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Effectiveness of Developed Comic Strips as Instructional Material in Teaching Specific Science Concepts

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Abstract

The study assessed the effectiveness of developed comic strips as an instructional material on teaching specific science concepts. The study also determined the perception of the respondents on the use of developed comic strips with regards the enhancement of their science process skills. Moreover, the study provided results on the mean difference between the pre-test and posttest performance of the respondents when aided by developed comic strips. The researchers made used of validated rubrics and survey-questionnaire as the primary tools of the study. The findings showed that the developed comic strip was effective as an instructional material in teaching science concepts, on waste generation and management topics in particular. It was rated acceptable and commendable by the expert-evaluators. There was a significant difference between the pre-test and posttest mean scores of the respondents. The respondents positively perceived that the developed comic strips had enhanced their inferring and communicating science process skills. Hence, the results further motivate the respondents to appreciate waste generation and management and put value on its effect to human and environment. Future utilization of this comic strip as an instructional material in teaching specific science concepts would raise environmental awareness and campaign.

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I. INTRODUCTION

Instructor's teaching effectiveness and student's learning are sometimes dependent on the Instructional Materials (IMs) used. Muzumdar (2016) noted that there are numerous researches supporting the contention that IMs affect students' learning. On the other hand, traditional instruction approaches caused negative image in the learning process especially in teaching science subjects and developing the science process skills of the students (Özdemir, 2010). Thus, improving quality teaching is the most significant goal in the education system.

Recently, the Philippine Government has shown serious commitment to Information and Communication Technology (ICT) education, but the Philippines as a developing country still is facing the big challenge in adapting technology (Reodique, 2017). Accordingly, the education department should be

flexible and invent ways how to deliver learning in this fast changing world. Teachers are getting challenged to adapt modernization that the department offered, but not all educators can cope with the challenges, particularly those in far-flung places which have lesser access to electronic sources such ICT and other non-traditional models of teaching. In the area of science, particularly on delivering the concepts of waste generation and management, most teachers in the province are unendingly searching for new instruments to improve learning. In fact, the Division of Surigao del Sur province is highly promoting contextualization and development of local materials to meet this concurrent demand on the absence of ICT and launching more interesting IMs in the rural context, a non-electronic material such as magazines and comic strips.

There are several modern teaching methods used in science teaching and learning process, one of these methods includes the use of non-electronic materials like comic strips. A study conducted by Estacio (2015) states that comic strip as an instructional material has a positive effect on the performance of the students in class where students learn the lesson easily as the picture diagram presented the topic. It also reiterates other findings that cartooning concept can improve the performance of students even in struggling subjects like Physics. Additionally, Toledo, et.al. (2014) gleaned that students' issue resolution skills in environmental education were significantly better upon exposure to media cartoon. The researcher also observed the active participation of the respondents in media cartooning that enable them to make better plans, actions, and solutions to local and global environmental issues.

The theories of Espada (2003), Gary (2012) and Özdemir (2016) stated that comics as an instructional material can facilitate students' learning of overarching concepts, such as cognitive development, motivation, and information processing. Scientifically accurate comic strip is an innovative way to promote higher order thinking skills through presenting scientific knowledge in a popular form that is enjoyed by most students. Comic strips as instructional material in science classes can promote science literacy and increase students' performance in some specific concepts (Tilley, et.al, 2017). However, none of the theories have claimed that comic strips in teaching science could enhance student's science process skills.

With the present situation and existing theories on comic strips as instructional materials, the researchers tried to fill the gaps by promoting another theory on comic strips as a productive tool in improving students' performances in a specific science concept, and how it enhance student's science process skills. The study also provided an evaluation on the effectiveness of the developed comic strips, its effect on the students' pretest and posttest performance and its contribution to the development of student's science process skills.

II. METHODOLOGY

The study made use of "design and development" type of research adopted from the study conducted by Institute of Education Science IES (2013) and Özdemir (2016), aiming to develop an instructional materials based on an existing theory and get feedback from the performance of students in a particular

science concept and the development of their process skills. The study has undergone three phases. Phase 1 on the evaluation of the effectiveness of the developed comic strips by the expert-evaluators from the Department of Education using the validated rubrics. Phase 2 was focused on the determining the respondents' pretest and posttest performance through the aid of developed comic strips. The researchers conducted lessons on the specific science concepts with a lesson plan implemented on the two homogeneous sections from the two selected public high schools in the province. The researcher-made lesson plan was composed of the following parts: a.) objectives b) activity plan c.) materials needed, d.) procedures and e.) assessment (multiple choice). Finally, Phase 3 covered the perceptions of respondents on the use of comic strips as instruction materials in teaching science concepts. The researchers adopted and modified the research instrument from the study of Özdemir (2016). The adopted instrument was categorized into two: Category one on how comic strips help Learning (LEA) and Category two on how comic strips develop students' Science Process Skills (SPS). LEA as category one was into two sub-categories division which measures the retention (RET) and comprehension (COM) skills of the respondents. While the category two researcher self-made questionnaires focus on the development of Science Process Skills (SPS). SPS was composed of competencies which could address the science process skills which include: observing, measuring, inferring, identifying cause and effect, classifying, predicting, experimenting, communicating, predicting, formulating models, analyzing, interpreting, making conclusions, and evaluating. The researcher also added another category which measures the perceptions of the respondents on the use of comic strips to Learning Waste Generation and Management (LWGM). Indicators were rated using the Likert Scale.

III. RESULTS

Table 1. Evaluation Rating of Comic Strips on its Effectiveness as Instructional Material

Area of Assessment	WM	Description
Factor 1: Content	3.87	Very Satisfactory
Factor 2: Format	3.67	Very Satisfactory
Factor 3: Presentation and Organization	3.89	Very Satisfactory
Factor 4: Accuracy and Up-to-datedness of Information	3.67	Very Satisfactory
Overall Mean	3.78	**Very Satisfactory**

Legend: 4.00-3.1- Very Satisfactory (VS), 3.00-2.1- Satisfactory (S), 2.00-1.1- Fair, 1.00-Poor

Table 2. Mean Scores and Standard Deviation Value for the Pretest and Posttest

		Pre-test		Post-Test	
Type of Group	**N**	**Mean**	**SD**	**Mean**	**SD**
Control Group	30	**6.3**	2.47	**9.67**	2.76
Experimental Group(Comics)	30	**8**	1.91	**12.8**	2.55

Table 3. T-test for Equality Means

Academic Performance	df	t-value	p-value	Decision	Conclusion
Control Group Experimental Group	58	4.576	.000	Reject Null Hypothesis	Significant

Table 4. Summary of the Weighted Mean Distribution of the Level of Perceptions of the Respondents on The Use of Developed Comic Strips in Teaching Waste Generation and Management.

Comic Strips Help Learning (LEA)	WM	Description
A. Retention (RET)	3.69	Strongly Agree
B. Comprehension (COM)	3.77	Strongly Agree
C. Science Process Skills (SPS)	3.72	Strongly Agree
D. Waste Generation and Management (WGM)	3.72	Strongly Agree
Overall Mean	3.73	**Strongly Agree**

Legend: 4.00-3.1- Strongly Agree, 3.00-2.1- Agree, 2.00-1.1- Disagree, 1.00-Strongly Disagree

IV. DISCUSSION

The developed comic strip was evaluated by different experts to assess its effectiveness in terms of content, format, presentation and organization, accuracy and up-to-datedness of information using the valuation rating sheet provided by the DepEd-Division of Surigao del Sur. Based on the result of the evaluation (Ref. Table 1), all the items are rated very satisfactory by the experts with an average weighted mean of 3.78. The results imply that the developed comic strips is suitable to the learner's level of development, contributes to achievement of the specific objectives, free from biases and prejudices, enhances the development of creativity and innovation, communication, collaboration, productivity, accountability, leadership and responsibility. The overall evaluation on its effectiveness revealed that the comic strip as a developed instructional material in teaching specific science concepts is highly usable. Expert-evaluators inferred that the comic strips possess a high level of acceptability and efficacy. The experts considered the material as potential instructional materials to enhance learners' performance in a particular concept.

Tables 2 and 3 showed the pretest and posttest mean scores of the respondents. The results conveyed that the group of students aided with the developed comic strips performs better than those in control group. The increase of their mean score is an indication that the students have really understood and perform well all the activities given to them. They showed ultimate interest in the science concept presented. There is an increase of the performance and development of their science process skills particularly on understanding

and appreciating waste generation and management topics. The results are supported with the ideas of Mallia (2007) and Ozdemir (2010) that comics promotes productive classroom engagements and shows a cognitive potentials for students' motivation and retention purposes. It further agrees with different assertions coming from different existing studies of Ritcher (2015), Soluhob (2015) and Affeldt (2018), that comics as a verbal visual element closes students to environmental issues and concerns, increases student's societal knowledge that gives them motivation to support environmental works and sanitation within their locality. The results also indicate that there is a significant difference between the pretest and posttest performance of the respondents in teaching science concept with the use of developed comic strip and from traditional teaching method. The claim is also supported with the study of Arroio (2011) and Weber, et al. (2013) stating that the use of visual and text format presentation gives comic a potential in getting away from traditional mode of delivering classes with the use of traditional textbook materials.

An examination of table 4 results on the summary of the perceptions of the respondents on the use of developed comic strips as an instructional materials presented positive attitude in all indicators. The results revealed that the student respondents generally have favorable attitudes towards comic strips as instructional materials for learning science concepts, science process skills, and waste generation and management. They appeared to have learned better, developed their science process skills and show the visionary trend towards waste generation and management. Most of the students perceived that the developed comic strips is a good provider of information about instant solution on waste management, solve environmental issues and concerns, provide them comprehensive and contextualized situation and plan on how to help the environment. The results agreed with the different assertions coming from different exiting studies that comic as a verbal and visual element closes in the students to environmental issues and concerns (Solohub, 2015), and a material in which situational context supports the environmental works (Affeldt, 2018). It increases students' societal knowledge that gives them motivation in making steps toward sanitation that may create a continuous impact on cleanliness within their locality (Ritcher, 2015).

IV. CONCLUSION

Based on the findings of the study, the researchers concluded that the developed comic strip was effective as instructional materials in teaching specific science concepts. Experts strongly agreed that the instructional material is acceptable and commendable to use in the classroom setting. Students perceived that comic strip helped promotes good comprehension, enhanced the development of their science process skills and raised better awareness on topics about waste generation and management and its effect on human and environment. Moreover, through the developed comic strips, the students were able to appreciate in an interesting ways, the importance of healthy environment, which led them to be supportive of environmental projects and advocacies. The utilization of the developed comic strips served as good tool to raise environmental awareness and campaign not just in young generation but for everyone's concern. Thus, future researches on developing another tool or set of comic strips in various areas of science and across different disciplines of different grade levels is invigorated.

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