities, that most of the time have only the neighbourhood square to play, it is not surprising that obesity rates are much higher among urban children compared to rural children.

3.3.1.8 Diet

The diet provides the energy necessary to preserve life and to obtain the necessary substances for the preservation of the biological structure (HOLLER, 2002). Over time, the diet was developed through the combination of natural resources and evolution. For the increase in the weight of children and young people, besides the incorrect and rich in calories diet, the amount of food is also responsible. Over the decades, the idea of portion size has changed significantly. So, in the earlier times, the portions were smaller than today. What today is considered a "normal" portion formerly was considered a 'huge portion'. Although, in former times motion and physical work were much more intense in the daily lives of most people, the size of the current portions is much larger. Overweight people on average eat about 25 grams of fat more than those with normal weight. This difference, which at first seems small, is concentrated in the annual balance and leads to weight gain by nine pounds (LAESSLE et al., 2001).

3.3.1.9 Lack of physical activity

Surprisingly, the spread of obesity has risen even further over the past few years in Germany, although the average calorie intake and in particular the high fat consumption has fallen slightly lately. And in the US between the years 1976 to 1980 and 1988 to 1991 there was a reduction in fat consumption from 41.0% to 36.6% of total calories and in total energy intake by 4%. However, at the same time, the spread of obesity among adults increased from 25.4% to 33.3%.

Even if there is no comparable data on the corresponding energy consumption, this paradox is only explained by the growing lack of physical activity. There are a number of indirect indications on this issue: For example, in recent years, the daily journey made by children and young people on foot or by bicycle

significantly decreased, while the time spent watching television was significantly increased, which is something closely related to weight gain (WINKLER, 1998).

The use of technology in the workplace and in leisure time played also a big part in the spread of the obesity epidemic. For example, human power as a power supply for productive processes was replaced by machines that take their energy from raw materials. Moreover, even for short trips, people nowadays travel mostly by car or bus, while formerly they would have walked the same distance. According to various surveys and estimates, about two-thirds of adults in North America and Central Europe are physically inactive, that is, in their daily lives they move very little and do not engage in any sport.

In Germany, a maximum of one third of the population aged 18 to 55 is engaged in sport, which we now accept that has a significant preventive action. The world of children that usually involves a lot of physical activity is becoming increasingly sedentary. The more children and young people sit in front of the TV or the computer, the more weight they gain. Especially at school, it is noticeable that fewer and fewer children are willing to exercise and an increasing number of them hardly move at all. During school breaks, many children prefer to play with their Game-Boy, which takes on the role previously played by football or other physical activities. A vicious circle is created: Lack of activity reduces body efficiency. Consequences: negative experiences, junk food, even more television and more abstention from sport, and social isolation manifested by mockery and teasing (BOES et al., 2002).

3.3.1.10 Mental causes

Obesity can also be due to mental causes. Obesity as a consequence of psychological reasons may be caused by loss experiences. Parents' divorce, the death of a parent or running away from the parental home are considered as such. Excessive eating is also caused by loneliness, boredom, long-term anxiety and stress, or a feeling of diminished self-esteem in the sense of *feeling unpopular*. In these cases food does not serve to satisfy hunger, but rather to take away the sadness. Food intake is used as a substitute satisfaction, in order to feel better and to do something good for oneself. Thus food becomes the defense against bad mood, fears and depression. Many overweight people have depressive personalities. However, some scientists are of the opinion that the mental peculiarities observed in obese people appear to be consequences rather than causes of obesity. Excessive eating can also be seen as an expression of unintentional aggression towards others and as unconscious self-destruction. Obesity can also serve as a defence mechanism against the role of sexes. But this only occurs in girls (PUDEL, 2003).

3.4 Consequences and diseases

Overweight is not in itself an independent risk factor, but rather increases the incidence of other risk factors such as diabetes, hypertension or metabolic disorders. Thus, overweight is characterized as *the risk factor of risk factors*. Overweight and obesity can cause a number of physical annoyances. Children with severe overweight often snore and suffer more often from a sleep related breathing disorder that appears with paroxysms, the sleep apnea syndrome (breathlessness lasting more than ten seconds). Typically dyspnoea and shortness of breath also occur. In addition to increased sweating, it can also cause orthopaedic problems such as back pain (mainly lumbar spine) and knee obstruction. The joints are constantly stressed by the

weight and wear out more quickly. Frequent evidence of articular cartilage damage of the knee joint and hip joint damage is present, as well as flat feet and lack of the transverse arc of the foot due to mechanical strain. The efficiency of the body of extremely overweight people is considerably limited. Even in small fatigue, the cardiovascular system is overly strained, which is manifested by dyspnoea, pulse increase, sweating and rapid exhaustion. In extreme cases, complete inertia or even motor disability (immobility) is observed. Among the skin folds of overweight, inflammations (wet eczema) are easily created. There is also increased risk for bile stones (cholelithiasis) and increased uric acid in the blood (hyperuricemia, and as a consequence gout). A more recent study notes that overweight children are at greater risk of developing asthma. Approximately in 40% of the cases menstrual disorders are also present. Disproportionate intake of food disrupts the processing of food components during the metabolism of sugar and fat. Excessive weight is considered to be the most important risk factor for the occurrence of sugar disease (diabetes mellitus) and high blood pressure (hypertension). Overweight children also present signs of vascular inflammation. These may develop into atherosclerosis, which often result in coronary heart disease, myocardial infarction or syncope. Because of these complications, life expectancy of overweight people is lower than those who have a normal weight. A study by Vrije University in Amsterdam confirms these effects. Children's blood samples have already shown the first signs of inflammation in the artery walls, something known to adults as a preliminary stage of heart disease. 7% of boys and 6% of girls had in their blood first signs of inflammation of their arteries. Some of these children were only eight years old. However, it is not only the medical consequences that play a role. The psychological and social consequences of obesity should not be underestimated.

Minority tolerance today is widely glorified, but this does not seem to apply to overweight people. Most obese children and obese young people suffer from the sarcasm and disdain of their environment. Especially children have no hesitation in mocking and humiliating others. In a survey among nursery children it was revealed that they had already created a negative image for obese people. They were shown images of normal weight children, overweight and disabled children and were asked whom they preferred. Their reply was that they considered the overweight children less popular and said that it would be less pleasurable to become friends with them. Another empirical study showed that overweight children and overweight young people develop a negative image of themselves as the duration of their overweight increases. Particularly overweight people suffer greatly from this and develop a feeling of low self-esteem. Also obese children present inhibitions, depressions, unused social potential and phobias. A negative body image and a negative perception of the body are further consequences of overweight. Humiliated children often try to be comforted with sweets and crisps, and thus they enter a vicious circle that they cannot interrupt alone without help and understanding. There is a risk that this behaviour may be established, and another eating disorder could be developed (anorexia nervosa, bulimia), especially in girls (LAESSLE et al., 2001).

For overweight children aged six to nine years there is a 55% chance of living a life as an overweight adult. The risk is twice as high in comparison to children with normal weight. 67% of overweight children aged between 10 and 14 years are at risk of having to fight obesity as adults. The risk is greater, the older the child is. Parents' weight also has a decisive influence. At the age of 7 an overweight boy with normal weight

parents has a probability of 37% of continuing to be overweight as an adult. On the other hand, for a boy of the same age that has an overweight parent the probability of becoming an overweight adult is up to 71%. This is explained by the fact that people who were first overweight as adults generally have a normal number of adipocytes, which have just grown in size. With a diet their size returns to normal. But if obesity develops from childhood, it is generally based on a large number of fat cells, which later in life are no longer degraded. In this case, diets lead to abnormally small adipocytes, which tend to return as quickly as possible to their previous size. As a result, overweight adults who were fat as children, find it hard to achieve and maintain a normal weight; so it is common that overweight and obesity will afflict them for a lifetime (PUDEL, 2003).

4. Summary

Overweight and obesity have always existed. However the voluptuous body, that formerly was considered a sign of wealth or a survival strategy, is now stigmatized. Overweight people not only have a higher risk for their health in the form of cardiovascular diseases, diabetes mellitus or premature bone and joint damage, but they do not correspond to today's ideal of beauty. Due to the changing living conditions, the spread of overweight and obesity in industrialized countries has greatly increased, therefore rapid action is needed. Obesity from a medical perspective has been investigated. Its epidemic effects, particularly in industrialized countries, have been demonstrated in numerous studies and the results show both an increasing spread and an increase in the impact of obesity. The causes of obesity are due to many interdependent factors. It is therefore difficult to formulate therapeutic proposals that have general validity. In summary, we can say that for the increasing number of overweight and obese children and adolescents the medical factors are less important. The causes should be sought in the social conditions and behaviours of certain social groups. It is important that children and young people are permanently involved in the subject of nutrition and movement, and that this engagement accompanies them throughout their development. The weakest link in the chain of measures will be children and young people. Here art must be expressed with imagination; their interest should be awakened with subtle and patient moves. Even if the politics supports, doctors encourage, health funds, kindergartens and schools raise awareness, sport clubs motivate, the media inform, parents recognize and offer incentives, the hardest part of the job should be done by the target group in order to achieve personal success; that is to remain or become "healthy". Furthermore the treatment of obesity is more difficult, than preventing its occurrence. Particular attention must therefore be paid to prevention, particularly in childhood and adolescence.

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