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REAL LIFE EXPERIENCE IN INQUIRY-BASED EARTH AND SPACE SCIENCE INSTRUCTION

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Abstract

Science teachers play an important role in improving science literacy of their students. In achieving and building students' interest and literacy about science, teachers must have an appropriate approach to be used in teaching. In teaching science, students must be active and participative in the learning process. Engaging students in variety of activities can help them in constructing their own knowledge by experiencing and observing results of the experiment. Teachers must provide real world experiences for students to engage with around global issues. This took the form of service-learning projects emphasizing issues of global concern, or working in teams to devise and debate solutions to real-world problems. Notably, these activities were student-centered and inquiry-based. Teachers also incorporated their own cross-cultural experiences into the classroom through informal conversation, discussions, around artifacts and photos, and lesson plans that incorporated knowledge gained and relationship built through their global experiences.

The need for utilizing real life experiences in science teaching is a must in today's classroom as the new generations of learners are ready to work with the different global issues and concerns of which can play an important role in the learning process. However, the utilization of real life experiences in science instruction grows as a measure when teachers are able to develop an engaging and positive learning environment for learners. With this, teachers should carefully plan how to utilize the students' real life experiences efficiently and effectively in inquiry-based science instruction to enhance more the teaching-learning process.

The focus of this study was to determine the real life experience in inquiry-based earth and space science instruction in public secondary schools in Batangas City. The descriptive method of research was applied in the study, with the questionnaire as the main data gathering instrument responded to by 102 science teachers. Based on the analysis, it was revealed that real life experiences in science areas were moderately utilized by the students while teachers applied inquiry-based learning activities along its phases of exploration, concept introduction, and concept application to a moderate extent. It was recommended that the proposed learning plans be used to enhance science instruction and an instrument or assessment tool may be developed to determine the impact of utilization of real life experiences in teaching-learning process.

Keywords: Real Life Experience; Science; Engaging Activities.

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1. Introduction

Science is no longer viewed as being remote from daily life. It is a systematic methodology of finding answers to the daily inquiries, suggesting solution to problem situations or simply finding expression for one's curiosity. Science is both a body of knowledge and a process. It is a way of discovering what is in the world, how those things work today, how they worked in the past, and how they are likely to work in the future. The knowledge generated by science is powerful and reliable. It is really significant because without it, life is miserable. It is considered as the most important subjects because it envisions students' thinking to gain a functional understanding of the more important principles and concepts of the subjects and their relationship and relevance to man to build competence in the skills, processes, and tools as they prepare themselves to become useful and effective members of society.

The K to 12 science curriculum provides learners with a repertoire of competencies important in the world of work and in a knowledge-based society. It envisions the development of scientifically, technologically, and environmentally literate Filipinos who are critical problem solvers, responsible stewards of nature, innovative and creative citizens, informed decision makers and effective communicators. This curriculum is designed around the three domains of learning science; understanding and applying scientific knowledge in local setting as well as global context whenever possible, performing scientific processes and skills, and developing and demonstrating scientific attitudes and values.

With all those facets of science, it seems that teaching science requires great patience in answering and explaining how and why. Science teachers have many obligations and responsibilities that the teaching professions demands of them. Science requires teachers to plan carefully the experiments and demonstrations necessary to be performed in connection with daily lessons and students' interest. Science teachers play an important role in improving the science literacy of their students. In achieving and building students' interest and literacy about science, teachers must have an appropriate approach to be used in teaching. In teaching science, students must be active and participative in the learning process. Engaging students in variety of activities can help them in constructing their own knowledge by experiencing and observing results of the experiment.

Since science is about asking questions and finding answers to questions, these are actually the same skills that are used in daily lives. When students are taught to use these skills in science, they are also taught to use these in the future in every area of their lives. It focuses on the characteristic attitudes and disposition of science. These include as being curious and imaginative, as well as being enthusiastic about asking questions and solving problems. Through the process of inquiry, individuals construct much of their understanding of the natural and human-designed worlds. Inquiry implies a "need or want to know" premise. It is not so much seeking the right answer because often there is none, but rather seeking appropriate resolutions to questions and issues. For educators, inquiry implies emphasis on the development of inquiry skills and the nurturing of

inquiring attitudes or habits of mind that will enable individuals to continue the quest for knowledge throughout life.

Today, it is a hundred times more difficult to get students to grasp an abstract concept they do not see an application for than it is to convey one that is an obvious part of their everyday life. Students make real world connections when they find a way to intertwine classroom theory with practical use and everyday experiences. When students realize it is not just school material but something they are going to face in their life, they are motivated to learn. Therefore, incorporating real world connections into a lesson helps students understand why what they are learning at is useful beyond school and university. It is an approach that works for every curriculum to increase engagement in the learning process as students gain valuable insights into real life applications of the skills they're being taught.

With these strategies in hand, the time is now for teachers to engage themselves, and their students, with the world. The lives of all students, no matter their zip code or their cultural, racial, linguistic, or economic background, are in some way influenced by the wider world. They too have the potential to shape that world. Their future, and the future of the world, depends on it. Fired with enthusiasm for quality science education, the researcher was motivated to help students understand learning and become engaged in the learning process as they gain valuable insights into real life applications of the skills they are being taught. The researcher believed that using real life experiences and tackling real-world problems in inquiry-based science instruction can make learning more engaging and meaningful to students and make them more aware of the choices they make in society.

New technologies in the classroom offer exciting opportunities for students to make meaningful connections with the outside world from the comfort and protection of their school environment. The information age opens a world of possibilities for teachers to demonstrate the value of subjects in a wider life context by connecting student interests to real world experiences – creating active learners who see the classroom as a place they want to be. Nurturing in-depth understanding and a passion for innovation, today's educators seek to maximise learning experiences so students can develop the skills needed to navigate a rapidly evolving world. Real-world connections draw from, or upon, actual objects, events, experiences and situations to effectively address a concept, problem or issue. It involves learning which allows students to actually experience or practice concepts and skills, as opposed to learning that is theoretical or idealistic.

Making real-world connections promotes student achievement through the authenticity of the learning. This approach utilizes concepts, problems or issues that are similar to ones students have encountered or are likely to encounter in life. Teachers can provide the students with living and inanimate objects to manipulate and experience such as 3-D models in chemistry. These hands-on learning opportunities are highly engaging and can help students successfully complete tasks requiring abstract thought. Real-life experiences provide the most direct type of learning, but they are difficult to supply in the traditional classroom. Most experiences in the classroom occur through verbal-symbolism—written and spoken words. These classroom experiences may be easier for teachers to supply, but they may be more difficult for many students to understand. Verbal symbolism depends on the ability to conceptualize and think in the abstract, while the

multisensory instructional aids—texts, pictures, games, simulations—can substitute for firsthand experiences and enhance understanding, so they are an integral part of the learning activity.

Teaching using students' experiences necessitate that the lessons promote active learning because learning does not occur by way of passive absorption. Through this, students are enhanced in developing skills, analysing and evaluating evidence, experiencing and discussing, and talking to their peers about their own understanding. Students work collaboratively with others to solve problems and plan investigations. Many students find that they learn better when they work with others in a collaborative environment than when they work alone in a competitive environment. When active, collaborative learning is directed toward scientific inquiry, students succeed in making their own discoveries. They ask questions, observe, analyze, explain, draw conclusions, and ask new questions. These inquiry-based experiences include both those that involve students in direct experimentation and those in which students develop explanations through critical and logical thinking.

One strategy on providing real learning experiences is students working in teams. This replicates the workplace for most professions so it's beneficial for students to get used to collaboration in the classroom. Problem-based exercises that provide shared learning experiences are an opportunity for students to learn through discussion, clarification and evaluation of ideas – with studies showing that students who connect with each other and wider communities through social learning attain higher level thinking and preserve information for longer than those working on their own.

⁽²⁾ Allowing the students to experience and observe the world around them by taking them outside of the classroom is a great way to give them a memorable experience that they can always take with them. This can be done through a virtual field trip, where students can get an inside look at something like the White House or a spacecraft through digital media, or outside of the classroom, where the children can learn to observe the world through their own eyes. Incorporating current affairs into the classroom creates a more engaging lesson which helps the students to become aware of global issues and allowing them to make connections between what is being taught at school and what is happening in the real world. Giving an opportunity to students to apply their classroom knowledge to a real-world problem will help them to see the value of learning. Whichever strategy that the teacher chooses to try, their goal is to create an authentic experience that will help students engage in their learning more.

Making learning fun and meaningful for students requires developing different strategies for each grade level. The lesson a teacher implements should have relevance to a student's life. If they cannot see the point in learning a topic or are totally uninterested in it, they would not sit quietly and attentively, patiently waiting to be filled with knowledge. At the start of any topic or lesson, the teacher need to give the students as many reasons as to why they need to hear something, there is more chance they will participate. Likewise, incorporating current concerns into the classroom creates a more engaging lesson – helping students become aware of the hazard in their surroundings and allowing them to make connections between what is being taught at school and what is happening in the real world. Benefiting from a wide range of cultural, social and political perspectives they may not otherwise be exposed to, students who are encouraged to keep up with the latest concern develop a more responsible outlook and are better prepared to operate in a globalized and multi-cultural economy.

This is to say that through science experiences, students can apply science to real-world problems. At the elementary level, the teacher can provide hands-on science activities that facilitate the learning of abstract arithmetic concepts such as number sequencing, re-grouping, and fractions. Teaching science process skills enhances problem-solving skills in science. Problem-solving and critical thinking are two of the most important skills students learn in school. They are essential to making good decisions that lead to achievement and success during and after school.

(3) Science is a systematic methodology of finding answers to daily inquiries, suggesting solutions to a problem situations or simply finding expressions for one's curiosity. It is a procedure which is modeled after the way a scientist searches for knowledge. A new learning environment designed to satisfy student's inquiries through self-activity was provided. During the elementary years, especially during science subjects, pupils get easily bored with routinary activities, instead they like to try their own ways of doing things. This becomes more evident when students get into the higher years. Using inquiry approach in teaching, science enhances the students' reasoning ability. Teaching science as inquiry provides teachers with opportunity to develop students' abilities and to enrich their understanding of science. As students focus on the process of doing investigations, they develop the ability to ask question, investigate aspects of the world around them and use their observation to construct reasonable explanation for the question posed.

Inquiry teaching was originated by Suchman. According to him, inquiry is the way people learn when they are left alone. It is a natural way that human beings learn about their environment. To Dewey, inquiry is the active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends. The grounding of any belief occurs through inquiry processes: reason, evidence, and generalization. Inquiry is a multifaceted term. Scientific inquiry refers to the diverse ways scientists study the natural world. Inquiry also refers to student activities in which they develop scientific knowledge and understanding, as well as skills and values of inquiry. Further, inquiry designates any teaching method intended to get students involved in inquiry activities. The aims of inquiry teaching in the classroom are to help students develop their intellectual skills of asking important questions and seeking answers; to help students acquire the inquiry process skills associated with the various domains of human learning; and to help students become independent, autonomous learners, confident and capable of learning on their own.

(4) The inquiry approach in teaching science, also termed as discovery approach or problem-solving approach, puts a premium on the processes that students employ in obtaining scientific information. It likewise stresses discovering and understanding science concepts through activity-based lessons. As such, all learning activities are designed to provide direct experiences with natural phenomena and nature as a whole. As a classroom methodology, it revolves around the student's daily interaction with his environment, more especially on the questions he asks, the information he receives, and what he does with his new leanings. Inquiry approach as a mode of teaching offers promise in directing the learning activities of the pupils or students to attain their objectives. This is modeled after the investigative processes employed scientist in analyzing a problem.

Unlike other teaching models which emphasize direct instruction, inquiry teaching aims to help students seek answers to their own questions, gather pieces of evidences and draw on conclusions

and generalizations. It puts premium of self-directed learning activities patterned after endures and processes. As such, they learn by inquiring about something, weighing and sorting out information and building their own meaning. In so doing, they employ such processes as analyzing, evaluating and synthesizing with an end in view at discovering concepts by themselves. Ultimately, they become independent, autonomous learners capable of learning in their own.

With this, the aim of study is to give the effectiveness of utilization of real life experiences in inquiry-based earth and space science instruction by helping the students retain more the absorbed facts by affording them the opportunity to think critically, to work through problems logically and to make connections with the real world. Moreover, the aim to produce better, deeper understanding and effective science instruction using inquiry approach. With the foregoing background in mind, the researcher is inspired and challenged to pursue her study with the hope of providing learning plans for maximum utilization of students' real life experiences in inquiry-based science instruction. This study may help and assist them in planning, designing, improving and strengthening the science instruction to better teach the subject and other disciplines. To science teachers, they will be able to prepare lessons which evoke more students' awareness, increase curiosity, and offer opportunities inside or outside the classroom that develop students' self-confidence to do more and discover more. The students may be made aware and understand that the utilization of real life experiences may provide them the opportunity to investigate, enjoy, discover, develop their critical thinking, and work cooperatively with their classmates regardless of their level of intelligence. The results of the study will provide them with better understanding of the relevance of real life experiences in science instruction and enhance their skills and better prepare them to life after school.

Gowin's theory focuses on the education event and its related concepts and facts. In an educating event, teachers and learners share meaning and feeling so as to bring about a change in human experiences. This theory stresses the centrality of the learner's experience in education. He mentioned that the theoretical grounding of concept map stems from the assimilation theory whereby, an individual that creates meaningful connection between concepts is better able to learn and use that knowledge than an individual that makes little or no meaningful connections between concepts. In this study, this theory was used because as a classroom manager, the teacher motivates the learners by introducing interesting activity that makes students link theories and their life activities and own experiences with follow-up questions. This can contribute to the students' interaction with their teacher; thereby, learners and teachers share their meaningful experiences in life.

2. Materials and Methods

The respondents of the study were the 102 science teachers in public secondary schools in the division of Batangas City. No sampling method was used in determining the respondents because all science teachers in the locale served as the respondents.

The study made use of the descriptive method of research to describe, analyze and interpret data in order to achieve an appropriate result. The design was used since it is the most appropriate in studying the concerns of this study. The researcher preferred to use this design as it was deemed effective in the analysis and interpretation of the data gathered. The study made use of a

questionnaire that was administered to the respondents and analyzed descriptively. Interview was also conducted to substantiate the findings of the study.

3. Results and Discussions

This study contends that real life experiences may be used in teaching earth and space subject. It focused on hands-on learning of the students. The actual participation of students will be measured in the knowledge they gained and the opportunity by the students to enjoy, discover, and develop skills in critical thinking. The students manage their own learning, rather than being told what to do and when to do it.

Items	W M	VI
1. Turning-off LPG tank to avoid gas leak	3.83	GM
2. Performing duck, cover and hold position/drills in case of earthquake	3.77	GM
3. Keeping myself updated on typhoon signals through media sources	3.75	GM
4. Using reusable shopping bag when going to market	3.72	GM
5. Participating in clean and green program of the community	3.57	GM
6. Reusing single-sided printed pages for scratch paper	3.47	MM
7. Observing a day-to-day weather conditions as seen in the cloud formation	3.38	MM
8. Sending documents through electronic mails to reduce paper consumption	3.37	MM
9. Following the evacuation plan (entry and exit gates) during calamities	3.37	MM
10. Cleaning and unclogging the canals to lessen the problems in drainage system	3.08	MM
11. Purchasing products made from recycled materials	2.85	MM
12. Making compost pit at home	2.65	MM
13. Witnessing falling stars, meteors and meteorite in the night sky	2.61	MM
14. Making creative home decoration using plastic soda bottle	2.51	MM
Composite Mean	3.28	M M

It can be gleaned in the table that turning-off LPG tank to avoid gas leak was greatly manifested by the students. This obtained the highest weighted mean of 3.83, an indication of students' awareness about the hazard of the LPG if not properly turned off. As practiced, when performing any experiment in the laboratory, students are oriented first of the precautionary measures to ensure safety. This supports the idea of Runnel that incorporating current concerns into the classroom creates a more engaging lesson – helping students become aware of the hazard in their surroundings and allowing them to make connections between what is being taught at school and what is happening in the real world. As can be noted, students' practice of turning off LPG tank is taught at home and in school to ensure safety. Awareness on the possible effect of gas leakage is an important learning that harmful gases when leaked could damage lives.

Performing duck, cover and hold position/drills in case of earthquake was moderately manifested by the students affirmed in weighted mean of 3.77. Being exposed in regular earthquake drills provide students the knowledge and skills to be demonstrated when an earthquake occurs. It is important that students are knowledgeable enough on what to do before, during and after an earthquake since earthquake is an unpredictable phenomenon. In line with this, science curriculum

includes the different concepts about earthquake specifically how it occurs, the reason of plate movements and how to be safe when it happens. This conforms to the idea of Doyle that students who have varied experiences learn more rather than just a set of facts about the world of objects, events, and living things they see. As it is, students become more prepared in earthquake since they conducted drills regularly in school.

Students greatly manifested keeping themselves updated on typhoon signals through media sources expressed in weighted mean of 3.75. This is an indication that aside from staying safe during calamities, they should monitor the changes in weather conditions so that they know when to evacuate if needed. Since the Philippines is a country which is mostly visited by typhoons, students are knowledgeable due to available media sources. Moreover, it is given priority in science classes to ensure their safety. This affirmed the idea of Aquino that in every classroom activity, the level of curiosity, open-mindedness, objectivity, and rationality must be recognized early enough and allowed to grow freely in a conducive classroom atmosphere. As such, science classes focusing on real life experiences of the students and instilling the importance of curiosity and open-mindedness make them aware during natural occurrences.

Using reusable shopping bag when going to market was greatly manifested by the students expressed in weighted mean of 3.72. This shows that students are taking care of the environment by simply practicing reusing available resources. This kind of practice is instilled among students when dealing with waste management practices as a lesson concerning the welfare of the environment which is incorporated in science classes. This affirmed the contention of Belegal that giving students real-life exercises or activities will lead them to understanding of concepts and provide opportunities to apply concepts learned to their daily life. Based on the result, the students were able to apply the concept of reusing resources as a way of helping the nature to conserve its resources.

Participating in clean and green program of the community was greatly manifested by the students reflected in weighted mean 3.57. This shows that the students experienced being involved in the program of the community that aims for cleanliness and greenness of the surroundings. Having activities that lead the concepts to real-life application make the students more engaged and as a result, they learn better. This supports the idea of Doyle that acquiring science skills as well as scientific attitudes and values is needed to address everyday problems pertaining to health and sanitation, nutrition, food production, environment and its conservation. Having the students participate in environmental activities such as tree planting, community and coastal clean-up allows them to cope with the different environmental problems and become more productive citizens.

Students greatly manifested reusing single-sided printed pages for scratch paper shown in weighted mean of 3.47. This could be traced from the practice of the students in doing their assignments and projects in science. Aside from saving money, this practice also helps in conserving resources and saving Mother Earth. This conforms to the idea of Francisco that it is teachers' responsibility to make learning as active and useful as possible so that students can respond and work on problems at hand. As it is, the students experienced applying the concept of reusing on actual situations.

Observing day-to-day weather conditions as seen in the cloud formation was moderately manifested by the students expressed in weighted mean of 3.38. This shows that the students can predict the weather based on the formation of the clouds. Weather conditions cannot be merely predicted with the aid of books. As such, students need to be exposed outside and witness the changes in cloud formations. This conforms to the idea of Runnel that taking students outside the classroom will allow students to experience and observe the world around them. Moreover, bringing real-world experiences into the classroom is a great way to give students a memorable experience that they can always take with them. It proves that when students are given the chance to explore outside the classroom, they will gain more learnings as they utilize their varied senses. As such, in studying weather conditions, students would be best benefitted if teachers let them learn it in a real-life context.

To sum it up, the real life experiences in earth and space were moderately manifested by the students reflected in composite mean of 3.28. This shows that most of the lessons in earth and space can be applied into real life situations. Since that earth and space focuses on the safety of the environment, concepts learned may be applied by students to solve the environmental problems. The environmental issues and concerns may raise awareness among students and they become inquisitive on how to address such problems and give quick solutions. But as real life experiences were moderately used, there is a need to find ways to productively use them through inquiry. This supports the idea of Carin that using inquiry teaching in the classroom may help students develop their intellectual skills of asking important questions and seeking answers to them.

4. Conclusions and Recommendations

The manifestation of real life experience in Earth and Space is utilized to a moderate extent. Hence, the prosed learning plans in the subject may be reviewed, refined and later be used to enhance instruction.

References

- [1] Doyle, T. (2010). *New Faculty of Professional Development Planning and Ideal Program Still Water*, Ok: New Forum Press.
- [2] Francisco, M. (2012) *Principles and Methods of Teaching*. Mandaluyong City: National Book Store
- [3] Santo, Rosita G., et al. (2009). *PAFTE*. Katha Publishing Co. Inc. 388 Quezon City.
- [4] Belegal, Sonia A. (2007). "The Usefulness of Teaching Strategies and Approaches in Secondary Science and Technology Instruction in the Division of Batangas City," Unpublished Thesis, Batangas State University, Batangas City.
- [5] Conole, G. (2010). *Personal Inquiry: Innovations in Participatory Design and Models for Inquiry Learning*, Educational Media International, 47, 277–292.
- [6] Boyce MP., *The gas turbine handbook*. 2nd ed. Houston, Texas: Gulf Professional Publishing; 2002, 411.
- [7] Runnel, M. (2013). *Model for Guiding Reflection in the Context of Inquiry-Based Science Education*. *Journal of Baltic Science Education*, 12, 107–118.

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