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Stories Unfold of Grade 7 Science Teachers on Instructional Materials: An Assessment

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ABSTRACT

Common sentiments of teachers in the field with the implementation of the K to 12 Curriculum are limited instructional materials. One of the responses to face these challenges is to use localized and contextualized materials for teaching based on the needs of students and teachers. This descriptive single case study anchored on Kolb's theory of experiential learning highlights the role of instructional materials in student's retention of knowledge. An in-depth, focused group discussion was used to assess the needs of Grade 7 science teachers of Northern Tacloban City National High School purposely selected as participants. Findings revealed that teachers need multimedia in the form of animated video with corresponding worksheets where they can answer questions based on the video seen, this helped for a more in-depth understanding of concepts, skills, and processes of the subject. The result of the study paves the way to develop an instructional kit in making learning more interactive and enjoyable to students.

Keywords**:** *context-based, teaching materials, Grade 7 science, animated videos, worksheets*

Introduction

Science education has faced challenges and interrelated problems throughout the world over the past 20 years. Problems include overload, isolated facts, lack of transfer, lack of relevance, inadequate emphasis, and misconceptions (Özay Köse & Cam-Tosun, 2013). Many learning theories, models, and interventions has been developed using different approaches to improve the quality of science teaching-learning process as well as learning outcomes. Currently, the Philippines has also one major educational innovation which is the implementation of K to 12 curricula. Part of the implementation is the use of modules as instructional materials in science and other subjects which poses problems and challenges to both teachers and students. As mentioned in the study of Sañosa (2013), the use of modules in teaching Grade 7 science, particularly in Eastern Visayas, makes it easier for the teachers to prepare for teaching and for students to comprehend since the materials are well chosen, relevant, localized, exciting, and within the understanding of the students. However, she added that despite the training conducted by DepEd on the K to 12 curricula, some teachers commented that the Grade 7 science modules were complicated in terms of required teaching competencies. Another findings that Gutierrez (2014) revealed in which students experienced difficulty in understanding biological concepts in the said modules.

The findings, as mentioned above, mean that despite the learning interventions and innovations, students still find it challenging to grasp science concepts, skills, and its relevance to their daily lives. As what Schwartz (2006) pointed out that if we compare our educational system to a ladder, unfortunately, many students do not see the connection between the successive rumps. They do not know the relevance of what they are learning in their daily living. He added that they jump or fall off the land before they reach the top and all they take from the experiences is distaste for science.

One primary possible solution to address these challenges is the use of context-based approach. A context in its related words "contextus" expresses "coherence," "connection," or "relationship" which provides

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a coherent structural meaning for something new that is set within a broader perspective (Gilbert, 2006). Context-based science education was designed to consider its significance and relevance to all students (Hooreman, 2008). The context-based approach in teaching science includes personal, social, economic, environmental, technological, and industrial application for science. The contexts are generally selected by their relevance to the students' everyday life. For example, ideas about Newton's law of motion in the context of traveling by bicycle or ideas about organic chemistry are introduced through research about the development of medicines (Bennett, Grasel, Parchmann, & Waddington, 2005a).

The real beauty of context-based innovation is its integration in the instructional materials used to teach the different subjects. In other countries, particularly the UK, Germany, and the Netherlands; science teachers designed the curriculum materials. Teacher involvement makes the curriculum materials well-suited to classroom practice (Bennett & Lubben, 2006). Further, Fullan (1994) added that teachers would be more willing to accept the innovation since they have been part of it.

Along with this point of view, with the development of context-based Grade seven science teaching materials, students of Northern Tacloban City National High School will be able to see the connection and relevance of science lessons to their daily lives based on their needs and interest since science concepts, and activities, are integrated into the instructional materials.

Review of Related Literature

Bennett, Lubben & Hogarth (2007) defined context-based approaches in science teaching, where using contexts and application of science as starting point for the development of scientific ideas. It has been used widely in other countries: United Kingdom, USA, Germany, Israel, and Netherlands. (Bennett & Holman, 2003; Gilbert, 2006; Pilot & Bulte 2006). The aims of context-based learning include: motivation, uptake of science subjects, learning of science ideas, and produce literature citizens scientifically. It has two particular features which enhance the understanding of scientific concepts. First is the motivational aspect approach, which explains that if students can see the point of what they are studying, they will engage with the materials and will learn more effectively. Second is a "drip-feed" approach, which is the revisiting of ideas at different points which provides more opportunities for students to enhance their understanding of scientific concepts (Bennett & Holman, 2003). Strategies employing student-centered, active learning approaches stimulates interest and motivation, such as small-group discussions, group, and individual problem-solving tasks, investigations and role-play exercises.

Along this line of thought, making comparisons of students' performances are done. Specifically, different science disciplines employed context-based and traditional approach cited the following advantages over the other: (a) gives students significant degree of autonomy over the learning activity (Bennett, Campbell, Hogarth, & Lubben,2005b); (b) develop levels of understanding of chemical ideas (Bennett & Lubben, 2006); (c) succeeded in increasing students' interest (Holman & Pilling, 2004); (d) enhance students' motivation, retention, and achievement (Murphy & Whitelegg, 2006); (e) better understanding of chemistry (Gutwill-Wise, 2001); (f) increase students' achievement and acquisition of students' scientific process skills in Biology (Özay Köse & Cam-Tosun, 2013); (g) relate physics learning to problem commonly encountered by the students and be able to create abilities that will give answer and solution to social problem (Koopman, 2010).

The emphasis of this research is the integration of a context-based approach in the instructional material's development and utilization, based on both teachers' and students' needs and interest. Teachers play a semi-structured role in the design of

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instructional materials since they have direct contact with the students (Hoogveld, Paas, & Jochems, 2005). Furthermore, teachers' involvement in the design of curriculum materials to the actual teaching practice results in the sense of ownership (Borko, Jacobs, & Koellner, 2010). As a support to this statement, Nentwig, Parchmann, Grasel, & Ralle's (2007) initial evaluation indicates positive effects and examines context-based learning in two areas: (a) the teaching and learning situation in the classroom and (b) the professional development of the participating teachers.

The review above of the literature showed the scarcity of the studies that give comprehensive process and its assessment in the development and utilization of context-based instructional materials. Thus, it became necessary to explore the possibility of this concern to ensure its usability and effectiveness in the field.

Theoretical Framework

The development of context-based science teaching materials on Kolb's Theory of Experiential Learning which highlights the role of instructional materials in student's retention of knowledge. Representing theory into a four-stage learning cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Reflective observation and abstract conceptualization stages require the development of learning activities and materials that could back-up and complement student's actual learning experience and knowledge retention (Kolb, 1984).

Presently under the K to 12 curriculum, learning modules are the first instructional material in teaching science and other subjects ass cited in the study of Larawan (2013), rooting use of modules is rooted in B.F. Skinner's operant conditioning theory which explains that programmed instructional materials help teachers carry-out efficient teaching and learning process among his students. It further explained that reinforcement is a better way to modify a person's behavior. This research resulted in varied approaches and instructional materials in hastening the development of knowledge and skills of students (Mercado, 2007).

Context-based instructional materials such as self-pacing use student-centered active learning approach (Bennett, Campbell, Hogarth, & Lubben, 2005b) is related to the theory of constructivism. In a related study by Alesandrini & Larson (2002) constructivists see learning as a process of actively exploring new information and constructing meaning from information by linking it to previous knowledge and experience. They further explained that in the constructivist paradigm, the role of the teacher is not to lecture or provide structured activities that lead students to mastery of some teacher-imposed goals. However, instead, teachers function as a facilitator, which means that in the theory of constructivist, teacher acts as a facilitator that guides the students to complete their tasks or learning activities as reflected in the module.

Context-based approaches integrated into the instructional materials emphasizes on the enhancement of science inquiry skills, higher order thinking skills, problem-solving, and decision-making ability (Bennett & Holmann, 2002; Gilbert, 2006; Schwartz, 2006). The acquisition of science concepts and skills will be appreciated more by students through the use of interactive instructional materials and activities wherein students can visualize the concepts and activities in the module. Visualizing science education is best explained by two theoretical perspectives: (a) dual coding theory (DCT) which provides essential insights on the role of visual perceptions to enhance memory retention, learning, and understanding (Sadoski & A Paivio, 2001); and (b) visual imagery hypothesis (VIT) allows one to process information more efficiently than verbal ones. In here, the visualization of objects and activities provide the necessary information and concepts to facilitate the application of

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knowledge and skills for problem-solving (Tversky, 2001).

Research Questions

Specifically, this study seeks to answer the following questions:

1. What are the emerging issues encountered by the Grade 7 science teachers in terms of instructional materials used in the classroom?
2. How do they respond to the emerging issues in the utilization of instructional materials used in the classroom?
3. What are the needs of the Grade 7 science teachers in terms of instructional materials?
4. Based on the findings, what emerging inputs from the study serve as a basis for the development of a contextualized-based material?

Methodology

Research Design

This study utilized the single descriptive case study paradigm. It pointed out a detailed description in the lived experiences of Grade 7 science teachers in terms of the challenges encountered, in the use of instructional materials. Its focus also includes response to problems and suggested solutions in the utilization of the instructional materials used in the classroom.

The research participants of this study are three Grade 7 science teachers of Northern Tacloban City National High School, purposely selected as the participants since they were both teaching Grade 7 science in which two teachers were major in Biological Science and the other one's major is Physical Science. The researchers based his judgment when choosing participants of the study (Patton, 2002). This research involves identifying and selecting an individual that is most knowledgeable in the subject and has direct contact with students as well (Creswell & Plano Clark, 2006).

Research Instrument

The study utilized the use of the researcher-made interview instrument used to extract the responses of the participant in terms of (a) the challenges encountered in the utilization of instructional materials used in the classroom; (b) how they respond to solve the problems; and (c) suggested solutions in addressing those challenges.

The in-depth interview guide was submitted for validation before it was filed for actual use. Dividing it into two parts: Part I – aimed to gather information on the participant's data such as name, the name of the school, and prime field; Part II was about instructional materials utilization and its related problems.

Data Collection Procedures

The researcher requested the participants to answer the questionnaire. A semi-structured interview was conducted to further validate the response. The researcher gave a consent form to the participants and explained the purpose of the study. Then, the researcher, together with each participant, set a date and place for a face-to-face interview. This way, the researcher elicited more in-depth responses and clarified the information when the participant did not understand the question (Olsen & Muise, 2009). The researcher transcribed the audio recorded interviews and proceeded to qualitative content analysis using specific themes as the unit for analysis.

Data Analysis

Data gathered was analyzed using Colaizzi's phenomenological method of data analysis. Shosha (2012) explained the following Colaizzi's seven steps: (1) each transcript must be read and reread in order to obtain a general sense about the whole content. (2) Significant statements from the transcript

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that pertain to the phenomenon under study were extracted and recorded. (3) Formulating meanings from these significant statements. (4) Sorting the formulated meanings into categories clusters of theme, and themes. (5) The findings of the study were integrated into an exhaustive description of the phenomenon under investigation. (6) The description of the fundamental structure of the phenomenon. (7) Validation of the findings was sought from the research participants to compare the researchers' detailed results with their experiences.

Research Reflexivity

The challenges encountered by the Grade 7 science teacher with the use of learning materials varies. It bridged the gap between the performances of the students and the existing learning material used by the teachers. It also emphasized the teachers need on instructional materials in order to improve the students' performance.

Results and Discussions

Data collected were processed in response to the research questions which were grouped and synthesized into themes:

Theme 1: Challenges/Problems Encountered.

Theme 1A. Lack of knowledge in the multimedia utilization

Significant Statement 1. *"I do not know how to use the "laptop" to make power point because I have no training."*
Significant Statement 2. *"I do not know how to operate the projector."*

Theme 1B. The misconception of science concepts

Significant Statement 1. *"I found out that there are some concepts that were a misconception of the lesson because there are some topics taught in elementary, which is wrong."*
Significant Statement 2. *"The students could not give the meaning of the science terms from their lessons in the elementary."*

Theme 1C. No relevance to daily lives

Significant Statement 1. *"Students do not see the importance why they have to study the circulatory system."*
Significant Statement 2. *"Students do not see the connections of the science lessons to their daily lives."*

Using the existing instructional materials provided by Department of Education (DepEd), the participants encountered various challenges and problems: lack of knowledge and skills in multimedia utilization, misconception, lack of connectivity of the science lesson with topics in the current level, and lack of relevance to daily lives. As what Schwartz (2006) mentioned, using the traditional teaching of chalk-board and book, it is common for students to retain misconceptions. This idea is supported in the study of Onwu & Kyle (2011) that science education failed to be relevant in meeting the needs of learners and society, which they called as "crisis of relevance" and "a crisis of misalignment."

Theme 2: Coping mechanisms towards challenges encountered. Theme 2A. Discuss basic science concepts

Significant Statement 1. *"I go back to the basics, the foundation of the subject to give students an idea of the topic."*
Significant Statement 2. *"I explained again so that they can understand since Grade 7 science is a little bit complicated."*

Theme 2B. Use available materials within the school premises and community

Significant Statement 1. *"I used my LCD projector to have multimedia instructions to my students."*
Significant Statement 2. *"I borrowed readymade researches from other schools like*

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*Abuyog Community College and Leyte Normal and let my students see it as a model."*Passionate as a science teacher, the participants respond to the challenges through discussing basic science concepts and connect past lessons to the current one. They made use of available materials in the school and community to perform some activities in the module. Concerning this, K to 12 curricula also emphasizes the localization and contextualization of teachers and their instructional materials. As stipulated in Section 16 of Republic Act no. 10533, "The Implementing Rules and Regulations," particularly section 5:

> *…. The curriculum shall be contextualized and global; (e) The curriculum shall use pedagogical approaches that are constructivist, inquiry-based, reflective, collaborative and integrative; (f) The curriculum shall use spiral progression approach to ensure mastery of knowledge and skills after each level; and (h) The curriculum shall be flexible enough to enable and allow schools to localize, indigenize, and enhance the same based on their respective educational and social contexts; 10.3. Production and Development of Materials. The production and development of the locally produced teaching and learning materials shall be encouraged. The approval of these materials shall be devolved to the regional and division education unit following national policies and standards*

At this point, the question arises: "Would the instructional approaches emphasize the use of localized materials in the community enough to improve learner's performance more than traditional teaching approaches?", "Is it enough to give linkage and relevance of scientific concepts to learner's daily life?"

Theme 3: Instructional material needs.Theme 3A. Additional school learning materials

Significant Statement 1. *"We want to conduct a science experiment, but we lack science apparatus and chemicals."*
Significant Statement 2*. "The practice exercises and worksheets in the module after each activity are limited."*

Theme 3B. Training on the utilization of multimedia for teaching

Significant Statement 1. *"I need the training to operate multimedia equipment."*
Significant Statement 2. *"It is my great desire to learn how to make power point since what I know is to type only."*

Theme 3C. Use of instructional video or animated videos for teaching especially to science concepts which involve processes (e.g., photosynthesis, blood circulation process)

Significant Statement 1. *"I look for a video clip because students learn more body processes like digestion easily using videos."*
Significant Statement 2. *"Teaching science processes with my students is more enjoyable with the use of the video."*As a response to the aforementioned concern, the participants suggested solutions which they think is useful to enhance the performance of the students through provision of needed laboratory materials, additional school learning materials or modules – learners' and teachers' copy, enrich activities emphasizing the development of higher order thinking skills, training on the utilization of multimedia for teaching and filling up school forms, use of instructional videos using animation for teaching, especially science topics that involves processes like digestion, excretion, blood circulation. This will make the lesson more interesting since it has connection and relevance to their daily

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lives. Connecting scientific concepts with learners' daily living entails the notion of "context-based" teaching (Bennett & Holman, 2003; Gilbert, 2006). Context-based approach embeds scientific content in factual context (real-life situation) which shows learners the application of scientific concepts and methods in real-life (Gilbert, 2006). Some studies (George & Lubben, 2002; Lubben, Campbell, & Dlamini, 1996; Suela, Cyril, & Said, 2010) explained that most learners like to relate science and scientific principles to their daily lives.

Theme 4: Contextualized-based material.

Significant Statement 1. *"I make use of available materials like egg of chicken for our topic about cell."*
Significant Statement 2. *"During our discussion I used as an example local plants available in our school like guava."*

Summing up based on the aforementioned three themes, the main suggested instructional materials of teacher participants is the used of context-based video. The said video is embedded with worksheets instruction in teaching science concepts and skills. As mentioned in the study of Choi & Johnson (2005), context-based video instruction was more memorable than the traditional text-based education, since learners were more motivated and had a longer attention span in context-based video instruction than conventional text-based instruction.

The above perspective implies that context-based videos have the potential to enhance learner's motivation and retention of knowledge and skills.

Conclusion and Recommendations

The responses of teacher participants pave the way for the possibility and potential to enhance learner's retention and motivation through the development of context-based video with worksheets instruction based on student's needs and interest. They believed that context-based approach is regarded as appropriate to achieve this objective since it involves: real-world context, engaging experience, and making use of available materials and resources in the community. These informed the learners to see the connectivity and relevance of science concepts, principles, and skills to their daily lives. Contextualized teaching is the best learning environment for the teaching-learning process, thus improving student's performance in science.

Results of the study serve as a window for teachers and school administrators to conduct an in-depth interview with the Grade 7 science students concerned. It also allowed them to contribute decisions about the context which they consider suitable for video learning with corresponding worksheets based on their needs and interest. The findings point out also to conduct a thorough study of specific topics in Grade 7 Earth Science, Biology, Chemistry, and Physics that students considered difficult to learn. The students can relate much if characters, setting, and storyline in the animated videos and worksheets depict the real scenario in the school and community site. Consider also Grade 7 science teachers of another school as participants to have results that are more conclusive. Moreover, conduct in-service training and seminars to teachers and pre-service teachers on the context-based approach integrated into the instructional materials development and utilization.

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