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Effects of Experiential-Reflective Teaching on Students' Environmental Knowledge and Pro-Environmental Consumer Behavior

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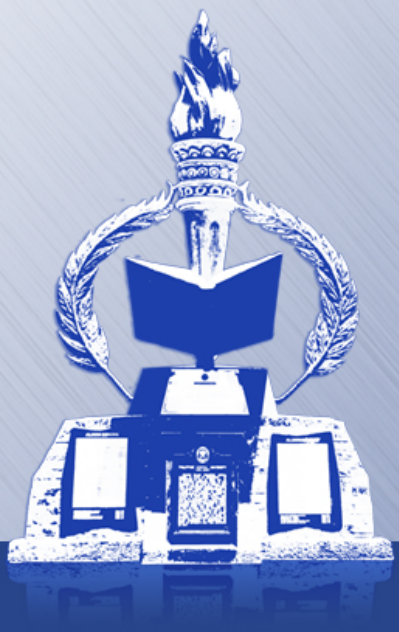

EFFECTS OF EXPERIENTIAL-REFLECTIVE TEACHING ON STUDENTS' ENVIRONMENTAL KNOWLEDGE AND PRO-ENVIRONMENTAL CONSUMER BEHAVIOR

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In Partial Fulfillment of the Requirements
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with Specialization in General Science

EDWIN B. CONEL

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APPROVAL SHEET

This thesis entitled "**EFFECTS OF EXPERIENTIAL-REFLECTIVE TEACHING ON STUDENTS' ENVIRONMENTAL KNOWLEDGE AND PRO-ENVIRONMENTAL CONSUMER BEHAVIOR"** prepared and submitted by **EDWIN B. CONEL** in partial fulfillment of the requirements for the degree of **Master of Arts in Science Education with Specialization in General Science,** is hereby recommended for approval and acceptance.

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ABSTRACT

Name : **Edwin B. Conel**

Title : **EFFECTS OF EXPERIENTIAL-REFLECTIVE TEACHING ON STUDENTS' ENVIRONMENTAL KNOWLEDGE AND PRO-ENVIRONMENTAL CONSUMER BEHAVIOR**

Key Concepts : experiential-reflective teaching, conventional teaching, environmental knowledge, pro-environmental consumer behavior

Degree : Master of Arts in Science Education

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This study investigated the effects of Experiential-Reflective Teaching Approach on students' environmental knowledge and pro-environmental consumer behavior. A quasi-experimental inquiry with the pretest-posttest two-group design was implemented randomly assigning one group to Conventional Teaching Approach group and the other to Experiential-Reflective Teaching Approach group. The study was conducted during the 4th quarter of Academic Year 2018-2019 with focus on environmental topics. The sample includes fifty-four (54) Grade 7 students from a public general high school in Quezon City. The two research instruments: Environmental Knowledge Scale and Pro-Environmental Consumer Behavior Scale, were validated by the experts and pilot tested among eighty (80) students in Grade 8. The data

were analyzed using a paired sample t-test and t-test for independence. Findings of the study revealed that there is a significant difference between experiential-reflective teaching group and conventional teaching group for enhancing the students' environmental knowledge. However, there is no significant difference between experiential-reflective teaching group and conventional teaching group for enhancing the students' pro-environmental consumer behavior. The study concludes that Experiential-Reflective Teaching Approach has an apparent effect on students' environmental knowledge; however, it may yield a positive effect on the development of students' pro-environmental consumer behavior particularly on Recycling. It is recommended that a thorough study may be conducted to explore external ways that hinder students from acting as pro-environmental consumers. This will also strengthen other factors on students' pro-environmental consumer behavior and explore other learning and teaching approach in science more proficient and expedient. Moreover, the findings from this study may help educators in the field to design teaching materials that will enhance students' environmental knowledge and will positively influence pro-environmental appreciations.

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THE PROBLEM AND THE LITERATURE REVIEW

BACKGROUND OF THE STUDY

Various environmental problems pose a threat to environmental sustainability. These include climate change, air pollution in the urban areas, shortages in the water supply, environmental noise and light pollution, and biodiversity loss. Many of these problems can be traced back to human behavior, and thus, can be managed by changing the relevant behavior so as to reduce its environmental impacts (DuNann Winter & Koger, 2004; Gardner & Stern, 2002; Vlek & Steg, 2007). Moreover, physical and technical innovations can influence behavior changes because individuals need to accept, understand, buy, and use them in proper ways.

Humans and the environment are interconnected. The environment provides the resources used by people while people are in charge of taking care of the environment. Unfortunately, humans tend to exhaust environmental resources, and this exploitation leads to environmental problems. Environmental degradation can pose risks to lives and health. To alleviate this, people must recognize the consequences of their actions and help solve environmental problems.

Humans, as the ones responsible for the protection of nature, face the challenge of environmental preservation, and conservation. Students, as vulnerable yet crucial members of society, possess great potential as possible protectors of the environment, if they have received proper environmental education in the household and academic institutions. Teaching children about environmental issues may encourage them to address environmental problems in the community.

The introduction of Environmental Education (EE) to the basic and higher instruction has been acknowledged because of the severe environmental concerns and issues encountered in

developing countries and highly developed nation. According to the National Environmental Education Action Plan (NEEAP)-Volume 1 (2005-2014), “Environmental Education (EE) refers to the practice by which individuals gradually advance awareness, knowledge, and concern of the environment and its diverse values and processes and learn to use this understanding to preserve, conserve and utilize the environment in its sustainable manner for the benefit of present and future generations” (pp.9-10). The main goals of green education are to generate consciousness, knowledge, broad outlook, greater perspective, skills, and engagement where an individual serves as a core member of environmental protection and care. The involvement of local units, small government sectors up to the highest government post must aim for long term plans in environmental restoration for the next generation.

The Environmental Education (EE) is strengthened through the curriculum indicated in the new K to 12 Basic Education Program mandated in the country. With the implementation of the K-12 Curriculum, environmental education is taught in schools through the inclusion of several environmental topics and themes into existing school subjects in the primary and secondary schools. Environment as part of the curriculum is included in the Living Things and Their Environment Section which is being taught as part of the Grade 3 curriculum. The curriculum standard indicates the theme pertaining to the dependence of living things on the environment as the main source of food, water, and air for survival and continuity of life.

In Grade 4 curriculum standard, the main theme focuses on the useful and harmful interactions that occur among living organisms as they obtain their basic needs in their habitat and surroundings. In addition, the students will learn the importance of water in daily activities and determine ways of using water wisely. In the Grade 5 curriculum standard, the students will focus on the different components of larger habitats including estuaries and intertidal zones. The

theme also emphasizes the interactions of living and non-living components thriving in the habitats indicated and determines the sustainable conditions that enable specific organisms to perpetuate. In the Grade 6 curriculum standard, the environmental theme allows the learners to explore on the expanded habitats like tropical rainforests, mangrove swamps, and coral reefs and its interactions. Population and interaction with the communities are the topics tackled in Grade 7 curriculum. In the Grade 7 curriculum, the fourth (4th) quarter topics tackle the Philippine environment wherein one competency covers the protection and conservation of natural resources such as water, rocks, soil, and other fossil fuels. In addition to this, interaction in the atmosphere is also tapped including the greenhouse effect and global warming, land and sea breezes, monsoons, and inter-tropical convergence zone. Meanwhile, in the latter part of the Grade 10 curriculum, the theme concentrates on the investigation of human activities and its impact on other organisms in the ecosystem. The curriculum enables the learners to determine the influence of biodiversity on the stability of the ecosystem. However, it was noticeable that the curriculum standards focus mostly on the benefits of the environment to humans as environmental terrains are introduced; rather than environmental restoration and protection. Environmental education is also taught in chunks and dispersed across the grade level curricula. This practice lacks emphasis on environmental care and protection which is a critical issue which needs to be tackled nowadays.

Experience is one of the best tools to foster any forms of learning. Through experiences, students are allowed to manipulate experiments or learning activities independently by using the trial and error method while using critical thinking to figure things out. These experiences are better taken into consideration by writing them on a journal or diary. This way, students can use these journal entries as references and aid to recall the lessons and activities. Reflection is

defined as “the activity which takes place in our own minds when we stand back from the first-order phenomena in everyday life and process these raw experiences from a distance, inviting second-order processes to come into play” (Humphrey, 2009, p. 381). Reflection and experience probably positively influence the quality of learning.

Reflective learning comes in when certain experiences happen to one person, either in random everyday circumstances or guided activities with an assessment. True learning is the result of students’ experiences, as well as the evaluation and reflection of these experiences. This is where reflective learning and experiential learning take place. The blending of these two will likely generate more information, strengthen and lengthen retention. Additionally, reflections of these new experiences result to the formation of new thoughts and ideas to aid in building new concepts from acquired experiences (Arnold, Warner, & Osborne, 2006). In the context of learning, reflection serves as a “channel between theory and experience” (Bringle & Hatcher, 1999, p.180). These imply that reflective learning allows the students to deepen and strengthen their learning.

Science as a branch of learning covers broad topics and the possibilities of exploration expound from minute details—gradually boils down to a conceptual one or thematic approach. Textbooks, written materials, journals, and media alone are not sufficient to teach science. Human intervention is needed to further explain it to students. Science, as referred to various articles and books, explains most of the phenomena that happen around and the world. This is the reason why it taps the possibility of observing, recreating and relearning by means of experience and learning while doing. As an individual, being socially-able is one trait that is gained through interactions which later on become an innate experience and promotes experiential learning on the situations. This experiential learning helps children relate science concepts as they apply

them in real-life situations, which results to functional understanding. In the same way, the true or natural relationship of objects and organisms in the environment is recognized.

As stated by Brucks (1985), knowledge is a significant factor that highly influences the behavior of the consumer in purchasing products. Likewise, knowledge commands the fascination of will and organization of information for decision-making skills of a purchaser. Due to the incremental needs of human and the competitiveness of product manufacturers, consumers have been given the choice to select the best products with the option of being an intelligent buyer.

Kollmuss and Agyeman (2002) describe pro-environmental behavior as the activities wherein people consciously try to reduce the adverse effects of one's actions on the environment. Humans as consumers have a positive or negative impact depending on his/her action and behavior on the condition of the environment. Likelihood of engagement in environmentally-conscious behaviors was also said to increase if there's a strong belief that these behaviors result to a positive outcome (Ellen, Weiner, & Cobb-Wlagren, 1991). Due to the increasing demand, high product cost and limited resources, consumers have to make tougher choices, particularly in consumption practices when considering the option of being pro-environmental. The vital force of choice, willingness and education are some of the motivations to promote the consumers' environmental knowledge and pro-environmental behavior. This allows the fusion of being environmentally literate with the aid of consumer behavior to work.

The result of this study benefits different stakeholders. First, the school and teachers can gain insights on how to integrate environmental issues in selected science topics. Through the Experiential-Reflective Teaching Approach, the results of this study provide an alternative teaching strategy in line with the educational goals of the K to 12 basic curriculum. Also**,**

reflective journals will serve as the documentation or references of students. This may also serve as a resource to curriculum planners and school administrators to develop and introduce innovation in the curriculum of Environmental Education to further increase environmental knowledge and foster scientific literacy among students. Second, administrators and school heads may place an emphasis on experiential and reflective teaching by conducting a seminar workshop, professional development session or group sharing to colleagues. Third, curriculum developers may initiate to develop a curriculum that will help the students recognize the role of consumption practices in alleviating environmental problems through enhancing their pro-environmental behavior. Lastly, instructional material developers may integrate environmental concepts and issues in selected topics in science by providing a new perspective in writing textbooks, laboratory booklets and other references that are responsive to the needs of elementary students in terms of developing their environmental knowledge and pro-environmental behavior.

Experiential learning has been a trending topic in terms of researches and publications globally. On the average, there are 67 out of 100 respondents who are interested in it, while reflective learning gamers 4 out of 100 respondents in terms of subject of interest, from August 2017-July 2018, as indicated in the Google trend website. This shows that the topic of experiential learning has been widely used for researches in the field of education, the government sector, and even in the medical field of a different region in the Western countries. Most studies also focused on experiential learning as a method used to cover the needs of professional fieldwork and as a form of assessment. On the contrary, reflective learning has been an emerging topic that is waiting to be tapped.

Locally, researches on experiential learning with a focus on the environmental concerns have not been frequently studied. Looking through local studies and references, there were very few resources that focus on environmental issues; others were studied in the mid-90s in some local schools in different regions. Nowadays, it has slowly garnered attention because of the bizarre climate disturbances that occur in the Philippines. With the pressing environmental concerns today, it seems imperative for the youth to widen their knowledge on environmental protection as well as disaster risk reduction. Guerrero (2016) recommended exploring the topic of experiential and reflective teaching as an alternative strategy to teach environmental issues in a rural or the urban areas as possible research topic.

Through this study, the researcher wanted to consider the combination of experiential and reflective learning and teaching as an alternative method in enhancing the environmental knowledge and the pro-environmental consumer behavior of intermediate level students in an urban or a rural area.

Students are particular targets for the study because of the society's high regard to them as the nation's future. Schools are also expected to facilitate the development of the students' potential to be advocates for a sustainable environment (Ahmad et al., 2015). Through this, there is an urgent need to streamline and sensitize young minds to environmental problems and concerns. Through education, human beings become knowledgeable of environment concerns, concepts, and problems. Students must have awareness about environmental problems so that they can perform their role very effectively in proper waste management (Tartiu, 2011).

The study aimed to explore experiential-reflective teaching as an alternative instructional approach that could help develop both the environmental knowledge and pro-environmental consumer behavior of students in a public school.

LITERATURE REVIEW

This chapter presents the related literature and researches relevant to the study. It also includes the conceptual framework, research hypotheses, and definition of terms.

Experiential Learning Theory

In Locke's philosophy, it was believed that at birth the (human) mind is a "clean slate or blank slate" and that information is added and rules for processing are formed solely by one's sensory experience. Sensory involves the senses that are monitored by the human brain through impulses and nerves that will allow a human being to distinguish light, sound, touch or stimuli, smell and taste. Those senses are innate to the body systems, gradually learned and acquired through experiences.

Experiential learning theory was drawn from the prominent and elite scholars of 20th century-notably John Dewey, Jean Piaget, William James, Carl Jung, Paulo Freire, Kurt Lewin, Carl Rogers and others who aimed to develop a holistic model of the experiential learning process. Kolb et al. (2007, p. 4-5) asserts that the theory is built on six propositions that are shared by these scholars.

1. *"Learning is a long term process."* The primary focus of learning should not be limited on the outcomes or assessment taken by the students. It must go beyond the experiences and engagements of students in and out the classroom. Through collective feedback and positive criticism, learning is further enhanced effectively.
2. *"All learning is relearning."* In a classroom setting, facilitators and students benefit the process of learning and relearning. Allowing the students to express

their beliefs and ideas on the topic given to them, enables them explore the possibility of creating new idea and philosophy that can be integrated and later on produce a more refined ideas.

3. *"Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world."* Different perspectives and ideas generate greater designs in the learning process. In the same way that conflict, differences, and disagreement invents new theories for learning. These theories were moving forward and backward to give way to the ones with stronger argument and continue progressing while others slowly fade away. This is similar to the learning process wherein one is called upon to move back and forth between the opposing modes of reflection, action, feeling, and thinking.
4. *"Learning is a holistic process of adaptation to the world."* Learning is not limited to the metacognition of individual. Learning taps the holistic nature of individual to fully integrate the process of learning in the environment, social-related being, and other elements of life. Learning fully involves the total package of a person from thinking, to feeling, perceiving, and behaving.
5. *"Learning results from synergetic transactions between the person and the environment."* In the term used by Piaget, learning is acquired through new learning experiences. The new experience will be assimilated into existing concepts and later on accommodates existing concepts to a new experience.
6. *"Learning is the process of creating knowledge."* The mind of a person is said to be "clean slate" at the beginning of birth so that the world could provide and fill the knowledge needed for growth. This refers to the constructivist theory of

learning where learning is continuously created and constructed by learner. Social knowledge is also created and recreated depending on the personal knowledge of the learner.

Experiential Learning Theory (ELT) defines learning as "the process whereby knowledge is created through the transformation of experience and knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p.41).

Experiential Learning Theory (ELT) as defined by Kolb (2007) theorizes that learning is the major determinant of human development, and how individuals learn shapes the course of their personal development. In Kolb's further study, it was found that learning styles are affected by several factors: personality type, educational specialization, career choice, and current job role and tasks (Kolb, 1984). Recently, Yamazaki (2003) also identified cultural influences as a contributor to one's learning style.

Experiential learning is a process of constructing knowledge that involves a creative tension, as a response to contextual demands, among the four learning modes: experiencing, reflecting, thinking, and acting. Portrayed as an idealized learning cycle or spiral, the learner "touches all the bases" through iteration and respond to the learning situation and topic. Immediate or actual experiences become the foundation for observations and reflections, which are then integrated and refined into abstract concepts. After which, these concepts are used to draw new implications for actions. These implications are repeated and become one's guide in creating new experiences (Kolb, 2007).

Experiential learning, as defined by Luckmann (1996), is a process of a learner's construction of knowledge, skill, and value through experience. Experience is learning; and reflection is relearning as part of the experience. To be able to learn from experience, reflection

must be done. It is considered as the "core difference between whether a person repeats the same experience several times, becoming highly proficient at one behavior, or learns from experience in such a way that he or she is cognitively or affectively changed" (Boyd and Fales, 1983, p.100).

Experiential Teaching and Learning

Myers and Roberts (2004) gave emphasis on experiential teaching that focuses on student-centered approach that uses active involvement as a means for the students to learn. It relies on the learners' owning and valuing of their experience to be effective. Parents are the first teachers who mold the mind of kids or children inside the household. During the early development, parents tend to teach motor refinement and social skills that may involve good manners and familiarization of surroundings. On the other hand, a teacher also has a significant role in the child's growth and development in school. The teacher introduces new knowledge and content on the basis of learning of students in the academe. Teaching as an educational endeavor refers to a critical responsibility of educators to engage the students in activities that facilitate the acquisition of knowledge and skills, and at the same time, aid their development of values and attitudes (Salandanan 2012, as cited in Guerrero, 2016).

Most educators believe that younger individuals are honed and guided easily because they are still in the formative phase. Individuals as formative and transformative learners can be fostered in various ways. One is learning through direct experience. Learners could construct their own concept through the physical and social interaction surrounding them (Fosnot, 1996). Recent research by Green and Farazmand (2012) suggested that guided learning experiences and

student participation provide a great avenue to communicate strong and encouraging educational messages.

Sorensen and Jensen (2015) and Bennett, Kerrigan, O'Reilly, and McDonald (2011) pointed out that via experience, an on-going way of preserving and protecting the precious possessions of environment are developed eventually by individuals. Clements and Cord (as cited by Ting, 2017) added that experience exerts major influence on the formation of attitude and behavior. Relatedly, Emil and Cress (2014), emphasized that to fully understand the inclination of individuals to environmental awareness, he/she must possess the characteristics of experiential learning such as self-discovery, participation, and sensory involvement. With this result, it was noted that experiential learning subsequently promotes positive attitudes toward pro-environmental behavior (De Leeuw et al., 2015). They further stated that a motivated individual is energized or stimulated to perform a certain behavior. Additionally, Deci and Ryan (1985) asserted a study on the satisfaction assessment of participants in terms of motivation links toward action. The outcome showed that participants who performed certain actions are a result of their high level of self-determined motivation.

The activity-based learning like learning by experience or hands-on task is valued and fruitful because the learners achieve a motivating force to execute certain environmental actions (Greenwood, 2013). As remarked from Fadeeva, Mochizuki, Brundiers, Wiek, and Redman (2010), conserving the environment and having surplus energy to act provide important drivers for motivation and ability to act and change.

Sharlanova (2004) defined experiential learning as the core of creativity and transforming experience into knowledge, skills, values, emotions, and senses. It can be inferred that

experience is the focus of learning. One cited and famous experiential learning model is the Kolb Learning Cycle (Kolb in Sharlanova, 2004). The model is divided into four continuous stages.

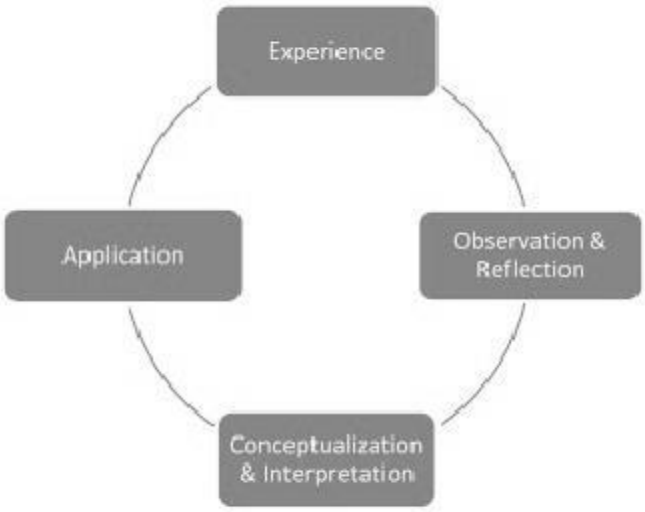

Figure 1. Stages of Experiential Learning (Sharlanova, 2004, p.37)

The first stage emphasizes experience. Learner's experience is the raw material of origin in a form of tasking or event. This experience allows the learner to manipulate things and learn the art of discovery. The next stage is observation and reflection where the learner uses the experience to gather data. In observation, senses are used to create a wide array of information and to reflect on the next step to work on. The next stage is the formation of concepts and giving an interpretation. This stage enables the learner to use higher order thinking skills because the concept is being understood and interpretation could vary depending on the experience. Lastly, the learner will now apply the knowledge obtained from the conceptual understanding into a new experience.

Rocha (2014), on her studies on evaluating experiential teaching methods in a policy practice course for undergraduate students, found that perceptions of competence in policy-related skills translate into action for the group of students who had activities of this nature in the

classroom. While the participants of the study were older students and those whose concentration was administration and planning, the fact that the community-based experience significantly drives policy-related activities is considered an important finding, and it is possibly applicable even if to younger participants. With the absence of policy-related activities by direct practice, social workers in the past (Figueira-McDonough, 1993), pointed out the need for possible integration of teaching direct practice and policy practice through experiential methods.

In contradiction, the study conducted by Brehmer (1980), cited studies which showed that experienced experts are often no better than novices at making clinical judgments. For example, a study comparing clinical psychologists' and secretaries' ability to diagnose brain damage showed no difference between these two groups. He also described studies that revealed that people have a number of biases which hinder them from using the information that experience provides. He concluded that experiences do not necessarily lead to better judgment and decisions "because it stems from a flawed conception of the nature of experience, a conception that that assumes that truth is manifest and does not have to be inferred." Additionally, it said that "if we do not learn from experience, this is largely because experience often gives us little information to learn from" (1980, pp. 239-240).

Duckworth (1977) realized that teaching is actually experiential in nature. He pointed out two aspects in teaching that makes it so. One is that students must be put into contact with phenomena related to the area being studied, the real things, so their interest can be drawn and in order to engage them, so they will continue to think and wonder about what they observed. Second, the students must be asked to make sense out of the phenomena and explain it on their own, instead of the teacher explaining things to the students.

Reflective Teaching, Learning, and Thinking

According to Chickering and Reisser (1993), learning is not a spectator sport wherein the learners are passive audiences. They further stated learning is not very effective if students are asked to simply sit in classes and listen to teachers, to memorize prepared assignments, and voicing out their answers. Students are recommended to discuss what is being learned, to write about the topic, to relate it to previous experiences, and to practically apply what they learned outside class. “Learning, must therefore, be made part of oneself” (p. 374).

Reflection is the concrete evidence that will assert the process of experiential learning. Gass and Priest (1993), claimed that genuine experiential education allows reflection to be inculcated in learning. As mentioned by Boud, Keogh and Walker (1985), reflection must be done between experience and learning in order to prevent children from having to digest a “half-baked” practical work.

Reflective practice is a meaningful and effective professional strategy that can be employed by educators in the field of teaching. For example, reflective writing assignments are tasks given to teachers in training programs to encourage thinking through reflection. Teachers allow students to draw from and enlarge critical moments that might have been recorded in a journal or diary. This reflection, when written or documented, might be a good reference whenever the instructor experiences a dilemma in the classroom. The highlight of reflection is the complexity of problem-solving and decision making in learning and teaching.

There are some research evidence (Lundberg and Scheurman, 1997) to show that those new teachers do benefit from the second reading of case analysis; it helps them connect theoretical knowledge with practice. Hence, a reflective journal serves as a guide in communicating and recalling the events which happened inside the school or classroom.

Additionally, Choy and Oo (2012) studied the reflective practices of teachers and how they influence their teaching. The result of their study revealed that teachers in the sample were using reflective thinking to enhance the quality of their teaching. However, for many of them; it was in terms of personal performance and expectations rather than as a tool of social change. This indicates that majority of the teachers engage in self-assessment only to ensure that they were doing their jobs properly.

On the other note, researches on reflective thinking skills of students, as well as their effect on their learning, are infrequent. The study conducted by Sen (2013), determined the reflective thinking skills (the phase which involves of questioning, assessment, and reasoning) of primary school students based on their problem-solving ability. In general, questioning, assessment and reasoning skill levels of the students are high with reasoning skill being the highest. Results revealed that there is a positive relationship between the reflective thinking skills of the students and their successes in Mathematics. Subsequently, it showed that the higher the student' reflective thinking skills, the higher their successes in Mathematics lesson.

One of the serious pitfalls with the idea of reflective practice is that it has tended to become a catch-all term. Zeichner (1994), pointed out the separate and distinct interpretations of reflective practice, only some known as critical. Critical reflection can create the conditions under which the student or the teacher can become aware of the power of agency and the possibilities for action. Critical reflection on practice provides freedom to the individual and to groups to change the operation of the social environment at the level of personal experiences.

As stated by Boyd and Fales (1983), reflective learning is the process of internally examining and exploring the issue of concern, triggered by an experience, which generates and clarifies meaning in terms of self, and its outcome is a change of conceptual perspective.

According to Boud et al. (1985, as cited in Guerrero, 2016), in the context of learning, reflection is a generic term for those intellectual and affective activities in which individuals engage to explore their experience in order to lead to new understandings and appreciations.

Moreover, reflective thinking is thought to enhance critical thinking (Dewey, 1998). It is part of the critical thinking process specifically referring to the processes of analyzing and making judgments about what has happened. One important role of reflective thinking is to act as means of prompting the thinker during problem-solving situations because it provides an opportunity to step back and think of the best strategies to achieve goals (Rudd, 2007).

Reflective Journal

Reflection can be done in any form; be it in verbal practice such as discourse, reflective discussion, and sharing of thoughts in a group or non-verbal such as diary, journal log, reflection essay, and reflection paper. The verbal practice frequently occurs in the classroom setting to generate immediate feedbacks, comments, and suggestions. Through this, individual can voice out or share his/her thoughts by means of facilitated learning. The only disadvantage of this type of reflection is the non-participation of other participants who are shy, afraid, or uncomfortable to raise his/her opinions in front of other people. Non-verbal reflection is done if the facilitator wants to gather all opinions or thoughts of participants. This type of reflection can also be done inside the classroom, at home, or any place where an individual wishes to write or log. This type of reflection gathers a wide array of thoughts or opinions if done inside the classroom because all learners are involved by means of writing. It can also be exclusive and non-compulsory such as those participants who wish to write in their diary or journal notebook about their thoughts, feelings, or experiences.

Reflective journals are referred to as personal records of student's learning experiences. Through this, students can record learning-related incidents more or often just after they occur. Entries can be prompted by questions about students' own ideas or students' thought processes about what happened in a particular class period. Journals are then submitted to the facilitator for feedback. The key to reflective journals is to see the progression over a period of time and to "gain a sense of achievement" (Dalhousie University).

These are some of the guide steps on how to begin a reflective journal as obtained from (Homik & Melis, 2007; Johnson, S., n.d.; RMIT, 2006, p.3)

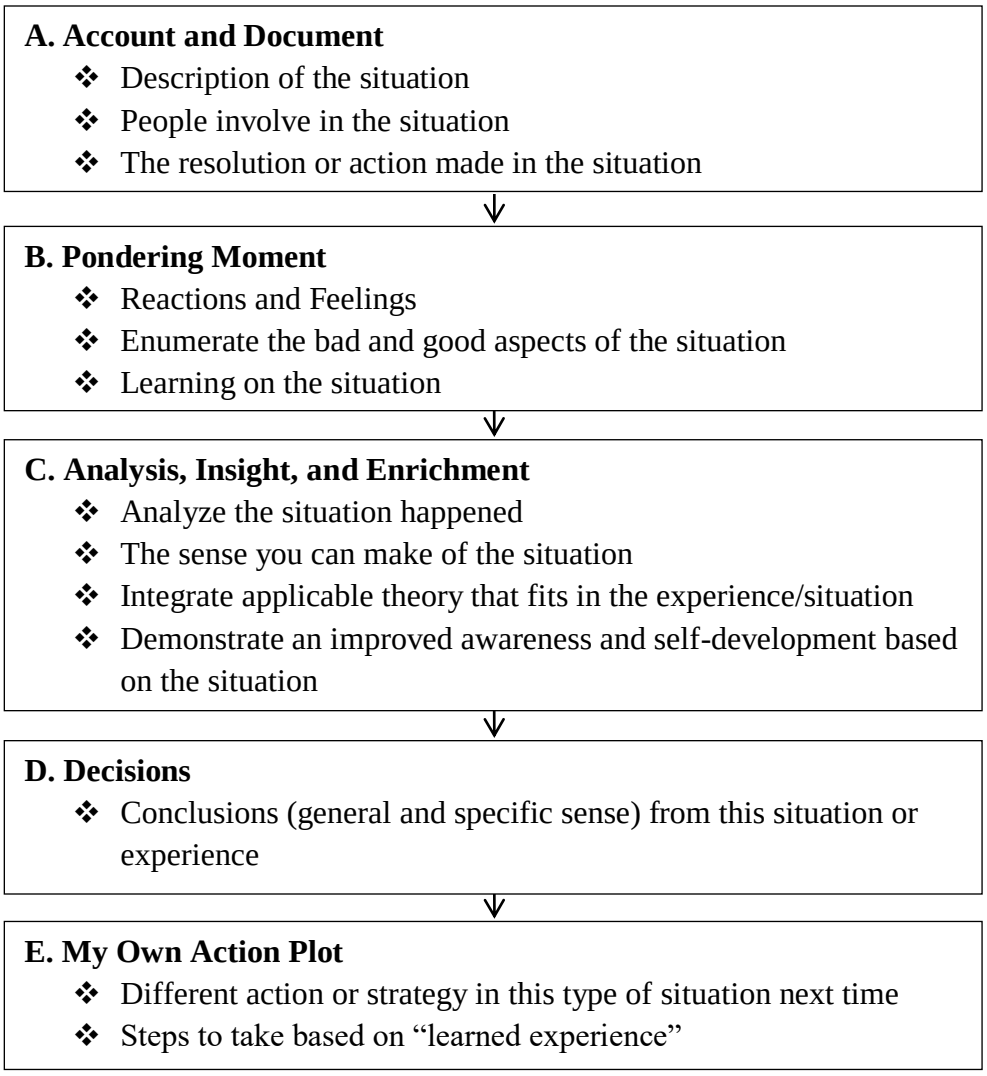

Figure 2. Guide Steps in Reflective Journal

Journals have long been used in exploratory writing activities. As stated in some literature, reflective journals may be considered less personal than the other; one might incorporate more on teacher prompts and questions while others might be more student-driven. As stated in the toolkit entitled "Equipped for the Future" (2014), journals are expected to contain personal experiences, reactions, and reflections. Evidently, the art of reflection was said to enhance the students' critical thinking skills, to encourage meta-cognition or thinking about their own thinking (meta-cognition) and to allow preparation for assignments and examinations. (Homik & Melis, 2007; Johnson, S. n.d.; RMIT, 2006).

As part of reflection, journaling is one of the key dynamics in retaining the memory of an experience. Journaling allows the students to move beyond the knowledge gained through a conventional classroom environment (Hiemstra, 2001). Also, "it allows the connections [to] often unfold almost magically in the writing process, as learners experience those wonderful 'ah-ha' moments through the free writing a journal invites" (Fenwick & Parsons, 2000, p.155).

Environmental Knowledge

Knowledge, as one of the components in solving problems in the environmental issues, plays an important role in the impact the students will have throughout their lives inside and outside the classroom. According to the North American Association of Environmental Educators (NAAEE), levels of knowledge are important goals from 3rd through 9th grade. Orr (1992) reflected on the concept of forming attitudes in order to build on ecological literacy. This ecological literacy should not be interpreted as the knowledge of facts and concepts only, but "the knowledge necessary to comprehend interrelatedness, and an attitude of care or

stewardship" (p.92). Orr (1990) added that knowledge, the attitude of caring, and practical competence are the basis of ecological literacy.

Consequently, Palmer (1998) emphasized that need for students to gain an appropriate range of knowledge, understanding, and concepts about the environment in order to make critical judgments. Furthermore, he banked on the need to allow experiences and reflection in the environment, so that environmentally focused skills can be developed and further relevant knowledge on the environment can be extracted.

Fryxell and Lo (2003) referred environmental knowledge as a general knowledge of facts, concepts, and relationships that concern the natural environment in its natural form and its major elements. They also said that it is possible for knowledge to be essential in pro-environmental behavior because it is difficult for individual consumers to determine if their behavior present environmental consequences without it. For example, the lack of awareness in environmental degradation caused by a certain action is not expected to trigger a negative attitude toward the said activity (Fransson & Garling 2002, as cited by Espina, 2017).

In the article published by Kaiser and Fuhrer (2003), they mentioned that increasing knowledge alone is seemingly insufficient. Knowledge is only useful when different knowledge systems all gear toward ecological behavior jointly and convergently. It must align towards a mutual ecological objective. The convergence of knowledge on its ecological objective results to a more significant ecological behavior development than any other form of knowledge.

It was proclaimed by Francis W. Parker that "the school is society shaping itself". It means that school is one of the dwellings that explicitly enhanced the knowledge, attitude, and behavior of individuals. The knowledge and behavior are the two main factors that are needed to converge in such a way that students are molded, honed, and transformed holistically. In order to

achieve that goal, education must aim to help children to learn and care for the environment to attain environmental education. The implementation of environmental education has the potential to affect a wide range of individuals and provide a chance to promote pro-environmental behavior.

As pointed out by Kos, Jerman, Anzlovar, and Torkar (2016), environmental education may focus on the capacity of individual to increase understanding in the long duration. Having a lengthy duration, environmental education can affect the attitude, behavior and the general worldviews of individuals as an outcome. The success of environmental education depends on factors such as cognitive development, environmental knowledge, affective and motivational factors, and actual behavior like taking action, participating, and problem-solving.

Madsen (1996) emphasized the concept of being responsible to the environment as one of the ultimate driving forces that simulate knowledge. The acknowledgment that an environmental problem existence entails being more cognizant of the facts about the state of the environment. Athman and Monroe (2000) stated that consciousness, understanding on environmental processes, and systems have a huge part in Environmental Education. However, behavior, in general, is said to be supported by knowledge and attitude however, there is indirect interconnection from knowledge toward attitude and later on to behavior (Monroe, Day, and Grieser, 2000).

As Bradley et al. (1999) studied the relationship between the environmental knowledge and attitude of high school students. They found out that the participants of the study who scored higher on knowledge garnered more commending environmental attitudes. The result was obtained even before the exposure of students to the science course, specifically environmental topics. Also, this trend was similar after the 10-day course given to students. The students got

higher scores in environmental knowledge as well as favored more in environmental attitudes. Moreover, similar researchers have reported a positive correlation between environmental knowledge and environmental attitudes of students who participated in the study where the programs and courses in environment are tackled. The duration of instructions lasted for over 4 to 8 weeks (Arcury, 1990; Armstrong, 1989; Armstrong & Impara, 1991; C. E. Ramsey & Rickson, 1976).

Several studies were synthesized by Vicente-Molina et al. (2013) which cited that younger generations will be affected by environmental problems arising from present actions so they need to be provided with accurate environmental knowledge and skills to develop sustainable solutions. It was also found out that lack of knowledge or information was an important barrier to acting pro-environmentally.

There are progressive studies which relate to the interconnection of environmental knowledge and pro-environmental attitudes. The knowledge is considered as a characteristic that influences all phases in the decision process. Alba and Hutchinson (as cited by Vicente-Molina, 2013) mentioned that knowledge is a relevant and significant construct that affects how consumers gather and organize information.

Moreover, Oguz et al., (2010), remarked that people who are knowledgeable enough on the needs of the environment and surroundings tend to behave in a pro-environmental way while lack of knowledge might limit pro-environmental behavior. Other researchers have suggested that lack of appropriate knowledge might result to wrong decisions of individuals in the environment. According to Barber et al., (as cited by Vicente-Molina, 2013), individuals who are motivated and more aware of environmental problems and their causes are mostly likely to act toward the environment in more responsible ways.

Environmental knowledge and concern as incorporated in the wide scope of environmental awareness were studied by Hausbeck, Milbrath, and Enright (1992). The study revealed that scores in environmental concern was significantly higher compared to scores in environmental knowledge of high school students.

Pro-Environmental Behavior

Behavior is a habitual and guided by automated cognitive processes, rather than being preceded by elaborate reasoning. According to Aarts, Verplanken, and Van Knippenberg (1998) habit has three important characteristics that are interconnected to behavior. First, habits require a goal to be achieved. Second, the same course of action is likely to be repeated when outcomes are generally satisfactory. Lastly, habitual responses are mediated by mental processes. When people frequently act in the same way in a particular situation, that situation will be mentally associated with the relevant goal-directed behavior. The more frequently this occurs, the stronger and more accessible the association becomes, and the more likely it is that the individual acts accordingly. Thus, habitual behavior is triggered by a cognitive structure that is learned, stored in, and retrieved from memory when individuals perceive a particular situation.

Anja Kollmuss and Julian Agyeman (2002) mentioned that pro-environment behavior simply means behavior that consciously seeks to minimize the negative impact of one's action on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, and reduce waste production and more).

Most educators believe that younger individuals are honed and guided easily because they are still in the progress of the formative phase. Bennett et al. (2011) remarked that exposure of young individuals in nature at the young age helps them recognize and appreciate the nature.

This allows young individuals to interact more in the environment, have connections of the interactions, and act proactively toward the environment. The guiding principles of moral norms and showing actions in favor of the community should be fully developed into a continuous behavior to activate the pro-environmental behavior of individuals. This is also the reason why people tend to remark judgment on the wrongdoing of others and follow certain guidelines of behavioral norm set in the community (De Leeuw et al., 2015).

Pro-environmental behavior is defined as the activities that consciously try to minimize the negative impacts of one's action on the environment (Kollmuss & Agyeman, 2002). The changes in human behavior for good intention are needed to increase the quality of the environment. Having a pro-environmental behavior means to act accordingly to change the environment and bring it back to normal conditions. Thus, it can be said that approaches may be impact-oriented or intent-oriented. Impact-oriented means that action yields a certain influence in the environment depending on the frequency of behavior while intent-oriented focuses on the earnest or eager attention to change the activity in the environment. Pro-environmental behavior encompasses the behavior such as conserving energy, mobility, transportation, waste avoidance, consumerism, recycling and social behavior toward conservation (Kaiser, Doka, Hofstetter, & Ranney, 2003).

Recycling behavior as part of being pro-environmental behavior has two factors namely psychological factor and situational factor (Barr, 2007). The personal attributes of the individuals and awareness of actions that they are undertaking are related to the psychological factor. Whereas, behavioral context, such as providing service, individual characteristics, knowledge, and experience, is related to situational factor.

The oldest and simplest models of pro-environmental behavior were based on the Early US Linear Models. These models were based on a linear progression of environmental knowledge leading to environmental awareness and concern (environmental attitudes), which in turn was thought to lead to pro-environmental behavior. They assumed that educating people about environmental issues would automatically result in more pro-environmental behavior, and have been using the term (information) 'deficit' models of public understanding and action by Burgess *et al.* (1998, p. 1447).

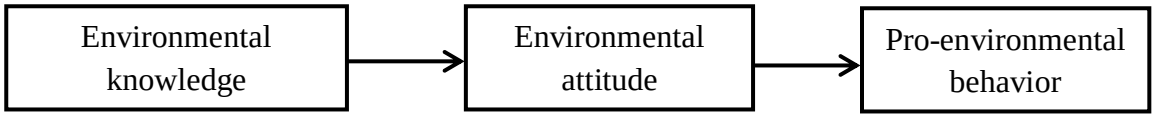

Figure 3. Early models of pro-environmental behavior

However, these models from the early 1970s were soon proven wrong. Research showed that in most cases, increases in knowledge and awareness did not lead to pro-environmental behavior. There were emerging and new models that arose; wherein some have mathematical equations, others have variables but are still lacking and have limitations to explain the ultimate goal of pro-environment behavior. Yet today, most of the environmental Non-Governmental Organizations (NGOs) still base their communication campaigns and strategies on the simplistic assumption that more knowledge will lead to more enlightened behavior.

Green purchase or pro-environmental behavior studies differ from general purchase-related consumer behavior (Espina, 2017). In the former, the individual benefits matter greatly when the consumer evaluates the cost and benefits of the products and services they purchase or intend to purchase. In this regard, it was proposed that environmental behavior might be different from other types of consumer behaviors, in terms of the underlying motivations (McCarty &

Shrum 2001, as cited in Espina, 2017). The purchase and consumption of green products is a reflection of one's conscious concern for the environment impact of purchased and consumed items; therefore, environmentally-responsible buying can be considered as a specific type of socially-conscious behavior.

Owens (2000) also explained that even governments have a similar assumption. For instance, the UK government's 'Save It' energy conservation campaign that was launched in the mid-1970s, and the 'Are You Doing Your Bit?' campaign, which was launched in 1998, both intended to move the public toward an understanding of sustainable development.

Another study that focused on environmental conscious purchasing (green buying) found out that, despite the public's strong support for environmental protection, there is still an uncertainty in terms of the public's willingness to do or pay to actually help the cause. Mandese (1991) cited that marketers have found that consumers still demonstrate price sensitivity in buying green products despite their professed support to the green initiative. The results brought about curiosities on the existence of linkage between pro-environment attitudes and buying decisions, and how the two may be connected.

Historically, the concentration of studies of environmental consumerism have been on measuring the appearance of social responsibility and perceived efficacy (Webster, 1977). Balderjahn's empirical studies on ecologically concerned consumers in West Germany around the 1980s revealed the following: a) belief in internal control increases participant's energy savings, b) belief in one's individual power results to increased number of purchases and improved use of non-polluting products; and (c) a positive attitude toward environmentally conscious living equates to improved use of non-polluting products in men (but not in women).

The study also revealed that one's purchasing behavior is not affected by demographic characteristics (Balderjahn, 1998).

In a review of recent studies on consumers' self-reported actions, Hume (1991) concluded that, although many consumers claim pro-environmentalism, their actions do not reflect their claim. One study also revealed that 74% of the respondents view environmental protection as a priority regardless if it results to slower economic growth. However, fewer respondents were found to actually engage in protective behaviors, with only 46% who recycle bottles and cans and 26% who reutilize newspapers. Similarly, even when three-fourths of the respondents agree to pay higher costs for "green" grocery items, only 14% claim to regularly purchase goods that are repackaged from recycled materials, and only 16% refrain from purchasing products from companies that they view as anti-environment.

Nowadays, people consider green buying because of the impact of materials that turned to waste which causes an effect on changing weather and chaotic environmental disaster that are widely communicated through media. Gradually, present generations are willing to pay more on green products or services compared to earlier generations. Though, this willingness is not often translated into pro-environmental consumer behavior. If the next generations of students become capable of making decisions that would be beneficial to the environment, society will move towards sustainability faster (Espina, 2017).

Pro-Environmental Consumer Behavior

Studies on pro-environmental behavior on green purchase behavior differ from general purchase-related consumer behavior. Generally, consumers assess the cost and benefits of the product and services, in which, individual benefits are taken a major part.

Meanwhile, today's consumers are more educated and informed more than ever, and they have the tools to verify companies' claims and seek out superior alternatives (Kotler and Keller 2011, as cited by Galalae and Voicu, 2013).

Anderson and Cunningham (1972) considered environmentally responsible buying as a specific type of socially-conscious behavior. They further explained that this is due to the fact that the said behavior is a reflection of one's conscious concern for the environmental costs brought about by purchasing and consuming certain products and services. If a consumer is concerned about the ecological consequences of their actions, their private consumptions would be geared toward environmental protection, and their use of green products will be greater than those who do not care about them.

Since the beginning of the 1990s, there has been considerable research in various scientific disciplines examining environmentally-conscious purchasing behavior. Especially, it is notable that there has been a small but growing literature relating the antecedents of socially conscious behaviors to green purchasing behavior (Anderson & Cunningham, 1972). Generally, the procurement of a particular product or service is determined by one's evaluation of its direct benefits to the individual or the household. The likelihood of purchase would increase if the costs associated are also favorable. Unlike most consumer behaviors, however, the benefits that can be obtained from environmental behavior most likely do not directly impact the individual performing it and are intended to be felt and observed in the future. More often than not, this behavior also requires sacrifice on the doer's part. Therefore, it is probable that basic value orientations consumers hold and their interaction with other consumers will influence their tendency to demonstrate environmentally conscious behaviors (McCarty & Shrum, 2001).

The definition of consumer behavior may depend on the period when it was developed thus, the evolutionary transformations of these definitions under the influence of knowledge expansion illustrate the progress of consumer behavior as a research domain (Galalae & Voicu, 2013). But a common thing about the definitions is represented by the acknowledgment of the dynamic and multidimensional nature of the decisions and judgments that precede and follow the act of buying a particular good or process. The process begins once an individual realizes a need as a response of exposure to internal or external stimuli (Hawkins and Coney, 1998 as cited by Galalae and Voicu, 2013). This, in turn, might determine pursuit for information about the means to satisfy that need, in an active/passive conscious/unconscious manner.

According to Jones and Fazio 2008 (as cited by Galalae & Voicu, 2013), the next natural step is the evaluation of alternatives and information processing, which may lead to an act of purchase; however, the outcome of the associations between the evaluations and the stimuli that determined the search in the first place does not lend itself to straightforward prediction. Acquisition and consumption generate new stimuli and attitudes that might, in turn, serve as seeds for other purchases made by the same individual or might determine his/her influence on other people's perception and behavior. The consumer passes through all stages with every purchase, but in the case of acquisition, such as, for example, the routine purchases, consumers often show no reservations about skipping or reversing some of these stages according to Hawkins et al, 1998 (as cited by Galalae & Voicu, 2013).

According to Moisander (2007), green consumers often struggle with deciding on what should be done. Most of them only commit to what they view as their "fair share of things that they know and come to think of as environmentally-friendly behaviors that can be done" (p. 406). Decision-making is such a difficult task because it needs a balancing of act and behavior.

Green consumers need knowledge, skills, and information. But information can be confusing and this can either demotivate or serve as an excuse. Perreau (2013) also explained that the purchase of item is the observable outcome of a complex decision process that the consumer had undergone for each buying decision that the person makes. She added that motivation is the expression of a need which can be pressing enough that it leads the consumer toward satisfying the need.

As eloquently stated by Barr (2007), it was mentioned that waste management behavior is influenced because of the vital role of environmental and behavioral knowledge. Schann and Holzer (1990) mentioned the term "abstract knowledge" which meant that the knowledge for action represents common knowledge, such as waste issues (in the state of the environment and an awareness of environmental problems) and the term "concrete knowledge" which is essentially the knowledge for action like knowing what or where to recycle waste. These two are vital in shaping general pro-environmental behavior. Both argued that there is a stronger link between concrete knowledge and behavior. This means that knowledge for action is a significant prerequisite for behaving in an appropriate manner.

Theory of Behavioral Change

The Theory of Planned Behavior (TPB) by Ajzen (1991) has been the reference on the current investigations on Pro-Environmental Behavior. The TPB is a social-psychological theory of human behavior which indicates that the individual's intention to act has a direct effect on his/her behavior. The figure is shown below:

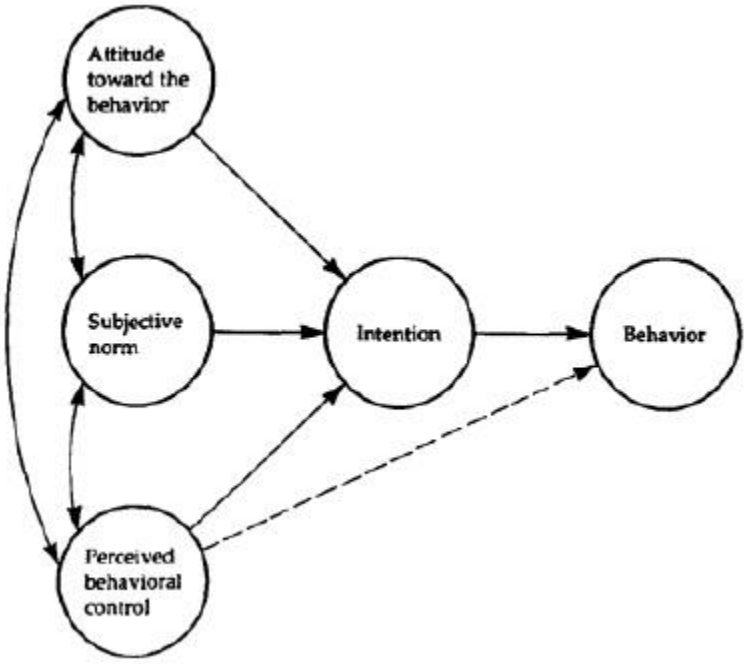

Figure 4. Theory of Planned Behavior (Ajzen, 1991)

The Theory of Planned Behavior is influenced by three factors: attitude toward behavior, subjective norm, and perceived control behavior. Based on the figure, the Theory of Planned Behavior proposes three independent variables that influence one's intent.

According to Ajzen (1991), the attitude toward the behavior as the first variable, designates to the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior. Another variable is the subjective norm which refers to the perceived social pressure to perform or not to perform the behavior. Lastly, is the degree of perceived behavioral control which refers to the perceived ease or difficulty of the behavior of interest performed. According to the Theory of Planned Behavior, the performance of a behavior is a combined role of intentions and perceived control behavior. For the behavior to occur, intentions and perceptions of control must be assessed in relation to the particular behavior of interest as well as specified context must be the same.

As discussed by Bamberg and Moser (2007), the model focused on the environmental behavior development which emphasizes on the knowledge and awareness as the antecedent of the positive environmental attitudes. The latter is the prerequisite for the development of moral norms that influence pro-environmental behavior. On the other hand, knowledge represents a necessary condition for ecological behavior as the appropriate behavior.

Chawla (2006) conducted interviews on environmental activists to better apprehend the different factors that influence their career interest and shaping attitudes and environmental awareness. Based on the result, the combination of factors was determined. Most of the respondents frequently mentioned on spending a lot of time in nature as a child and having a family member role model who directs their attention to nature. Other significant factors include participating in the pro-environmental organization and studying about the environment.

Emotion also affects learning. According to Fredrickson (2004), positive emotions such as excitement, interest, joy, explore and take in new experience and information enable the individual to be more likely to relate learning as an application to other aspects of life. On the contrary, negative emotions such as anxiety, anger, fear, and sadness can make people unable to solve the problem. Being a responsible citizen as part of community development also plays a significant role in the learning process. Bryant (1999) conducted a research which revealed that sense of community can increase engagement and participation, as well as to give a chance for the learner to learn from one another.

Thus, knowledge and awareness, together with numerous variables such as societal pressures and the ability of an individual to change behavior, are the major path that lead to pro-environmental behavior.

Environmental Education through Experiential and Reflective Learning

In the aspect of experiential education, the experience of students is developed to achieve greater learning instead of using articles, textbooks and knowledge imposed by the teachers as what the traditional education ensures (Dewey, 1998). Through this educational approach, outdoor and adventure education, together with the overlying and other related fields of environmental education, is being established (Dumouchel, 2003). In such, the merging of environmental education and experiential education is recognized by workers in the field (Adkins & Simon, 2003).

Kolb (1984) expounded that retention can be increased by experiential learning as the student progresses from one experiential learning mode to another. From the experiential learning perspective, to create new knowledge and understanding, students' engagement must involve exploring ideas and reflection on the learning process. Roland (2017), identified the three core benefits of experiential learning through the practice of reflection. She indicated that experiential learning through reflective practice enhances student engagement. It was also said to provide an avenue for the learner to acquire skills needed to effectively navigate the realities of the workplace. Finally, reflective practice was said to allow development of one's personal commitment to professionalism. As mentioned by Osterman (1990) in a speaking engagement regarding the impact of reflective practice in schools, emphasis must be placed on the importance of theory and ideas and on experience and reflection to be able to reconstruct and create better schools.

The relationship between experience, values, and actions are lacking the pragmatic support until the late '90s (Bogeholz, 2006). Over that time, a series of articles appeared about the "significant life experiences" which aims to build on the belief that in shaping the behaviors

of activists, direct environmental experiences might have been a decisive factor (Chawla, 1998; Recuenco, 2007).

The development of a pro-environmental influence on children's attitude and behavior was established and recognized because of the consequence of all the intense involvement and experiences (Georgopoulos, Birbili & Dimitriou, 2011). According to Falk (2005), someone should be in direct physical contact with an aspect of environment to construct a personal relationship with it. This relationship can create harmonious positive feelings which may be perceived as intended intermediate outcomes that serve as the moving force behind the "will" to protect the environment. As stated by Wilson (1992), experiencing nature's physical beauty provides inspiration that leads one to build a personal bonding with nature and later develop positive habits toward its conservation.

There was a study conducted by Georgopoulos, Birbili, and Dimitriou (2011) which was set to explore early childhood teachers' perceptions about the relationship between experiential education and environmental education. The study considered experiential education as the procedural instrument of environmental education used for pre-school teachers. It was found out that interviewees seemed to have awareness of the pre-schoolers' need to explore and discover the world around them. The main concept of the teachers' kind of experiential education is connected to personal experiences, emotionally engaged and reflected upon the way of knowledge construction. Also, research participants claim that lived experiences stimulate empowerment by offering opportunities to launch environmental action for pre-schoolers. The interplay between experiential education and environmental education provides evidence by means of engaging children with the public issues at the local level is a productive root in

helping and nurturing the future children to become a responsible citizen of caring the surroundings.

Researches of Bandura (1989) and Hsu (2017) revealed that life experiences play a great role in children's learning. They become intuitive to ideas and issues linked to the environment. Experiences with natural occurrences and concrete objects in the environment are where the children learn best. Moreover, learning in the environment as experience gives the students to explore and interact with the environment using senses. Bogner (1998) said that such interactions with the environment improve the students' appreciation in nature. It was also added by Tanner and Handee (as cited in Palmer, 1998) that the key factor in developing favorable attitudes toward the environment is direct experiences with nature.

According to Adkins and Simmons (2003), there was evidence that if environmental education, experiential education, and reflection will be integrated—particularly in combination with outdoor education in a manner that allows children to support each other, then its results with the children will be strong and lasting. As cited by Consulta-Francisco (2008), students' logical-visualization skills, social awareness, and scientific literacy in Biology are being enhanced by using the method of merging experiential learning and reflection.

In lieu of the results and suggestions from the abovementioned studies, experiential-reflective teaching approach was conceptualized as an alternative instructional method that could unfold both the knowledge on environment and pro-environmental consumer behavior skills of students. The immersion of students in inquiry and reflection through their classroom experience may serve as a good call through the implementation of K to 12 programs of Department of Education (DepEd) basic education, especially in the Science Curriculum.

CONCEPTUAL FRAMEWORK

The research investigated the environmental knowledge and pro-environmental consumer behavior of students exposed to experiential-reflective teaching and the conventional approach.

Knowledge on environment and pro-environmental attitudes are related constructs. Knowledge is considered as a significant factor that influences consumer absorption and organization of information for use in decision-making in purchasing merchandises (Brucks, as cited by Vicente-Molina, 2013). Today, consumers have more choices in terms of buying products because of the option of being pro-environmental in consumption practices. This is where environmental knowledge connects with consumer behavior as a guide.

Figure 5 shows the conceptual framework of the study.

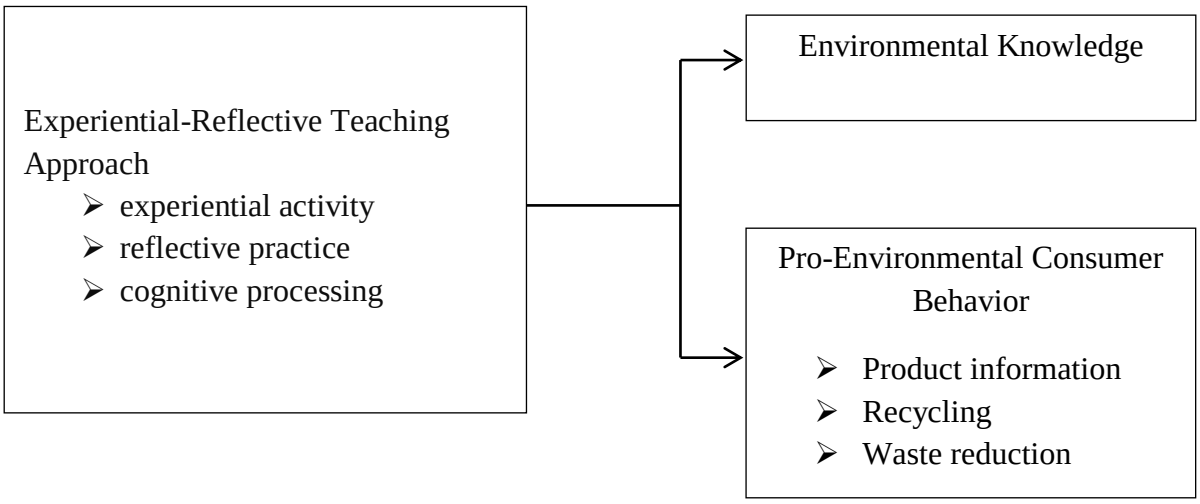

Figure 5. Conceptual Framework

In this study, experiential-reflective teaching approach was tested as an alternative approach in science teaching. It was assumed that experiential-reflective teaching would have a significant effect on the development of environmental knowledge and pro-environmental

consumer behavior of Grade 7 students. Thus, the study hypothesized that students exposed in experiential-reflective teaching approach will have higher post-test score than those exposed to the conventional teaching approach.

The framework shows variables that were examined in this study. The independent variables were methods known as the experiential-reflective teaching and conventional teaching. The experiential-reflective teaching approach consists of three sub-teaching components such as experiential activity, reflective practice, and cognitive processing. The experiential activity utilizes hands-on experiments, simulations, role-playing, gallery walk, and video watching. Reflective practice involves students writing a reflective journal entry and an essay related to the topic. Cognitive processing highlights the student-led discussion and sharing of insights in the classroom regarding environmental issues and working on the possible solution to the given issues. On the other hand, conventional approach consists of lecture and note-taking. The lecture involves the instructor and the students interacting in a face-to-face manner in the classroom, and it focuses solely on knowing the content of textbooks and notes. Students receive the information and reiterate the information as discussed and obtained from the source.

The dependent variables were students' environmental knowledge and pro-environmental consumer behavior with components including product information, recycling, and waste reduction. Environmental knowledge is the general knowledge of facts, concepts, and relationships concerning the natural environment. Pro-environmental consumer behavior pertains to the individual's sensitivity to the environment by being environmentally-conscious in the stages of the buying process and using purchasing power to build conditions that will not cause harm to the environment. Product information refers to product label and its environmental

impact. Recycling involves the conversion of waste into reusable material. Waste reduction highlights lessening the use of excess material.

RESEARCH PROBLEM AND HYPOTHESES

Statement of the Problem

Generally, this study aimed to examine the influence of experiential-reflective teaching in enhancing the environmental knowledge and pro-environmental consumer behavior of students.

Specifically, this study sought to answer the following questions:

1. Does the group exposed to Experiential-Reflective Teaching Approach have higher mean post-test score in environmental knowledge than that of the group exposed to Conventional Teaching Approach?
2. Does the group exposed to Experiential-Reflective Teaching Approach have higher mean post-test score in pro-environmental consumer behavior than that of the group exposed to Conventional Teaching Approach?
3. What are the students' perceptions on Experiential-Reflective Teaching Approach?

Research Hypothesis

The following are the research hypotheses of the study:

1. The mean post-test score on environmental knowledge of the group exposed to Experiential-Reflective Teaching Approach is significantly higher than that of the group exposed to Conventional Teaching Approach.
2. The mean post-test score on pro-environmental consumer behavior of the group exposed to Experiential-Reflective Teaching Approach is significantly higher than that of the group exposed to Conventional Teaching Approach.

Scope and Limitations

The research participants of this study were Grade 7 students of in a public school in Quezon City. Nicer (1999) as cited by Guerrero (2016), denotes that Filipino children become more environmentally sensitive at the age of 13 onwards. This study focused on some environmental issues covered in the 4th quarter section of Science Curriculum in Grade 7. The topics included "The Philippine Environment" which tackles the protection and conservation of natural resources, and "Interactions in the Atmosphere" which includes on the topics about the greenhouse effect and global warming, monsoons, and inter-tropical convergence zone (effect). Two heterogeneous sections in Grade 7 were involved in this study. One class was exposed to Experiential-Reflective Teaching (ERT) while the other group was exposed to Conventional Teaching Approach (CTA). The researcher taught and observed both classes and implemented the intervention during the 4th Quarter of School Year 2018-2019. This study covered only selected environmental topics with the duration of one (1) hour per day or five (5) hours per week depending on the time of Science, subject to the availability of two classes on the day. The data gathering was targeted and conducted on six to eight (6-8) weeks. The result of this study considered only the data collected from the students who were mostly present during the duration of the intervention period.

Definition of Terms

The following terms are defined operationally in this study:

Experiential Learning refers to the learning process involving scientific knowledge by exposing the students in various hands-on activities relevant to the topics and skills appropriate to the learners. (Guerrero, 2016).

Experiential Teaching is a student-centered approach in which students learn through active involvement.

Reflective Learning is the process of internally examining and exploring the issue of concern, triggered by an experience, which generates and clarifies meaning in terms of self, and its outcome is a change of conceptual perspective.

Pro-Environmental Behavior simply means behavior that consciously seeks to minimize the negative impact of one's action on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, and reduce waste production and more).

Pro-environmental Consumer Behavior pertains to the individual's sensitivity to the environment by being environmentally-conscious in the stages of buying process and using one's purchasing power in helping to build conditions that will not be harmful to the environment. This was also measured by a 15-item checklist from Espina (2017).

Environmental Knowledge refers to the general knowledge of facts, concepts, and relationships concerning the natural environment and its major components.

Experiential-Reflective Teaching Approach (ERTA) refers to the teaching method with three sub-teaching components such as hands-on activity, reflection, and cognitive processing. The experiential activity utilizes experiments, simulations, role-playing, and video watching related to the topic. Reflective practice involves students in a written reflective journal of the topic concern (Guerrero, 2016). Cognitive processing highlights the student-led discussion and sharing of insights in the classroom by stating the pros and cons of environmental issues and working on a possible solution to the given scenarios or issues.

Conventional Teaching Approach (CTA) or traditional teaching refers to a teaching method involving instructors and the students interacting in a face-to-face manner in the classroom, and focus exclusively on knowing the content of textbooks and notes. Students receive the information passively and reiterate the information as discussed and obtained from the source.

Chapter 2

METHODS

This chapter discusses the research design, describes the sample and participants of the study, research instruments, data gathering, analysis procedures, and ethical considerations.

Research Design

This research study employed a quasi-experimental method. A quasi-experimental method is an interventional study which eliminates the causal impact of an intervention on the target population without random assignment. This method uses the information received from the senses, particularly by observation and documentation of patterns and behavior through experimentation. Thus, the quasi-experimental method resembles the experimental method but is not truly experimental in nature. Although the independent variable is manipulated, participants are not randomly assigned to conditions or orders of conditions (Cook and Campbell, 1979).

The sampling technique applied to this study is non-random. This study used the convenience sampling also known as the availability sampling. The convenience sampling is a type of non-probability sampling which involves the sample being drawn from the part of the population which is close at hand or within reach (freedictionary.com). The researcher-observer conducted the study in a nearby school for easy access to transportation and convenience.

An inferential statistics (t-test of independence and paired sample t-test) were used to determine whether there was a significant difference between the pre-test and post-test means scores of two groups. In this study, there were two intact classes involved wherein one group was exposed to Conventional Teaching Approach (CTA) and the other group was exposed to the Experiential-Reflective Teaching (ERT).

The research design is represented as follows:

ERTA	O_1	O_2	X_1	$O_{1'}$	$O_{2'}$
CTA	O_1	O_2	X_2	$O_{1'}$	$O_{2'}$

Where: O_1 = Environmental Knowledge Scale used as a pretest

O_2 = Pro-environmental Consumer Behavior Scale used as a pretest

$O_{1'}$ = Environmental Knowledge Scale used as a posttest

$O_{2'}$ = Pro-environmental Consumer Behavior Scale used as a posttest

X_1 = Experiential-Reflective Teaching Approach (ERTA)

X_2 = Conventional Teaching Approach (CTA)

Sampling and Participants

The participants of this study consisted of fifty-four (54) Grade 7 students from two heterogeneous intact classes in a general public secondary school in Quezon City through the Academic Year 2018-2019. The initial population for each class is 30. However, due to absences and non-participation during the pretest and posttest period, only 27 students per class were considered. They were considered as the subjects of this study because selected topics in Environment are specified on their Science Curriculum in the 4th quarter. Prior to the intervention, the instruments on Environmental Knowledge Scale and Pro-Environmental Consumer Behavior Scale were administered to these sections and analyses revealed that there was no significant difference between their mean scores signifying that these groups are matched and comparable. The next chapter presented the details of the analyses. The two classes were assigned to Conventional Teaching Approach (CTA) group and Experiential-Reflective

Teaching (ERT) group. The Conventional Teaching Approach (CTA) group and ERT groups were composed of 27 students each.

Research Instruments

This study used the research instruments developed and adapted by the teacher-researcher. The contents of the instruments were submitted to environmental science and technical experts for validation. The instruments were pilot-tested to 80 students from grade 8 of a general public high school in Quezon City. The consistency of the test was determined using the Cronbach's alpha. The research instruments used in this study focused on the following variables: (1) Environmental knowledge and (2) Pro-environmental consumer behavior.

1. Environmental Knowledge Scale (EKS)

The first instrument is a four-level Likert scale. The instrument consisted of 15-item Likert scale. The content, structure, and format of this instrument were patterned after the study by Espina (2017); Ahmad, Juhdi and Awadz (2010); and Bogan and Kromrey (1996). Participants were asked to rate each statement from 4 (strongly agree) to 1 (strongly disagree). There was no neutral answer to indicate the degree of agreement for each item. Obtaining a higher score in this scale denotes that they have more knowledge on the environment. Item scores were added up to calculate the total score for each respondent. Table 1 shows the computed Cronbach alpha coefficient of the Environmental Knowledge Scale.

Table 1. The *reliability coefficient of Environmental Knowledge Scale*

Instrument	Respondent	N	No of Items	Cronbach alpha
Environmental Knowledge Scale	Grade 8 pupils	80	15	.805

Based on the table, the Cronbach alpha coefficient was = .805. Hence, the alpha coefficient values indicate that the instrument is acceptable. This interpretation is based on the guidelines presented by De Vellis and Nunally as cited in Saadati, Tarmizi, and Bayat (2010). The guidelines used for interpretation of the reliability coefficient are as follows:

<.50	low reliability
≥.50 - ≤.70	moderate reliability
≥.70	high reliability

2. Pro-Environmental Consumer Behavior Scale (PECBS)

This instrument consisted of 15-item Likert scale adapted from Espina (2017) with added questions at the end part. This instrument was meant to measure the student's or client's pro-environmental consumer behavior. There were four options to choose from: "always", "most of the time", "sometimes" and "never". Participants were asked to rate each statement from 4 (always) to 1 (never). There was no neutral answer so students had to indicate how often they do each item that was included in the scale. The higher score for this scale means that the clients or students behave in a pro-environmental way.

The initial form of the PECB scale consisted of 24 items with a Cronbach alpha of 0.755 after pilot-tested by Espina (2017). The final instrument was reduced to 15 items with a Cronbach alpha of 0.790. These alpha coefficient values indicated that the instrument was

acceptable. All of the statements included in the instrument of PECB were authentic and retained with the permission from the author.

Table 2 shows the components of the PECB questionnaire. Content in the said instrument included: (1) Product Information; (2) Recycling; (3) Waste Reduction.

Table 2. *Components of PECB*

Components of PECB	Statements
Product Information	1. I buy products with labels that say they help save the environment. 3. I read products labels to know about the product's environmental impact. 6. I spend some time looking for products that are made of environmentally-friendly materials. 8. I find out how the products I buy are made of. 15. I read the ingredients of the products I buy.
Recycling	5. I use plastic bags that are labelled as biodegradable. 9. I reuse some of the packaging materials of the products I buy. 10. I buy products that are in refillable containers. 11. I buy products packaged in recycled materials. 14. I buy products made from recycled materials.
Waste Reduction	2. I **do not** buy a product that I know will cause an environmental problem (example: will cause pollution) 4. I buy products that are in reusable containers. 7. I use reusable bags when buying. 12. I buy goods in bulk to reduce too much materials in packaging (example: buying in bottles rather than in sachets) 13. I buy products that are wrapped with reusable materials.

Experiential-Reflective Teaching (ERT)

This study involved the intervention called Experiential-Reflective Teaching (ERT) which is consisted of three sub-teaching components—hands-on activity, reflection, and cognitive processing.

Topics on environmental issues were discussed depending on how many sessions they were covered in the lesson. During the hands-on activity, the class was grouped accordingly. The members performed experiential activities like laboratory experimentations, simulations, games, rotation station, gallery walk, situational role-playing, and playing videos related to the topics covered in 4th quarter. Guide questions were constructed reflecting the Individual Reflective Practice Guide (IRPG) adapted from the study of and created by Guerrero (2016) and modified by the researcher to be used in this study.

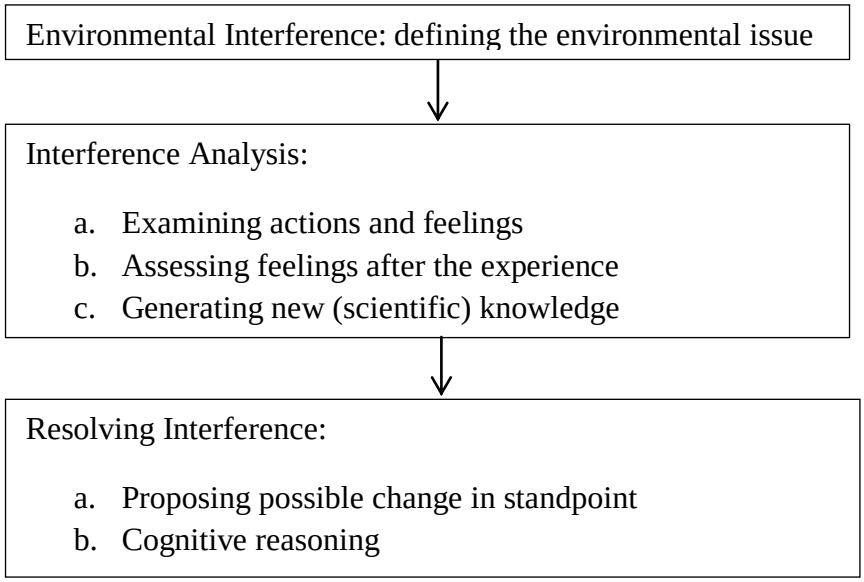

Figure 6. Individual Reflective Practice Guide (IRPB)

Each reflection defined their reactions, feelings, and realizations about the experiential activity. The processing phase was done after the activity, so the students could assess and share

their insights on the content of the lesson. During the processing phase, each group reported and discussed the environmental issue and science concepts that have been developed through the activity by presenting their output. The teacher-researcher allowed students from each group to facilitate the discussions (if needed and necessary). The teacher intently listened to the discussion and took note of the insights, as well as the students' reactions about the issue during the presentation. Time limit was imposed so the teacher-researcher can provide clarifications of the lesson and additional inputs.

Then, students were given ten to twenty (10-20) minutes to analyze the issue through writing reflective journal entries as part of their seatwork or group activity. Guide questions were constructed by the researcher to aid the students in writing entries. This reflective journal could be continued in their homes so they can also add inputs on what they observed or noticed on their environment.

The conventional group had the same environmental topics and issues discussed. The teacher presented the environmental topics using a textbook by means of storytelling, discussion, and note-taking. Then, representatives from each group were asked to present the environmental topics in front of the class. The teacher provided guide questions to facilitate the students' group discussion. The presentation and analysis of an environmental topic/issue took one class session matching likely as the ERT group.

Assessment tools such as seatwork and quizzes were both given to the two classes even though the two groups were exposed to different instructional activities.

Table 3 shows the layout on how the lessons were delivered in the experiential-reflective group and conventional group.

Table 3. *Comparison of the Experiential-Reflective Teaching Approach Group and the Conventional Teaching Approach Group*

Experiential-Reflective Teaching Approach	**Conventional Teaching Approach**
Presentation of the environmental topics and issues	Presentation of the environmental topics and issues
Analysis of the environmental issue through Written or Oral Reflective Practice	Group and Oral Discussion about the topics on environment
Cognitive Processing (facilitated by students or by teacher-researcher)	Cognitive Processing (guide questions will be provided by the teacher-researcher)

Lesson plans were also prepared and implemented by the teacher-researcher on both classes. Each plan was composed of different parts namely: objectives, learning resources, materials, and procedure (5Es are injected in the procedure including the processing phase). Table 4 shows the environmental topics from Science 7 obtained from the K-12 DepEd Curriculum, while Table 5 shows the comparative sample lesson structure of the ERTA group and the CTA group. Other samples of lesson plan structure are indicated in the Appendix H.

Table 4. *Environmental Topics from Science 7of DepEd Curriculum*

Topic	**DepEd Learning Competency**	**Possible Experiential-Reflective Activities**
The topics involved are in the 4th Quarter	The learning competency includes:	Possible activities are:
The Philippine Environment • Philippine location in respect to landmasses and bodies of water • Conservation and Protection of natural resources	• Describe the location of the Philippines with respect to the continents and oceans of the world; • Recognize that soil, water, rocks coal, and other fossil fuels are Earth materials that people use as resources;	• Station Rotation • Gallery Walk • Simulation • Role Playing on conservation of water • Model making • Picture Match-O • Oral Reflection

	• Describe ways of using Earth's resources sustainably;	• Group Presentation • Reflective Essay • Pick-Up the Good!
Interaction in the Atmosphere • Greenhouse Effect and Global Warming • Land and sea breezes	• Discuss how energy from the Sun interacts with the layers of the atmosphere; • Explain how some human activities affect the atmosphere; • Account for the occurrence of land and sea breeze;	• Station Rotation • Gallery Walk • Simulation • Role Playing • Puzzle • Picture Match-O • Oral Reflection • Group Presentation • Reflective Essay • Garbage War

As indicated in the possible activities under experiential-reflective teaching, physical manipulatives such as model-making and simulation of physical materials are beneficial educational tools since they aid in learning abstract ideas. The study of Martin, Shaw, and Daughenbaugh (2014) found that manipulatives allow the students to actively participate in hands-on activities and the teacher implements the concepts easily to students. In addition, Moch (2002) found that exposing the students to manipulative activities foster them to engage both semantic (remembering the general facts) and episodic (recall of personal facts) memory systems while enhancing the opportunity for retention.

Experiential-reflective teaching focuses on the learner-centered approach which is active and pro-active. Learning Station Rotation Strategy is considered as one of the most important strategies that highly influenced active learning. Jonse (1997) as cited by Aqel and Haboush (2017) described this teaching method as "move and rotate" where every station is provided with educational materials and tools for educational activity. The learning stations strategy emphasizes on the role of students in learning by distributing them into group, roaming on a

number of stations in order to conduct an experiment on the subject, or read topic in another station, or watch the images of the subject (Zinati, 2014).

There were studies that proved the effectiveness of the learning station strategy in teaching. One is through the study conducted by Soliman (2015) as cited by Aqel and Haboush (2017) which showed the effectiveness of a program activities based on learning stations on scientific concepts in kindergarten. Zinati (2014) demonstrated the effectiveness of learning stations strategy in developing processes of learning and reflective thinking skills in science among ninth grade learners. While Jarret and Bulunuz (2010) revealed the impact of the use of scientific stations strategy in enhancing the understanding of teachers in American primary schools for four scientific concepts in Space and Earth Science.

Table 5. Comparative sample lesson structure of the ERTA group and the CTA group

	Experiential-Reflective Teaching Approach (ERTA)	**Conventional Teaching Approach (CTA)**
I. Objectives		
A. Content Standards	The learners demonstrate an understanding of the relation of geographical location of the Philippines to its environment	The learners demonstrate an understanding of the relation of geographical location of the Philippines to its environment
B. Performance Standards	The learners shall be able to analyze the advantages of the location of the Philippines in relation to the climate, weather, and seasons	The learners shall be able to analyze the advantages of the location of the Philippines in relation to the climate, weather, and seasons
C. Learning Competencies/ Objectives Write the LC code for each	The learners shall be able to recognize that soil, water, rocks, coal, and other fossil fuels are Earth materials that people use as resources (S7ES-IVb-3)	The learners shall be able to recognize that soil, water, rocks, coal, and other fossil fuels are Earth materials that people use as resources (S7ES-IVb-3)
II. Learning Resources		

A. Content (Presentation of the Environmental Issue)	**Water Resources and Biodiversity**	**Water Resources and Biodiversity**
B. Focus	Learner-centered	Teacher and learner-centered
C. Total Lesson Time	1 hour	1 hour
D. Reference	Science 7 pp. 98-101	Science 7 pp. 98-101
III. Procedure		
A. Review (Engage)	***#WowPilipinas*** The teacher will show the illustration of different natural water forms such as bays, rivers, lakes, falls and gulfs. Additional points will be given to group who can provide the exact name of water forms (e.g. Maria Cristina Falls) (5 minutes)	***#WowPilipinas*** The teacher will ask the different natural water forms in the Philippines. The teacher will write on the board the different natural water forms given by the students. Additional points will be given to group who can provide the exact name of water forms (e.g. Maria Cristina Falls) (5 minutes)
B. Establishing Lesson Purpose (Explore)	***Experiential Activity (DIY Watershed)*** The teacher will ask the students to proceed to their respective group. Each group will be given the materials needed. The students will make a simple watershed using the crumpled paper, pan, spray bottle of water, and water based color markers. The sample questions on the activity are: 1. What do you think the paper represent? the spray? 2. Why does water flow down into the creases? 3. What happened to the ink from the markers as the water	***Lecture Method and Groupings*** The teacher will ask the students to proceed to their respective group. The students will get their book and draw the watershed on the manila paper and label the parts. The students will be asked to describe the parts of the watershed after the activity. (20 minutes)

	flowed? Where did it end up? 4. Did the different pollutants mix together? If so, where did this happen in the watershed? (20 minutes)	
C. Presenting Examples/ Instances of lesson (Explain)	***(Cognitive Processing)*** Each group will present and share their output to the class. After the presentation, the teacher will facilitate the discussion using the prepared slides about the water resources and biodiversity. Note-taking and participation of the students is highly encouraged. (10 minutes)	***(Class Discussion)*** The teacher will discuss the lesson about the water resources and the biodiversity including the habitat, plants, and animals. The students will be asked to get their notebook for note-taking. Class participation is highly encouraged. (10 minutes)
D. Developing Mastery (Elaborate)	***Reflective Activity (Analysis of the Issue)*** The following are the guide questions to facilitate reflection/discussion of the students in the class. Each group will assign 2-3 representatives to answer and share their ideas about the topic tackled. 1. What happened to the watershed if there are factories and agricultural wastes located on top of it? 2. How would you take care of the water in your community? 3. As an environmental consumer, how would you minimize the pollution that affects the watershed in the La Mesa Dam? 4. How do you feel about it after the activity? (15 minutes)	***(Elaborate it Further!)*** The teacher will ask the students to name the different watersheds in the Philippines. The teacher will also ask the students: What happened to the watershed if there are factories and agricultural wastes located on top of it? (15 minutes)

E. Evaluating Learning (Evaluate)	A 10-item seatwork will be given to the class. (5 minutes)	A 10-item seatwork will be given to the class. (5 minutes)

Classroom Observation

Apart from the aforementioned instruments, the teacher-researcher also utilized a classroom observation procedure as mandated by the institution to provide information regarding the behavior of students during the class instruction and support the objective of the instruments. The observation is based on the assumption that it would eradicate the possible bias in handling the two groups involved in the study.

Focus Group Discussion/Interview

Once the intervention period was done, a Focus Group Discussion (FGD) was conducted for both groups to gather insights about the environmental topic which provided support to the results of the instruments. Five randomly selected students from each group were asked about their learning and experiences during the intervention period. The questions were aligned on the strategy of teaching toward knowledge on environment and pro-environmental consumer behavior. The responses of the respondents were recorded and moderated by the teacher-researcher. The teacher's interview was only done after the class and in the form of feedback or comment.

Data Gathering Procedure

With the permission and go signal from the school head, the teacher-researcher carried out the study—administered the test, and interviewed the participants of this research.

One week before the start of the fourth quarter period, the teacher-researcher administered the pretest on Environmental Knowledge Scale (EKS) and Pro-Environmental Consumer Behavior Scale (PECBS) to both the Conventional Teaching Approach (CTA) Group and the Experiential-Reflective Teaching Approach (ERTA) Group.

Prior to the administration of pre-test and post-test in school, both the teacher/adviser and the Grade 7 students were oriented about the research study to clarify things. The said briefing was conducted by the researcher to discuss the following aspects of the research: rules, guidelines, objectives, significance, safety of participants, consent of participants, and the anonymity and confidentiality of information collected. Similarly, the students were given informed consent forms to be signed by their parents, informing that they will serve as participants of this research.

The Grade 7 students were observed and handled by the teacher-researcher. The researcher is not affiliated with the school where the study was conducted. He submitted a request to the head office of the Department of Education in Quezon City and this was forwarded to the school head to seek permission for the implementation of the study. The researcher selected the school on the basis of distance accessibility and convenience. The science teacher assigned to the classes included in this study was also guided by the researcher in terms of observing and managing the students.

The study was conducted during the 4th Quarter of School Year 2018-2019. The teacher-researcher taught and observed the two groups of Grade 7 students. The lessons covered on this part focused on the Philippine Environment, particularly the location of the country with respect to the landmasses and bodies of water, protection, and conservation of natural resources, as well as the Interaction in the Atmosphere, —specifically the greenhouse effect, global warming and

the land and sea breezes. The format of the lesson plans in this study was based on the learning plan established by the DepEd Curriculum Learning Plan where this study was conducted. The learning plans were submitted to the Subject Teacher for evaluation and enhancement prior to the actual implementation.

For the intervention, students in the two sections of the experimental group were tasked to write a reflective journal, reflective essay or provide oral reflection as part of the class discussion to analyze the environmental issue presented during the class. This was done after the experiential and processing activity. Ten to twenty (10-20) minutes of the class time were allotted to writing their reflective journal entry/essay or oral reflection. Guide questions were also given to help them write their entry. Students were allowed to write journals either in Filipino or English to better express themselves.

In addition, selected students or groups from the two classes were randomly selected to participate in the Focus Group Discussion (FGD) or interview. The teacher-researcher conducted this interview to assess the sufficiency and validity of the data gathered before and after the implementation.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) software was used to analyze the data of this study. All the hypotheses of this study were set at .05 level of significance in statistical treatment.

The teacher-researcher obtained the pretest mean scores in the Environmental Knowledge and Pro-Environmental Consumer Behavior for both groups. They were analyzed using the t-test of independence samples to determine the comparability of the two groups prior to the

intervention. The post-test mean scores of the two groups were also determined using the same statistical analyses to examine if there is a significant difference between the post-test mean scores in the Environmental Knowledge Scale (EKS) and Pro-Environmental Consumer Behavior Scale (PECBS).

Subsequently, pretest and post-test results of both groups were compared using the t-test for paired samples to find out if there is an improvement on EKS and PECBS before and after the intervention period.

Lastly, the researcher gathered qualitative data through transcript interviews to provide more understanding of the students' Environmental Knowledge and Pro-Environmental Consumer Behavior.

Ethical Considerations

Ethical considerations were reviewed and taken into account in this study. Permission was obtained from the School Head and Coordinator of the target subject prior to the conduct of the study. Since the participants in this study are still minors, informed consent was obtained from their parents. An adequate level of confidentiality of the research data was kept by the researcher and information gathered will be used for the purpose of the research. Moreover, the result of this study will be shared to the school and a copy of the manuscript will be provided as reference.

In this study, the researcher was both a facilitator and a researcher so he could gauge the length and scope of the study. The researcher hoped that the results of the study would be consistent and reliable. He also considered the environment where the study was conducted so

students would be encouraged to improve their leadership abilities and be able to work as a team and contribute to the group outputs.

Before the data gathering, the researcher oriented the teacher who handled the class. He was briefed about the general flow of the class discussion, as indicated in the experiential-reflective approach learning plan, the process of teaching, and the selected environmental topics needed for study. The teacher-researcher also sought the consent or permission of the subject teacher to observe and teach the class.

Furthermore, the researcher asked the teacher to be an observer and teacher on the day he implemented the study. In this manner, the researcher would able to follow the guidelines and objectives of the lesson on the day-to-day basis and will be guided or monitored if there are biases or diversion from the lessons.

Chapter 3

RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study on how experiential-reflective teaching enhances the environmental knowledge and pro-environmental consumer behavior of students in public high school together with its analysis and interpretation. The discussion of the research questions and hypotheses are organized accordingly.

RESULTS

Environmental Knowledge

Comparability of Group Scores Point Difference on the Environmental Knowledge Scale

A t-test of independence samples was conducted to compare the pretest and post-test mean scores of Conventional Teaching Approach (CTA) Group and the Experiential-Reflective Teaching Approach (ERTA) Group in the Environmental Knowledge Scale. The post-test and pretest scores were determined and the point differences between the two were used to analyze if there was a change of scores before and after the intervention was applied. The level of significance was set at .05 in all analyses, with the number of samples for each group at N=27. Table 6 presents the mean, standard deviation, and the result of t-test analysis.

Table 6. *Independent t-test of CTA and ERTA in pretest mean scores in the Environmental Knowledge Scale*

Measure	Group	Mean	SD	df	t	p (one-tailed)
Pretest	CTA	44.6296	5.49229	52	-1.395	.169
	ERTA	42.6667	4.82780			

As presented in Table 6, the comparison group (CTA) had a slightly higher pretest mean score (*M*=44.6296, *SD*=5.49229) in the Environmental Knowledge Scale than that of the experimental group (ERTA) (*M*=42.6667, *SD*=4.82780). Despite the distinct mean scores in Environmental Knowledge Scale, statistical analysis showed that there is no significant difference between the mean scores of the two groups, *t*(52)= -1.395, *p*=.169. This means that the two groups are comparable in terms of Environmental Knowledge prior to the experiential-reflective teaching enriched lessons. This result supports the choice of sample for the study.

Effect of Experiential-Reflective Teaching on Environmental Knowledge

Table 7. Independent sample t-test of post-test mean scores of CTA and ERTA groups in the Environmental Knowledge

Measure	Group	Mean	SD	df	t	p (one-tailed)
Post-test	CTA	47.5926	5.93075	52	.712	.478
	ERTA	48.7037	5.52487			

As presented in Table 7, the p-value was higher than the alpha value of 0.05, which means that there is no significant difference between those who have undergone the intervention and those who were exposed to the conventional teaching method. However, looking at the mean scores of both groups, it was noticeable that it slightly increased.

While it is possible that the intervention did not influence the students' environmental knowledge of the ERTA group, effect size could be a contributor to these insignificant results. Considering that only 27 people per group were assessed, the effect size can be used to interpret the results further. The effect size (d) is computed using the formula (Cohen, 1988).

$$\textbf{Effect Size} = \frac{\textbf{Mean of ERTA group} - \textbf{Mean of CTA group}}{\textbf{Standard Deviation}}$$

With the standard deviation being based on that of the CTA (comparison group), the effect size in the post-test scores of the group is calculated to be 0.19. According to Coe (2002, p.3), the "effect size is exactly equivalent to a 'z-score' of a standard normal distribution."

Cohen (1988) as cited by Coe (2002) did acknowledge the danger of using terms like 'small', 'medium', and 'large' out of context. In education, if it could be shown that making a small and inexpensive change would raise academic achievement by an effect size of even as little as 0.1, then this could be a very significant improvement, particularly if the improvement applied uniformly to all students, and even more so if the effect were cumulative over time (Coe, 2002).

Furthermore, the summative test and gain of scores were analyzed to determine if the scores between the two groups had significantly improved before and after the intervention.

Table 8. Independent sample t-test of summative test mean scores of CTA and ERTA groups in the Environmental Knowledge

Measure	Group	Mean	SD	df	t	p (one-tailed)
Summative test	CTA	36.0741	7.49321	52	2.084	.042*
	ERTA	40.7037	8.78292			

$*p < .05$

As presented in Table 8, the ERTA group had a slightly higher summative mean score (M=40.7037, SD=8.78292) in the content of Environmental Knowledge than that of the comparison group (CTA) (M=36.0741, SD=7.49321). Statistical analysis showed that there is a significant difference between the mean scores of the two groups, $t(52)= 2.084$, p=.042 before and after the treatment period.

Table 9. *Independent t-test of CTA and ERTA in post-test and pretest gain of scores in the Environmental Knowledge Scale*

Measure	Group	Mean	SD	df	f	t	p (one-tailed)	95% Confidence Interval	
								Lower	Upper
Gain of Scores	CTA	2.9630	5.04961	52	1.098	2.349	.023*	0.445	5.700
	ERTA	6.0370	4.55295						

**p < .05*

As presented in Table 9, the ERTA Group had a relatively higher mean score (*M*=6.0370, *SD*=4.55295) in the Environmental Knowledge Scale compared to the CTA Group with the mean score (*M*=2.9630, *SD*=5.04961). It was also noticeable that the mean score of ERTA Group was two times higher compared to the CTA Group. Statistical analysis showed that there is a significant difference between the mean scores of the two groups, $t(52)= 2.349$, $p=.023$ before and after the treatment period.

Furthermore, it may be noted that there are several ways to determine whether the calculated value is significant or not. One way is to look for the f value and t value. As referred to Table 10, the given value of f=1.098 which accounts that it still falls within the confidence interval value of upper=5.700 and lower=0.445. Also, the t value must be greater than the absolute value of 2 to be considered as significant. Based on the table, the value of t=2.349; hence, it is significant.

This result supports the initial hypothesis of this study that the Environmental Knowledge post-test-pretest mean scores of the students exposed to Experiential-Reflective Teaching Approach group are significantly higher than that of those exposed to Conventional Teaching Approach group.

Relating to the positive result, it could be attributed to the activities conducted in the classroom during the intervention period. Such activities included active participation in class discussion, eagerness to work within the group, and reflective discussion. Active participation enables the students to express their point of view on the issues. It elicits information from different ideas thus, engaging them through facilitative learning. In one of the classes, some of the randomly selected students mentioned about class recitation.

Student (A): *Kapag may recitation sa klase, mas nalalaman ko yung mga sagot sa mga tanong ni teacher.* (When there is a class recitation, I know more about the answers to the teacher's questions.)

Student (B): *Mas natututo po ako kapag nagrerecite sa klase*. (I learn more when I recite during class discussion.)

The teacher's interaction and calling on the students are said to be a form of encouragement as the teacher is able to engage the students and promote their way of thinking (Shumow & Schmidt, 2014). Based from their responses, it was evident that class recitation enabled the students to learn more thus, increasing their knowledge.

Group activity aids the students' learning by engaging them in class. This makes learning as a fun and sort of a bonding experience since it allows students to contribute different ideas and it fosters unity among them. Below are the responses of students in the interview conducted.

Student (L): *Nakakapagdonate o nakakapagshare po ako at sila ng mga sagot na hindi ko nalalaman at nagkakaisa din kami.* (I was able to contribute or share answers/ideas while I also learned from my classmates. This activity also fostered unity among us.)

Student (M): *Sa group activity, doon ko po naalala yung mga lessons pati dun kami sumisigla.* (If there is a group activity, I can easily remember the lessons and the activity makes us enthusiastic.)

Assessing their responses, it was evident that group activity enabled the students to cooperate and initiate collaborative learning. By working in a group, the students' motivation is increased. As mentioned by Brown (2001), group work allows the students to become more responsible for action and progress. In addition, when students are in groups, they feel more secured.

Reflective discussion was employed in the class to draw out students' knowledge through critical thinking. This allowed the students to state the advantages and the disadvantages of environmental issues. At the same time, it also encouraged students to exchange and elicit ideas from one another. It was observed that some students were shy in class but were able to provide valuable ideas to the issues when called upon to answer.

Since the intervention placed importance on engaging the students and promoting classroom interaction, it would have contributed to the improvement of their environmental knowledge scores.

Comparability of Within-Group Scores on the Environmental Knowledge Scale

Analyses were conducted to evaluate the effect of the intervention on the environmental knowledge scale of both groups. Using the t-test for paired samples, the pretest and posttest mean scores in the Environmental Knowledge Scale of Conventional Teaching Approach (CTA) Group and the Experiential-Reflective Teaching Approach (ERTA) Group were compared. The level of significance was set at .05 for the statistical analyses. The test analyses are presented in

Table 10 for the mean scores, standard deviations, mean difference, and the result of paired sample t-test.

Table 10. *Paired sample t-test of CTA and ERTA in pretest and posttest mean scores in the Environmental Knowledge Scale*

Group	Measure	Mean	SD	Mean Difference	df	t	p (one-tailed)
CTA	Pretest	44.6296	5.49229	-2.96296	26	-3.049	**.005****
	Posttest	47.5926	5.93075				
ERTA	Pretest	42.6667	4.82780	-6.03704	26	-6.890	**.000*****
	Posttest	48.7037	5.52487				

***p< .01, ***p< .001*

Table 10 displays the pretest and posttest mean scores of environmental knowledge of the participants before and after the intervention period. As shown in the table, CTA had a higher post-test mean score (*M*=47.5926, *SD*=5.93075) than its pretest mean score (*M*=44.6296, *SD*=5.49229). The result also indicated that the mean difference between the two paired samples of CTA is (*M*= -2.96296). Generally, the CTA Group showed that there is a gain of scores before and after the test was administered during the conduct of the study.

The statistical analysis showed that there is a highly significant difference between these mean scores *t*(26) = -3.049, *p*=.005. This result suggests that the environmental knowledge of students exposed to Conventional Teaching Approach Group has significantly improved.

Comparably, the Experiential-Reflective Teaching Approach Group showed almost the same trend in terms of scores with the Conventional Teaching Approach Group. As with the ERTA Group, it can be observed that it had a higher post-test mean score (*M*=48.7037, *SD*=5.52487) than the pretest mean score (*M*=42.6667, *SD*=4.82780). The result also indicated

that the mean difference between the two paired samples of ERTA is (*M*= -6.03704). As presented in the table, the ERTA Group showed that there is a change of scores before and after the test is administered during the conduct of the study.

The statistical analysis showed that there is a highly significant difference between these mean scores $t(26) = -6.890$, $p=.000$. This result suggests that the environmental knowledge of students exposed to Experiential-Reflective Teaching Approach Group has significantly improved.

Comparing the two groups in terms of mean difference, it was noticeable that the ERTA group (*M*= -6.03704) was two times higher than that of the CTA group (*M*= -2.96296). In addition to that, by looking at the mean scores of CTA and ERTA in the environmental knowledge scale, findings suggest that both groups brought a positive change in the environmental knowledge toward learning the Earth Science portion which included lessons on the environment. The significant changes showed that students from the Conventional Teaching Approach and Experiential-Reflective Teaching Approach group both attained higher post-test mean scores as the lesson was being taught using hands-on activities.

Similarly, considering the p-value, the results of the group who has undergone Experiential-Reflective Teaching Approach (ERTA group) were more significant than that of the comparison group, and there was strong evidence that those who have undergone the intervention have higher post-test scores than those who did not. This means that the difference in means is significant enough to prove that there was a change after the intervention.

Relating to the abovementioned result, fun activity such as games and puzzle-making through group activity enabled the students to enjoy while learning. Some of the randomly-

selected students mentioned this during the Focus Group Discussion (FGD) conducted after the intervention. Such responses are presented accordingly.

From the Conventional Teaching Group:

Moderator: *Anu-anong mga gawain ang nakakatulong sa'yo upang matuto at magkaroon ng interes sa leksyon tulad ng Agham*? (What certain activities motivate you to learn and be interested in your lesson in Science?)

Student (C): *Nakakatulong po ang mga group activity, kasi nagkakaroon po kami ng cooperation sa grupo.* (Group activities helped because it fostered cooperation among the group members.)

Student (W): *Natututo pong magtulungan ang bawat isa at nakakapagcomunicate sa ibang tao.* (We learn to help each other and communicate with others.)

From the Experiential-Reflective Teaching Group:

Student (F): *Nalalaman ko kung ano ang sagot o ideya nila, nadadagdag mo sa isip mo, nakakatulong din ito upang mahasa yung kaalaman ng sarili at kagrupo.* (I learned some answers or ideas from them, and this increased my knowledge, as well as that of my groupmates.)

Student (S): *Sa group activity, kasi po dun ko po naaalala yung mga lesson pati dun kami sumisigla kapag may group activity. Kapag may games mas lalo po kaming magana matuto. Sa mga group activity, nalalaman ko ang mga sagot sa tanong. Tapos kapag may puzzles o games, mas natututunan ko yung mga lessons na kailangan at nagiging masaya po ang klase.* (I could easily remember the lesson when we have a group activity, and it also keeps us interested. If there are games, we are more motivated to learn. The group

activity also allows me to know the answers. Puzzles and games enable me to understand the lesson more and these allow the class to have fun.)

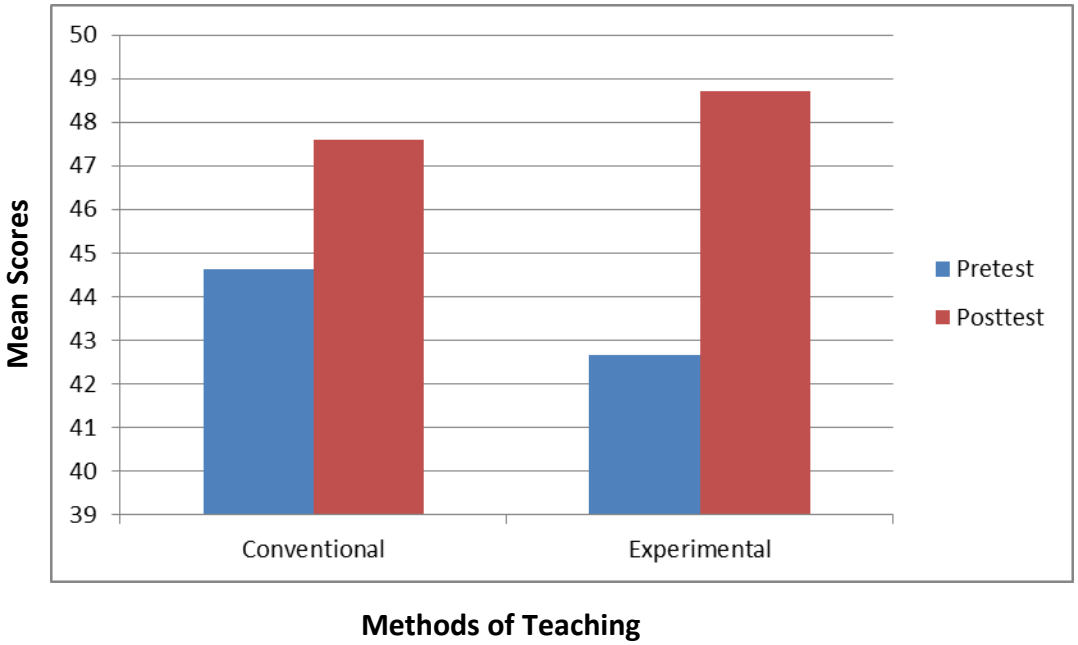

Figure 7. The pretest and posttest mean scores of Conventional Teaching Approach (comparison group) and Experiential-Reflective Teaching Approach (experimental group) in Environmental Knowledge Scale

The figure shows that the pre-test mean score of Conventional Teaching Approach (comparison group) was slightly higher in margin compared to the Experiential-Reflective Teaching Approach (experimental group). The closeness of the mean scores indicates that both groups have the same knowledge in environmental issues prior to the intervention. However, the post-test mean scores of Conventional Teaching Approach (comparison group) and the Experiential-Reflective Teaching Approach (experimental group) increased respectively, but the latter had a more evident increase.

Pro-Environmental Consumer Behavior

Comparability of Group Scores Point Difference on the Pro-Environmental Consumer Behavior Scale

A t-test of independence samples was conducted to compare the pretest and post-test mean scores of Conventional Teaching Approach (CTA) Group and the Experiential-Reflective Teaching Approach (ERTA) Group in the Pro-Environmental Consumer Behavior Scale. The post-test and pretest scores were determined and the point difference between the two was used to examine if there is a change of scores before and after the intervention was applied. The level of significance in all analyses was set at .05. Table 10 presents the mean, standard deviation, and the result of t-test analyses.

Table 11. *Independent t-test of CTA and ERTA in pretest mean scores in the Pro-Environmental Consumer Behavior Scale*

Measure	Group	Mean	SD	df	t	p (one-tailed)
Pretest	CTA	43.1481	7.36783	52	-.265	.792
	ERTA	42.6667	5.91608			

As presented in Table 11, the comparison group (CTA) had a slightly higher pretest mean score (M=43.1481, SD=7.36783) in the Pro-Environmental Consumer Behavior Scale than that of the experimental group (ERTA) (M=42.6667, SD=5.91608). However, despite the dissimilar mean scores in Pro-Environmental Consumer Behavior Scale, statistical analysis indicated that there is no significant difference between the pretest mean scores of the two groups, $t(52)$= -.265, p=.792. Hence, it can be deduced that the two groups are comparable in terms of their pro-

environmental consumer behavior prior to the intervention period. This result highly supports the choice of sample for the study.

Effect of Experiential-Reflective Teaching on Pro-Environmental Consumer Behavior

Table 12. Independent sample t-test of post-test mean scores of CTA and ERTA groups in the Pro-Environmental Consumer Behavior

Measure	Group	Mean	SD	df	t	p (one-tailed)
Post-test	CTA	45.9259	6.00593	52	.080	.936
	ERTA	46.0741	7.48293			

Results indicated that there is a slight increase in the mean post-test score of the students in both classes. As indicated, the p-value of the post-test scores is more than the alpha value of 0.05, which means that there is no significant difference between the scores of the students who have undergone the intervention and those who were exposed to the conventional teaching. While it is possible that the intervention did not influence the students' pro-environmental consumer behavior from the ERTA group, the results can also be attributed to effect size. Considering that only 27 participants per group were assessed, the effect size can be used to interpret the results further.

With the standard deviation being based from that of the CTA group, the effect size in the posttest scores of the group is calculated to be 0.02. The d value of 0.02 also represents a very small effect size.

Table 13. *Independent t-test of CTA and ERTA in posttest and pretest gain of scores in the Pro-Environmental Consumer Behavior Scale*

Measure	Group	Mean	SD	df	f	t	p (one-tailed)	95% Confidence Interval	
								Lower	Upper
Gain of Scores	CTA	2.7778	5.88566	52	.967	.316	.719	-2.867	4.126
	ERTA	3.4074	6.87951						

As presented in Table 13, the experimental group which is the ERTA Group had a slightly higher mean score (*M*=3.4074, *SD*=6.87951) in the Pro-Environmental Consumer Behavior Scale than that of the comparison group which is the CTA Group with the mean score (*M*=2.7778, *SD*=5.88566).

Moreover, there are several ways to determine whether the calculated value is significant or not. One way is to look for the f value and t value. As referred to Table 9, the given value of f=.967 which accounts that it still falls within the confidence interval value of upper=4.126 and lower= -2.867. However, the t value must be greater than the absolute value of 2 to be considered significant. Looking at the data on the table, the value of t= .316 denotes that the result is not significant.

Likewise, statistical analysis indicates that there is no significant difference between the mean scores of the two groups, $t(52) = .361$, $p = .719$ before and after the treatment period. This result opposed the initial hypothesis of this study that the Pro-Environmental Consumer Behavior post-test-pretest mean scores of the students exposed to Experiential-Reflective Teaching Approach group is significantly higher than that of those exposed to Conventional Teaching Approach group.

Comparability of Within Group Scores on the Pro-Environmental Consumer Behavior Scale

Further analyses were also conducted to confirm if there is an increase in mean scores in the Pro-Environmental Consumer Behavior of students from CTA and ERTA groups. The pretest and post-test mean scores of both groups were compared using the t-test for paired samples. The level of significance was set at .05. Table 14 presents the mean scores, standard deviations, mean difference and the result of t-test analyses.

Table 14. *Paired sample t-test of CTA and ERTA in pretest and posttest mean scores in the Pro-Environmental Consumer Behavior Scale*

Group	Measure	Mean	SD	Mean Difference	df	t	p (one-tailed)
CTA	Pretest	43.1481	7.36783	-2.77778	26	-2.452	**.021***
	Posttest	45.9259	6.00593				
ERTA	Pretest	42.6667	5.91608	-3.40741	26	-2.574	**.016***
	Posttest	46.0741	7.48293				

*$p < .05$

Table 14 displays the result of the analysis of the students' Pro-Environmental Consumer Behavior before and after the intervention period. As shown in the table, the post-test mean score of CTA (M=45.9259, SD=6.00593) is higher than the pretest mean score (M=43.1481, SD=7.36783). This result indicates that the mean difference between the two paired samples of CTA is (M= -2.77778). Statistical analysis confirmed that there is a significant difference between the mean scores of CTA in the Pro-Environmental Consumer Behavior [$t(26)$= -2.452, p=.021]. Similarly, analysis showed that there was also a significant increase between the post-test mean score of ERTA (M=46.0741, SD=7.48293) and its pretest mean score (M=42.6667, SD=5.91608). This result indicates that the mean difference between the two paired samples of

ERTA is (*M*= -3.40741). Statistical analysis confirmed that there is a significant difference between the mean scores of ERTA in the Pro-Environmental Consumer Behavior [*t*(26)= -2.574, *p*=.016]. Comparing the two groups in terms of mean difference, it was noticeable that the mean point difference of ERTA group (*M*= -3.40741) was relatively higher than the mean point difference of CTA group (*M*= -2.77778). These results suggest that there was a significant improvement in Pro-Environmental Consumer Behavior of the students exposed to Conventional Teaching Approach Group and Experiential-Reflective Teaching Approach Group.

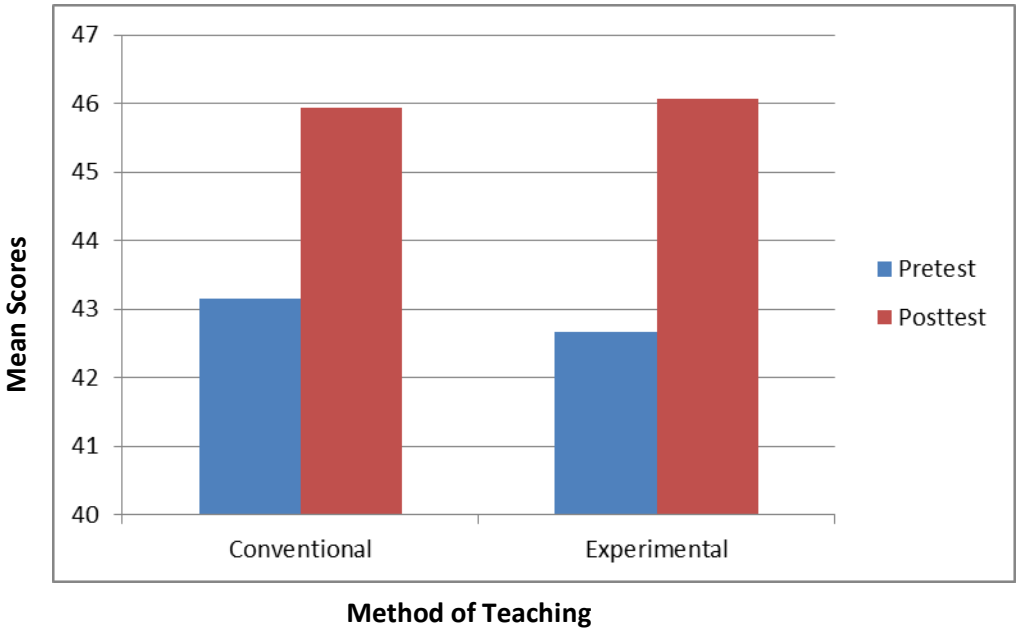

Figure 8. The pretest and posttest mean scores of Conventional Teaching Approach (comparison group) and Experiential-Reflective Teaching Approach (experimental group in Pro-Environmental Consumer Behavior Scale

The figure reveals that the pre-test mean score of Conventional Teaching Approach (comparison group) is slightly higher in margin as compared to the Experiential-Reflective Teaching Approach (experimental group). The closeness of the pretest mean scores indicate that both groups have the same knowledge in pro-environmental consumer behavior scale prior to the intervention. However, the post-test mean scores of Conventional Teaching Approach

(comparison group) and the Experiential-Reflective Teaching Approach (experimental group) increased respectively with both scores being almost equal.

Table 15. *Paired sample t-test of CTA and ERTA in pretest and posttest mean scores in the components of Pro-Environmental Consumer Behavior Scale*

Teaching Approach	Component	Measure	Mean	SD	df	t	p (one-tailed)
Conventional Teaching	Product Information	Pretest	14.7778	3.01705	26	-1.333	**.194**
		Posttest	15.4815	2.31002			
	Recycling	Pretest	14.7037	2.79855	26	-0.800	**.431**
		Posttest	15.1481	2.75547			
	Waste Reduction	Pretest	13.6667	3.12558	26	-2.570	**.016***
		Posttest	15.2963	2.31741			
Experiential-Reflective Teaching	Product Information	Pretest	14.5556	2.70801	26	-1.318	**.199**
		Posttest	15.1852	2.92255			
	Recycling	Pretest	14.0741	2.61543	26	-2.977	**.006****
		Posttest	15.7407	2.72584			
	Waste Reduction	Pretest	14.0370	2.40962	26	-1.727	**.096**
		Posttest	15.1481	3.05971			

**p< .05, **p< .01*

As seen in Table 15, the Conventional Teaching Group and Experiential-Reflective Teaching Group, both have no significant relationship to Product Information. However, looking through their post-test and pretest mean scores, it was noticeable that the pretest mean scores were similar in both groups while the post-test mean scores of both groups have improved after the intervention.

Subsequently, the components of Recycling in both groups showed a different result. As presented in Table 10, the post-test mean score of CTA (*M*=15.1481, *SD*=2.75547) has a short margin of increase than that of the pretest mean score (*M*=14.7037, *SD*=2.79855). Statistical analysis confirmed that there is no significant difference between the mean scores of CTA in the Recycling component. On the other hand, the post-test mean score of ERTA (*M*=15.7407, *SD*=2.72584) was higher than the pretest mean score (*M*=14.0741, *SD*=2.61543). Statistical analysis confirmed that there is a significant difference between the mean scores of ERTA in the Recycling component [*t*(26)= -2.977, *p*=.006]. This suggested that students exposed in ERTA group had a significant change in the component of Recycling.

Lastly, the Waste Reduction component in both groups showed an interesting result. As shown in the table, the post-test mean score of CTA (*M*=15.2963, *SD*=2.31741) was slightly higher than the pretest mean score (*M*=13.6667, *SD*=3.12558). Statistical analysis confirmed that there is a significant difference between the mean scores of CTA in the Waste Reduction component [*t*(26)= -2.570, *p*=.016]. On the other hand, the posttest mean score of ERTA (*M*=15.1481, *SD*=3.05971) is only of the short margin of increase in the score compared to the pretest mean score (*M*=14.0370, *SD*=2.40962). Statistical analysis confirmed that there is no significant difference between the mean scores of ERTA in the Waste Reduction component. This statistical finding suggests that only the CTA students had a significant change in the component of Waste Reduction.

These findings can be summarized through a Venn diagram in Figure 9.

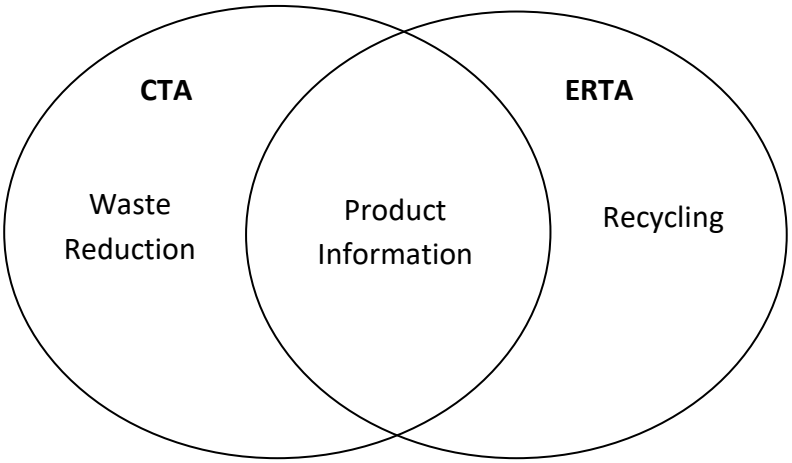

Figure 9. Components of Pro-Environmental Consumer Behavior in CTA and ERTA

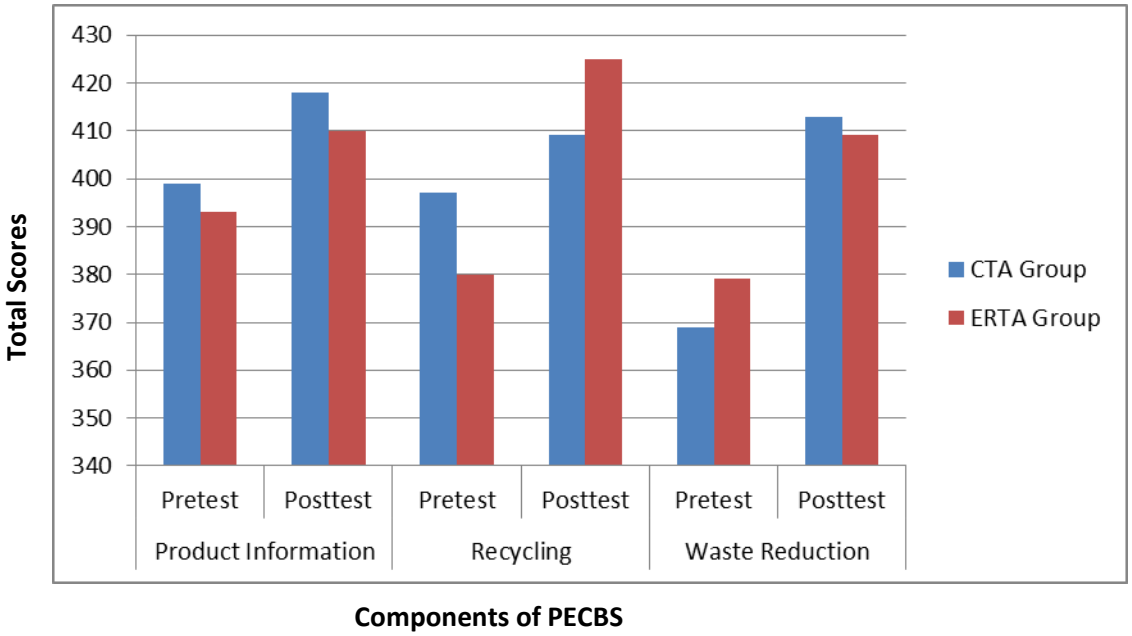

Figure 10. Components of PECBS in CTA and ERTA Group

The pretest and posttest scores were graphed according to the components of Pro-Environmental Consumer Behavior Scale. Based on the figure, the ERTA group got the lowest pretest scores on Waste Reduction and Recycling components. However, as shown in the graph, both their post-test scores in Waste Reduction and Recycling components increases. This

indicates that students in the experimental group became more appreciative of reducing and recycling waste after the intervention. Regarding the product information, only slight differences of scores were observed both on the CTA and ERTA groups.

Among the three areas, the CTA group got the lowest pretest scores in the Waste Reduction component. However, as shown in the graph, their posttest scores increased after the teaching period. This indicates that students in the comparison group became more appreciative of waste reduction. The post-test scores of the CTA group in the recycling and product information components showed a slight increase from the prestest scores.

DISCUSSION

Environmental Knowledge

The process of acquiring knowledge after having experienced or done something new is known as experiential learning. This practice is based on the pedagogical principle of "learning by doing" where students are the recipient of knowledge. The experiential technique facilitates the learners to explore nature, open up their senses and connect with it, as well as increase their receptivity toward the environmental reality (Bagh, 2018). The development of skills such as confidence, independence, and students' autonomy are enhanced by experiential learning. It also creates positive attitudes toward learning.

Environmental knowledge refers to one's ability to understand and evaluate the impact of ecosystem on the society, and the amount of knowledge he or she has about the environmental issues (Chan, Haron, et al. and Aini, et al., as cited by Tan, 2011a). There are two types of environmental knowledge to examine environmental behavior. Abstract knowledge focuses on the environmental issues, problems, causes, and solutions while factual knowledge refers to the

activity or action made by a person like knowing the waste or where to put the waste (Schann and Holze, 1990).

The inclusion of experiential practice in environmental learning has produced a worthy result in this study. Based from the analysis of the pretest to posttest differences within the group, it was revealed that the students' environmental knowledge increased after being exposed to the experiential-reflective approach focusing on environmental topics. The same result was also observed in the comparison group. This finding is similar to the study of Mrema (2008) wherein more than 80% of all students had a high level of knowledge towards Environmental Education (EE) after measuring the environmental literacy among the students in University of Putra Indonesia. The result is similar to the study of Mehra and Kaur in 2010 (as cited by Bagh, 2018) wherein they compared the effect of experiential learning strategy and conventional learning method on the enhancement of environmental awareness of 120 fourth graders. The major findings of their study revealed that students exposed to experiential learning yielded a better mean gain on environmental awareness scores as compared to the conventional learning method. Likewise, as indicated in the mean gain on environmental awareness the students performed better at the comprehension rather than knowledge level. Results of the study done by Doris (2013) which involved Grade 9 students affirmed that the use of a fun activity, compared with utilizing self-learning and audio-visual materials, is the most effective approach in developing environmental awareness.

Findings of Bagh in 2018 revealed that there is a significant difference at 0.01 level between experiential learning strategies and traditional learning methods in enhancing environmental awareness of students in class V in Environmental Studies. This reiterated that the students taught under Environmental program using experiential learning strategies displayed a

higher level of environmental awareness compared to those who were exposed to traditional learning strategies.

Student's reflection is often injected in the definition of experiential learning. Reflection can be sometimes in the form of a journal, diaries or facilitative discussion. As defined by Dewey (1910), reflection or reflective thought is the "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it" (p.6). Reflection is essential to experiential learning because repetitive behavior becomes highly proficient or affectively changed. Through reflective learning, student learning is strengthened.

Relating to this study, reflective learning is injected in the lesson through a reflective essay and reflective class discussion in a semi-structured approach. Students were asked to write essays as part of their seatwork to process and document their thoughts or insights on the lesson. Some of the randomly selected students mentioned this during the Focus Group Discussion (FGD) conducted after the intervention. Such responses are presented below.

From the Experiential-Reflective Teaching Group:

Moderator: *Ang pagsagot ba sa katanungan tulad ng essay ay nakakatulong upang maalala at mahasa ang iyong kaalaman sa mga leksyon sa Agham?* (Does answering questions in the form of an essay help you remember and improve your knowledge in Science lessons?)

Student (S): *Opo, kasi po yun po yung pumapasok sa isip natin, dun tayo natututo at nalalaman kung ano yung nangyayari, ano dapat nating gawin. Nakakatulong ito dahil nasasabi mo kung ano ang mga gustong sabihin. Nakakatulong din ito sa pag-aaral, dahil yung mga questions ay related sa subjects at sa totoong buhay na nakalagay sa mga essay. Para malaman kung*

ano yung kailangan malaman sa klase. Ang diary ko ang nagsisilbing gabay tungkol sa mga nangyayari sa buhay at mga sekreto ko. (Yes, because these are our thoughts, and we learn from them, and this allows us to reflect on what is happening and things that we should do. It also helps me share the things that I want to say. It also helps me learn since the essay questions are related to the subjects and real-life situations. (It also allows me) to learn what I need to learn in class. The diary guides me in everyday activities and keeps my secrets.)

Student (T): *Opo, nakakatulong yung mga tanong dun, sinusubukan ng guro kung kaya ko bang sagutin ang mga tanong. Tinetest kung kaya mo pang mas malalim at malawak ang sagot. Dun ko rin nalalaman kung malalim kang mag-isip. Sa diary ko sinusulat kung ano yung nangyayari sa buong araw at tungkol sa mga sekreto.* (Yes, the questions are helpful; the teacher tests if I can answer the questions, or if I provide deep or elaborate answers. It also helps me determine if I can think deeply. I write about my daily life and secrets in the diary.)

One study on experiential and reflective learning was conducted by Moore et al. (2010). The research revealed that experiential learning and writing assignments as reflective practice were effective to the students. Their internalization of leadership concepts also increased. Experiential learning together with reflection enabled the students to retain and internalize leadership concepts, and these were transformative on taking a deep approach to learning.

Findings of the study of De Regla (2015) reiterated a positive correlation between environmental awareness and academic performance of students (specifically students in

education class) from Bulacan State University. This suggested that if students were more aware in the environment, it also enhanced or increased their academic performance.

The results of this study contradicted the findings of Erhabor et al. (2016) on environmental knowledge and attitude. In the said study, it was found that there was no relationship between the students' level of knowledge on the environment and their attitude. Another study assumed that in order to attain a higher level of knowledge in a specific area, such as environmental topics, instructional time on the topic must be increased. Results of the study conducted by Jordan, Hungerford and Tomera in 1986 revealed that the students' level of knowledge of environmental action did not increase after receiving an instructional strategy focusing on issue awareness. These findings support the claim that making people aware of environmental issues is not by itself sufficient to increase their knowledge of environmental action strategies.

Similarly, Hausbeck, Milbrath, and Enright (1992) examined the environmental knowledge and concern and environmental awareness of high school students. Findings revealed that their scores in environmental awareness and concern were significantly higher compared to their environmental knowledge. It was also revealed that the primary source of environmental information was electronic sources (NEETF, 1998) whereas the awareness and concern can be picked up with little substantive knowledge.

Pro-Environmental Consumer Behavior

Pro-environmental consumer behavior refers to the behavior that causes little to no harm as possible to the environment or even benefits the environment (Kollmuss and Agyeman, 2002). This means that human behavior needs an adaptable change to increase the quality of the

environment. This study revealed that students from the experimental group enhanced their pro-environmental consumer behavior after the intervention. This study indicated that after buying the products, students became aware on to where the materials will end up to. Moreover, students tend to reuse the empty products by means of collecting, recycling, and reducing the waste instead of dumping it. This affirms the remarks of Anderson and Cunningham in 1972, reiterated that buying responsibly with environmental concern is categorized as a type of socially-conscious behavior since buying and consuming green products reflect on the environmental consequences related to the consumption of certain products or services.

Education is one gauge to increase the pro-environmental behavior of an individual. In this study, experiential learning method was used to determine if there is an increase in students' pro-environmental consumer behavior. Based on the result of pretest to post-test differences within the group, it was found that the students' pro-environmental consumer behavior increased after receiving experiential-reflective approach focusing on environmental topics. In the same way, experiential learning may help influence pro-environmental behavior when the activity is able to foster positive feelings and attitude as described in the Theory Planned Behavior (TPB). The Theory of Planned Behavior (TPB) is one of the famous theories that are used by different authors which explain how people act (Ajzen, 1991). Cognitive engagement is just as important as the students' feelings about learning. Learners must believe that emotions will frame the outcomes of their actions. This indicates that cognitive experience is accompanied by affective component.

There are studies which affirmed that a higher level of environmental knowledge yields a positive result in pro-environmental behavior. Lowenstein (2018) used the Treebath curriculum which integrates activities and lessons to optimize knowledge gained and behavioral changes

regarding the environment. Based on the findings, the implementation of Treebath curriculum through experiential and hands-on learning was effective in developing pro-environmental behavior and attitude of children. According to Emil and Cress (2014), some components related to experiential learning such as self-discovery, participation, and sensory involvement lead to awareness of the environmental issues. With this result, it indicated that experiential learning consequently encourages positive attitudes toward pro-environmental behavior (De Leeuw et al., 2015).

The study of Lozano (2006) suggested that individuals who have higher education seem to have a higher level of environmental knowledge which leads turned to pro-environmental behavior. As cited in wg.aegee.org, individuals with higher education refer to people who attained university-level education. This level would qualify someone to work in a professional field and will usually be taught in an environment with technical knowledge and in-depth understanding.

This may be attributed to the study of (Ajzen, 1991) which revealed that increased knowledge alone does not help in changing behavior. This was the case in Indonesia. According to the Indonesian Ministry of Environment (2013), more than 60% of Indonesian people have high level of environmental knowledge. Despite this, its Pro-Environmental Behavior Index is 0.57, which means that almost half of the population still are not concerned with the environment. The findings illustrate the fact that a high level of environmental knowledge does not always translate to a high level of pro-environmental behavior.

According to the study of Tanner and Kast in 2003, factual knowledge was not a predictor of green food purchases as pro-environmental consumer behavior. In addition to this, Rolston and Di Benedetto in 1994, warned against the use of green food instead to predict

environmental behavior because even experts could not agree on a product's effect on the environment.

Behavioral change is achievable when the attitude is leaned toward behavior (Ajzen, 1991). Azwar 2011 (as cited by Akhtar, 2014) stated that personal experience and feeling can shape one's attitude. Thus, one learning method to employ is experiential and reflective learning since it encompasses experience and learning. However, the result of the study showed no significant changes in student's behavior in general. Hirsch and Terlau (2015) mentioned the so-called "attitude/behavior gap" referring to the disconnection between what the attitude says versus what the behavior does. It appears that consumers are not willing to pay and invest a large amount of money in order to put their beliefs into practice. This also means that individuals with positive outlook on environment do not necessarily translate the attitude toward product purchase.

Based from the study in the UK by Mcdonald et.al, (2010), 30% of the consumers reported that they are very concerned about the environmental issues but they struggle to translate it into green purchases. Analyses also showed weaker influence between green values and purchasing a product (where it is vital in understanding and changing consumer behavior). This is said due to the following factors such as culture, demographic characteristics, finance, habit and lack of information (Biel and Dalstrand, 2005; Sener and Hazer, 2007; and Wheale and Hinton, 2007). Moreover, demographic, social, political, economic, and psychological factors as the context of the purchase are as important as temporal and ideological structuring of domestic practices (Hand et al, 1984). The concept of attitude-behavior gap is well recognized across a number of studies conducted in different countries with diverse demographics (Auger, Burke,

Devinney & Louviere, 2003; Chatzidakis, Hibbert, & Smith, 2007; Eckhardt, Belk, & Devinney, 2010; Schroder & McEachem, 2005; Szmigin et al., 2008).

Furthermore, in Ting's (2017) survey regarding Pro-Environmental Behavior (PEB), it was revealed that most participants are aware of the PEB elements which include the use of biodegradable packaging, reusing and recycling plastic bags and conserving energy. However, most of them did not practice these. This supports that although most people possess environmental knowledge and awareness, they often regarded the PEB to be less important, hence their lack of action in "green" practices.

Relatedly, several studies do not examine the impact of participation and experiences to promote a greater appreciation and understanding of the environmental sustainability. Monroe, Day and Grieser 2000 (as cited by Cruz et al. in 2004) mentioned that behavior, in general, is supported by knowledge and attitude but there is no direct cause-and-effect progression from knowledge to attitude to behavior.

Components of Pro-Environmental Consumer Behavior Scale

The students involved in this study were from an urban community which means that to some extent, they are exposed to environmental problems such as pollution and improper waste disposal, which tend to be common in cities. As mentioned by Alcock, White, Wheeler, Fleming, and Depledge 2014 (as cited by Ting, 2017), the prevalence of environmental problems were first encountered by urban residents, since they were considered as the first hand-hand experience which later on leads to greater environmental problem. Hence, in general, the support of environmental protection is structured in urban communities.

The school aims to integrate waste segregation as part of a long term plan to educate the students in environment issues, so that it will be translated in home and the community. Based from the result of this study, it was noted that students in the comparison group tends to be more appreciative of waste reduction with the closer result on the experimental group. On the other hand, recycling was dominant and more appreciated in the experimental group.

Reduction and reuse behavior are the two practices which are less simple to encourage (Barr, 2007). These social behaviors are definitely practiced by people who are knowledgeable of environmental issues and programs, as well as those who have strong environmental values and who feel that they have the responsibility to do something to address environmental problems. Though, long term awareness campaigns are needed to change the knowledge and fundamental values, there are other strategies which can be utilized.

As shown in Figure 9, waste reduction behavior has a favorable result in the CTA group. This indicates that the CTA group practice waste reduction as expected from them in school and community. Barr (2007) revealed that reduction behavior showed significant variability. He mentioned that more people are buying fruits and vegetables in per piece or in loose and people are not concerned on the packaging of the products they buy. It was indicated that behaviors are relatively flexible and much less defined than recycling. Barr (2007) summarized that reduction behavior is characterized by strong value and knowledge base. As reported, people with strong environmental values, citizenship value, and good awareness of the waste problem were more likely to be willing to reduce their waste.

Recycling can be characterized as a fundamentally normative behavior (Barr, 2007). As recycling is technically a form of reuse. It relies on access to good facilities, awareness of these facilities and perceptions of convenience. As shown in the figure, it was interesting to know that

the recycling behavior was inclined to the ERTA group. The result is somewhat parallel to the study of Barr in 2007. He stated that those involved in the surveys felt that their actions were valuable, they were satisfied and willing to reuse the materials, and were more likely to do so. Also, one of the most noticeable factors is the importance of access to a sidewalk recycling facility. A similar study of Labog (2017) supports the result of this study. In his study which was participated by 384 students, one component of the survey questionnaires includes the perception of the level of sustainable practices in terms of recycling. The value of reduce, reuse, and recycle gained a weighted mean of 4.11 and described as high. It was inferred that the school highly contributes to the economy and the environment. Comparing it to the vicinity in Krus na Ligas High School (KNLHS), garbage bins, both for biodegradable and non-biodegradable waste, are placed in the designated areas where students can easily segregate their trash accordingly. As mentioned by their science teacher, segregating is part of the values that are incorporated into teaching. As anticipated, such access provides a major increase in recycling behavior. There are numerous previous studies regarding recycling behavior as part of environmental awareness. However, studies examining the consumers' attitude and behavior toward green purchase are still few and limited.

On the part of product information, both groups yielded no significant result. Based from the outcome, students are less aware of the importance of reading the labels of the product as part of being a wise consumer. Buying products with labels that say "help save the environment" and spending time looking for products that are made of environmentally-friendly ingredients are also considered as least of their priorities. They just look at the ingredients of the products that they buy to know its content but are less concerned about the health benefits obtained from the product.

Looking through the post-test-pretest mean scores on the Pro-Environmental Environmental Behavior of students in KNLHS, it was evident that the students are not aware of the information or label on the product. This is similar to the study of Zsóka et al. in 2012 in Hungary which revealed that the pro-environmental shopping is rare for high school students. Majority of the respondents never buy products with environmental label (74%) and do not pay attention to buying (71%). This supports that high school students fail to make a connection between reading product labels in buying and the state of the environment.

Product information without the encouragement and proper instruction could lead to a lack of knowledge about the product.

Students' Perceptions on the Experiential-Reflective Teaching Approach

Experiential and Reflective Learning

Teaching may become effective if the students are motivated and engaged in learning. Considerably, the assessment and thoughts contained in students' experiences result to a direct and true learning. The students, as the core of learning in experiential-reflective teaching approach, are required to think well and logically. They are allowed to express their ideas, relate their experiences, apply their knowledge, and write a journal about it.

In experiential learning, group activity is one of the elements that promotes efficient tasking and allows the students to manipulate the materials. Group activity fosters camaraderie and social activity. It also enables the group to designate the tasks, elicit more and better ideas, and garner experiences as part of student's journey to learn.

Additionally, reflection allows the learners to use the experiences to generate greater learning. Through facilitative interaction, students were asked to share their ideas and opinions during oral reflection during the class discussion. Also, students were asked to write essays as part of their seatwork related to the theme of the lesson. Responses below are the students' perceptions on experiential-reflective teaching.

Table 16. *Responses of students' perceptions on experiential-reflective teaching*

Experiential Learning	**Reflective Learning**
a. Boost fun and cooperative learning	***a. Self-expression and self-assessment on the lesson***
Student (A): *Sa mga individual at group activities, nagiging independent at nakakagawa sa sarili kapag individual activity. Natututo naman po ako makipagcooperate kapag may group activity. Nakakatulong yung games dahil nagagawa mo na yung paglalaro, natututo pa po kami.* (I can work independently on an individual activity. While on a group activity, I learned to cooperate with my groupmates. Games are helpful because we enjoyed it	Student (A): *Opo, kasi dito ko nailalabas yung saloobin ko na hindi nagagawa sa mga group activity. Dito ko rin naipapahayag kung nadididiscuss ba ng maayos ang lesson sa klase.* (Yes, because through essays, I can share my thoughts which I could not do during the group activity. Through this, I can express if the lessons were explained properly.)
	Student (B): *Yung pagsagot sa essay, nakakatulong kasi dun nagrereflect kung ano ang iniisip*

while learning and having fun.)

Student (B): *Sa mga group activities po, recitation sa klase, kasi nalalaman ko yung mga sagot sa mga tanong. Kapag natutuwa kami sa game at group activity, mas nabibigyan kami ng saya upang mas lalong matutunan ang leksyon.* (I learned through group activities and recitation in the class. Through these, I was able to know the answers to the questions. The fun activity gave us the motivation and excitement to learn the lesson.)

Student (C): *Mas nalalaman ko yung mga leksyon lalo na kapag may group activities. Kapag may mga puzzles o games, mas natutunan ko yung mga lessons na kailangan at nagiging masaya po ang klase.* (I learned more on the lesson if there is a group activity.

mo. Para siyang isang diary, dun nagrereflect kung anong lesson, sa essay dun ako natututong gamitin ang mga salitang ingles at nalalaman ko din kung ano yung mga opinyon naisusulat ko, maiksi man ito o mahaba. Sa diary naman, doon ko naisusulat ang mga pang-araw-araw na gawain. Ang diary ko din ang nagsisilbing kaibigan at reflection at pinag-aaralan sa klasrum. (Writing essays enables me to reflect; it is like writing a diary entry where I think about the lessons and share my opinions. It also allows me to express myself in English. Through the diary, I got to write about my daily activities. It also serves as a friend and an outlet to reflect about the lessons taught in the classroom.)

The puzzles and games allow us to learn more about the lessons and the class is fun.)

Student (D): *Nakakagana at nalalaman mo yung opinyon ng mga kagrupo mo, makukuha mo rin yung atensyon sa pangkalahatang gawain. Sa mga group activity, ginagawa yung mga pag-aaralan at pinag-aralan, sa ganung paraan mas madali mong matututunan. Kapag natutuwa ka sa activity, mas nabibigyan kami ng saya at mas lalong natututo sa leksyon.* (I t motivates and makes me interested. I also got to learn the opinions of my groupmates. Through the group activity, we get to apply what we have learned. When you enjoy the activity, we are elated and get to learn the lessons more.)

b. Activate retention and participation in class	***b. Increase environmental awareness***

Student (A): Mas lalo po akong nakikinig sa teacher, titingnan ko din ang notebook and books para may reference. Nagtatanong ako kay teacher kapag hindi ko naiintindihan ang lesson at nagtataas ako ng kamay kapag alam ko yung sagot. (I listen more to my teacher. I also used books and notebooks as references. I asked my teacher if I have questions and I raised my hand to participate if I know the answer.)

Student (B): Ginaganahan po akong magrecite sa class. Nagtatanong din ako sa teacher kapag may hindi malinaw sa akin. (I am excited to recite in the class. I asked the teacher to clarify something about the lesson.)

Student (C): Opo, kasi po dun po naalala yung mga lesson pati dun kami sumisigla kapag may group

Student (A): Dahil ang essay ay patungkol sa leksyon tungkol sa kapaligiran, mas lalo po naming natututunan mag-hiwalay ng mga basura tulad ng papel at plastic. Sa ngayon po, ginagawa na po namin sa school ang reduce, reuse at recycle. (Essay pertaining to environment lesson allows us to segregate paper and plastic waste. As of now, we are practicing reduce, reuse and recycle of waste at school.)

Student (B): Ang mga essay na patungkol sa kapaligiran ay mas nakakadagdag po ng kaalaman para mapangalagaan po ang paligid namin. Parang sa bahay po, hinihiwalay ko ang plastic at bote dahil naibebenta ko po ito. Sa school ginagawa po naming paso ang mga bote. (Essays about the environment make us learn more to protect the

	activities. (Yes, we remembered the lessons and we are excited when there are group activities.)	surroundings. In our home, I used to separate plastics and bottles because I can sell them. In school, we recycle the bottle by transforming it into a flower pot.)

Based on the responses of the participants, group activities play a vital role in the internalization of concepts in learning. Group activities lead to cooperative learning because students acquired the motivation to learn. These also promote the same level of communication within the group, and activate pro-social behavior. Through them, the educator can be able to assess greater understanding of students with varied learning and adjustment needs.

According to Richard-Amato (1996), fun activities such as games and hands-on materials are effective because these give them the opportunity to manipulate the materials, motivate the students to learn, and lower the frustrations and stress of students toward learning.

Reflective writing and oral reflection are some of the elements contained in the experiential-reflective learning. As mentioned above, reflective writing in the form of diary enables the students to freely express their emotions. Essay, as a form of journaling, facilitates the students to express their opinions and ideas regarding the topic. Oral reflection allows the students to share and voice out their thoughts and opinions as part of facilitative learning. All of these reflective practices are instrumental in self-expression and self-assessment on one's learning.

The act of critically reflecting, together with the teaching approach incorporated with experiential learning, produced an environment conducive to the students taking a deep approach to learning (Moore, Boyd, & Dooley, 2010).

Implications to Science Teaching and Environmental Education

The use of experiential-reflective teaching and learning tends to be an effective strategy for students. However, it represents big challenges on the part of science teachers such as materials preparation, lack of spacious activity area, financial aid, huge students' population, and tedious planning. Due to these factors, teachers tend to choose the approach where students are contained in their spaces. Experiential-reflective learning does not only happen inside the classroom, exploring the environment and touring around the school community make the students involved and integrate the lessons. Hands-on learning outside the classroom gives the students the opportunity to broaden the scope of learning and appreciate the topic. Science teachers may examine other topics in the Science curriculum where experiential-reflective learning can be integrated and utilized. In this manner, the potential of students to learn can be easily addressed and maximized.

The school, together with teachers, must not only focus on teaching and practicing the theories within the school community. The holistic collaboration of school and teachers should initiate, organize and support the group of students who are willing to extend or apply their knowledge in proper waste disposal, recycling, tree planting, and energy conservation to the community. Tapping the agencies such as Department of Environment and Natural Resources (DENR) and Local Government Units (LGUs) may strengthen the established linkage in order to conduct exploratory activities in the community. These activities include seminar-workshop for

students, vegetable planting, recycling, and waste collecting which are vital concerns related to environmental awareness and sustainability. Applications of learning must not be limited in schools but should also extend to the community and other institutions.

The main implication of this research for environmental education is that educators should be aware of the high variety of commitment and interest among students towards environmental and sustainability issues when designing the courses and curricula. In environmental education, the different level of knowledge, attitude, and behaviors of students must be addressed through effective and strategic approaches. The main theme and content of environmental education should be aligned across grade levels with emphasis on sustainable living, sustainable consumer behavior, and involvement of students in solving environmental concerns. The opportunities to provide positive and practical examples of sustainable behavior are far from being adequately utilized in environmental education in the Philippines. The greatest challenge for environmental education is to create, educate and mobilize motivated and committed students who behave in a consistently pro-environmental manner because students are the key drivers of a more sustainable future (Zsóka, Szerényi, Széchy, & Kocsis, 2012).

Chapter 4

SUMMARY, CONCLUSION, AND RECOMMENDATION

This chapter presents the overview, limitations of the study, and the summary of the results. The conclusion and recommendation based on the study's findings are also discussed in this chapter.

SUMMARY OF THE STUDY

Through the years, teaching and learning approaches have been eminent to the level of the needs of learners and be inclusive in balancing the technology as a catalyst in educating the youth. This study examined the effectiveness of experiential learning and reflective knowledge in stirring the interest of students in science education and the availability of these to the students. Experts suggest that these practices have been implemented and necessary in learning and applying science and can even lead to more discoveries and application in real-life situations.

This study investigated the effectiveness of experiential-reflective teaching in enhancing the environmental knowledge and pro-environmental consumer behavior of students in a general high school setting. This study may provide a new paradigm and theoretical grounding on the impact of this kind of approach as a philosophical tool in learning Earth Science on the specific ground of environmental topics.

Two heterogeneous groups composed of 27 students each were randomly assigned to Conventional Teaching group and Experiential-Reflective Teaching group. The researcher observed and taught both groups for six weeks during the fourth quarter of the months of January and February 2019.

The instruments for this study were either obtained or customized from existing studies. The instrument on environmental knowledge was almost entirely made by the researcher except for a few items adapted from an existing instrument. On the other hand, the instrument on pro-environmental consumer behavior was adapted by the researcher from another author with the permission. These instruments were validated by experts and pilot-tested before they were administered to the respondents. Classroom observations and focus group discussions were also conducted to eliminate bias and gather additional data about the students' insights on the approach. The data were analyzed using paired sample t-test and independent t-test to determine if the experiential-reflective teaching approach enhances the environmental knowledge and pro-environmental consumer behavior of students.

SUMMARY OF RESULTS

In this study, the effect of experiential-reflective teaching approach on environmental knowledge and pro-environmental consumer behavior of students were determined.

The following findings were established:

1. There is no significant difference between the pretest mean scores in Environmental Knowledge Scale of CTA and ERTA. This supported the comparability of the two groups prior to the study.
2. There is no significant difference between the post-test mean scores in Environmental Knowledge Scale of CTA and ERTA. However, there is a significant improvement between the summative mean scores in Environmental Knowledge Scale of CTA score and ERTA score before and after the intervention. In addition, there is a significant difference between the pretest-post-test mean scores (gain of scores) in the Environmental Knowledge Scale of

CTA and ERTA. This could be attributed to their active participation in the group activity andreflective discussion, listening to the lesson and note taking. Likewise, the students' persistence, anticipation of group activity, and eagerness to work within the group allowed them to elicit ideas from one another.

3. Within the group, there is a significant difference between the pretest mean score and post-test mean score in the Environmental Knowledge Scale of CTA group. Similarly, there is a significant difference between the pretest mean score and post-test mean score in the Environmental Knowledge Scale of ERTA group.
4. There is no significant difference between the pretest mean scores in Pro-Environmental Consumer Behavior Scale of CTA and ERTA score. This further supported the comparability of the two groups prior to the study.
5. There is no significant difference between the post-test mean scores in Pro-Environmental Consumer Behavior Scale of CTA score and ERTA score. Similarly, there is no significant difference between the pretest-post-test mean scores (gain of scores) in the Pro-Environmental Consumer Behavior of CTA and ERTA. This could be due to the explicit application of the behavior, attitude/behavior gap of students, lack of monitoring after school hours, and lack of monitoring in the house.
6. Within the group, there is a significant difference between the pretest mean score and post-test mean score in the Pro-Environmental Consumer Behavior Scale of CTA. Moreover, further analysis of the component showed that only the students of the CTA group had a significant improvement in Waste Reduction. This may be attributed to the knowledge of students in reducing waste which is part of the program implemented in the school.

7. Within the group, there is a significant difference between the pretest mean score and post-test mean score in the Pro-Environmental Consumer Behavior Scale of ERTA. Likewise, further analysis of the component showed that only the students of ERTA group had significant appreciation for Recycling. This could be due to the awareness of students in recycling materials which was taught to them as an application during the class reflective discussion. In addition, recycling of materials was also done and integrated with other subjects such as Practical Arts (TLE). Recycling is also mandated in the school as part of the environmental awareness program.

LIMITATIONS OF THE STUDY

The following occurrences were the limitations encountered while conducting the study:

1. Inadequate time to implement the Experiential-Reflective Teaching Approach

Data gathering in the experimental method requires six to eight (6-8) weeks or more than three months to produce a good outcome from the time that the intervention is introduced to the class. However, in this study, the researcher was only given six weeks as the maximum time to implement the study, minus the time for holidays and weather disturbances. The timeline of the study coincided with the last quarter of the academic year; thus, missed requirements are followed-up by teachers. With the science time consisting of only four hours a week, the class time was divided into two parts: two-hour discussion and two-hour group activity.

2. Students' attendance

Absenteeism and tardiness are also dominant in a typical general high school. School records showed that there were students whose attendance was only felt during the school's general activities such as the Intramurals, periodical examination, nutrition month, Christmas

season or a month before graduation. According to a study of Casiguran et al., (2010), the prominent reasons of absenteeism in typical public high school were sickness or illnesses, bad weather, no allowance, and household chores. In this study, the scores of the students who were mostly present during the intervention period were the ones considered.

3. Students' readiness

Learning readiness refers to how likely a person is to seek out knowledge and participate in behavioral change. Some of the physical or psychological factors that affect a student's readiness to learn include pain, fatigue, anxiety or fear (euromedinfo.eu). Fatigue and information overload were observed factors during the duration of intervention. Students' motivation and passion to learn in the fourth quarter were observed to be lower compared to the previous quarter. Some of the students' reasons for wanting to take a break from school include boredom, the lack motivation for learning, or negative emotions toward schooling (Clark et al, 2006). This may be attributed to the students' excitement for school vacation and their assumption that fourth quarter performance was negligible to their eligibility to proceed to the next grade level.

4. Predictability of the Learning Outcomes

In conducting a study, outcomes may yield a favorable or an unfavorable result. The results are learner and learning conditions dependent. The students were in the age range from 12-14, and they have various experiences and maturity levels. Also, the suitability of materials in a type of activity is needed to obtain the desired result in experiential activity. The researcher was often forced to make choices on lesson coverage to achieve lesson goals and objectives without compromising the content and conceptual value.

5. Learning space for the intervention

During the course of the study, the school was being rehabilitated, and the science laboratory was closed and used as a storage facility. Due to this, the experiential learning activities were done inside the classroom, which has a limited space for movement and did not have available laboratory materials. Hallways were also used for group activities, such as gallery walk and station rotation. Learning spaces are areas connected to experiences that shape the philosophical orientations of learners, and they extend beyond the physical (classroom) and virtual (online) spaces (Dewey, 1938). "A learning space needs to be sufficiently broad and varied to cater and challenge a range of interests and abilities, and still focused enough to offer students some coherent rhythms and goals" (Ayers, 2010, p.61). This indicates that knowledge is socially created via experiences by both teachers and students bring to construct further experiences and knowledge (Weinstein and Park, 2014).

CONCLUSION

Based on the results of the study, the following conclusions were drawn:

1. The Experiential-Reflective Teaching Approach is more effective in increasing students' environmental knowledge than the Conventional Teaching Approach. Thus, Experiential-Reflective Teaching Approach had an apparent effect on students' Environmental Knowledge in Earth Science.
2. Experiential-Reflective Teaching Approach enhanced the students' Pro-Environmental Consumer Behavior in Earth Science topics. Likewise, it also increased their appreciation of recycling.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations were set:

1. Science Teachers may conduct a curriculum review on the Grade 7 topics to investigate the reason behind the awareness in pro-environmental consumer behavior of students. They can provide situational activities that will target the retention and long term practice of students to become more appreciative in performing tasks to solve environmental problems. Emphasis on environmental issues that are timely and relevant can be strengthened through the incorporation of values that can highly affect the extent of students' belief that they can help save the environment. Environmental concepts must be highlighted to motivate students to act as pro-environmental consumers. Teachers can also point out the importance of knowing more about environmentally-friendly products.
2. This study may encourage the school leaders to implement policies on environmental knowledge and initiate campaigns to promote pro-environmental consumer behavior among high school students. Continuous practice of providing product information, recycling, and waste reduction is highly encouraged. Moreover, this study may encourage school heads to provide more opportunities for professional development such as school-based trainings that foster various teaching approaches including Experiential-Reflective Teaching Approach to promote the integration of science practices to other fields and enhance the students' environmental knowledge and pro-environmental consumer behavior.
3. The Science Program may be furthered enhanced by curriculum developers to highlight the integration of different scientific practices such as using interactive materials such as puzzles and games for explaining and communicating scientific concepts. Through this,

students may boost their confidence and become more proficient in learning and applying science concepts to real-life situations.

4. Learning materials may be enhanced by textbook writers and other learning material providers to enable students to create and assess their own instructional materials. This can foster the critical thinking skills of students as they learn and understand science concepts. For success factor, for long-lasting and large behavioral change, environmental values need to be developed through education. In addition to that, instructional material developers may incorporate environmental issues and concerns to other topics in Science as part of integration within and across the discipline.
5. Future researchers may use and even enhance the instruments to gather information on students' environmental knowledge and pro-environmental consumer behavior. The researchers may conduct a comparative study between the students from a higher grade level such as senior high through the insertion of Environmental Science class in the alignment of K-12 curriculum. They may also consider a curriculum review on the transition of Environmental topics in the K-12 curriculum. In depth study on the perceptions of students on the experiential-reflective teaching approach may also be conducted. Lastly, researchers may carry out a comparative study on the environmental knowledge and pro-environmental consumer behavior of students in a public and private high schools.

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APPENDICES

Appendix A

10 December 2018

ELIZABETH E. QUESADA, PhD
Schools Division Superintendent
Schools Division Office of Quezon City
Nueva Ecija St. Sitio Bago Bantay
Barangay Pag-asa, Quezon City

Dear Dr. Quesada:

Good day! I am Edwin B. Conel, currently taking up Master of Arts in Science Education in General Science under the College of Graduate Studies and Teacher Education Research (CGSTER) at Philippine Normal University-Manila. I will be conducting my study entitled, "Enhancing Students' Environmental Knowledge and Pro-Environmental Consumer Behavior Using Experiential-Reflective Teaching". This study aims to explore the experiential-reflective teaching as an alternative instructional approach that could help develop both the environmental knowledge and pro-environmental consumer behavior of students in a public school. Participants of this study are Grade 7 students. Their participation in the class will take six to eight weeks during the 4th Quarter of Academic Year 2018-2019.

In line with this, I would like to ask your permission to teach and observe two classes of Grade 7 at Krus na Ligas High School from January to March 2019 during their science subject.

Your favorable response to this request would greatly contribute to the success of the study. Should you have questions or concerns regarding this request, you may reach me through e-mail at edwinconel@gmail.com or through text at 0905-2282229.

Rest assured that whatever responses or results obtained from this study will be confidential and be preserved for the purpose of this study only.

Sincerely,

EDWIN B. CONEL
Student, Master of Arts in Science Education major in General Science

Noted by:

PROF. RUEL A. AVILLA
Thesis Adviser

Appendix B

Pagpapahintulot na Makilahok sa Pag-aaral ng Pananaliksik
(Informed Consent to Participate in a Research Study)

Pamagat ng Pananaliksik: *Enhancing Students' Environmental Knowledge and Pro-Environmental Consumer Behavior Using Experiential-Reflective Teaching*
Pangalan ng Mananaliksik: Edwin B. Conel
Email address: edwinconel@gmail.com

A. Layunin at *Background* ng Pananaliksik

Ako si Edwin B. Conel, mag-aaral at kasalukuyang kumukuha ng kurso na Master of Arts in Science Education major in General Science ay nagsasagawa ng pananaliksik na may pamagat na "*Enhancing Students' Environmental Knowledge and Pro-Environmental Consumer Behavior Using Experiential-Reflective Teaching*". Ang iyong pakikilahok sa pananaliksik na ito ay may layunin upang tulungan ang mananaliksik na isaalang-alang ang kumbinasyon ng karanasan (*experiential*) at mapanimdim na pag-aaral (*reflective*) sa pagtuturo bilang isang alternatibong paraan upang mapahusay ang kaalaman sa kapaligiran at ang pag-uugali ng mamimili ng mga mag-aaral sa pampublikong paaralan.

B. Pamamaraan

Kung ikaw ay sumasang-ayon na sumali sa pananaliksik na ito, ang mga sumusunod ay mangyayari:

1. Pagsagot ng *pre-test* at *post-test survey*
2. Pakikilahok sa mga pang-eksperimentong aktibidad, paglahok, talakayan sa klase at diskurso sa grupo para sa masayang pagkatuto.
3. Pakikinayam (*random interview*)
4. Ang mananaliksik ay magtuturo at magmamasid sa klase ng 1 oras kada araw sa sabjek na Agham (5 oras bawat linggo)
5. Ang pananaliksik na ito ay kukuha at magtatapos ng 6-8 na linggo sa ika-apat na kwarter sa Akademikong Taon 2018-2019

C. *Confidentiality*

Ang mga talaan mula sa pag-aaral na ito ay itatago bilang kumpidensyal (*confidential*) hangga't maaari. Walang indibidwal na kinikilala ang gagamitin sa anumang mga ulat o mga *publisher* na nagreresulta mula sa pag-aaral. Lahat ng mga *questionnaires* ay itatago at ang mananaliksik lamang ang may *access* nito.

D. Boluntaryong Paglahok

Ang iyong desisyon na lumahok sa pag-aaral na ito ay boluntaryo at hindi makakaapekto sa iyong relasyon sa Philippine Normal University. Kung pinili mong makilahok sa pag-aaral na ito, maaari mong bawiin ang iyong pahintulot at ipagpatuloy ang pakikilahok sa anumang oras nang walang pagtanggi.

E. Pahintulot (*Consent*)

Ang aking lagda sa ibaba ay nagpapahiwatig na nagpapasya akong sumali sa pag-aaral pagkatapos basahin ang lahat ng impormasyon sa itaas at nauunawaan ko ang impormasyon sa *form* na ito.

Lagda:_____ Grado at Seksyon: _____ Petsa: _____
(Kalahok o *Participant*)

Lagda: _____ Petsa: _____
(Mananaliksik o *Researcher*)

Appendix C
(Parent Consent)

Nobyembre 23, 2018

Mahal na mga magulang/Tagapangalaga,

Isang magandang araw!

Hinihingi ko po ang inyong permiso na payagan ang inyong anak na maging kalahok bilang mag-aaral sa aking pananaliksik na may pamagat, "*Enhancing Students' Environmental Knowledge and Pro-Environmental Consumer Behavior Using Experiential-Reflective Teaching*".

Ang pananalikisik na ito ay naglalayon na matugunan at isaalang-alang ang kumbinasyon ng karanasan (*experiential*) at mapanimdim na pag-aaral (*reflective*) sa pagtuturo bilang isang alternatibong paraan upang mapahusay ang kaalaman sa kapaligiran at ang pag-uugali ng mamimili ng mga mag-aaral sa pampublikong paaralan. Ang mga kalahok sa pananaliksik na ito ay mula sa Grado 7. Ang pakikilahok nila sa klase ay magsisimula at magtatapos sa anim hanggang walong linggo ng ikaapat na kwarter (*4th Quarter*) ng Akademikong Taon 2018-2019.

Titiyakin ko po na anumang mga tugon o resulta na makukuha mula sa pag-aaral na ito ay magiging kumpidensyal at mapanatili para sa layunin ng pananaliksik lamang na ito.

Maraming salamat po sa inyong suporta at kooperasyon!

Sumasainyo,

EDWIN B. CONEL
MASED General Science Student
Philippine Normal University-Manila

Pinagtibay ni:

PROP. RUEL A. AVILLA
Thesis Adviser

Reply Slip

Pakilagyan ng tsek (✓) ang kahon para sa inyong tugon.
☐ Oo, pinapayagan ko ang aking anak na maging kalahok sa pananaliksik na ito.
☐ Hindi ko pinapayagan ang aking anak na maging kalahok sa pananaliksik na ito.
Pangalan ng Magulang at Lagda: _____ Petsa: _____

Appendix D
Environmental Knowledge Scale (EKS)

Name: _____

Grade and Section: _____ Age: _____ Gender: Male [ ] Female [ ]

Direction: Please indicate your degree of agreement to each of the following statements by putting a (✓) mark on your choice. Make sure you answer all the statements and the question below. ☺ The corresponding points are:

Strongly Agree=4 **Agree=3** **Disagree=2** **Strongly Disagree=1**

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Natural Resources (Soil, Water, Rocks and Minerals, Energy)				
1. Saving endangered plant species is just as important as saving endangered animal species.				
2. The most effective way to save an endangered animal is to establish a large enough reserve for it to live and reproduce.				
3. The change of landscape from forests to farmlands can reduce the biodiversity of species.				
4. The use of solar panels as an alternative source of energy.				
5. Mining of minerals changes the landscape of an area and contributes to the loss of habitat of animals.				
Layers of the Atmosphere, Climate Change and Greenhouse Effect				
6. The recent floods in the country are due to climate change.				
7. The climate change is just a natural shift or change in earth's temperature.				
8. The pollution from factories is one of the main causes of climate change.				
9. People should limit or reduce their energy use to decrease climate change.				
10. Leaving the lights on and turning on the television at home add to climate change.				
11. Most cars and other transportation vehicles produce carbon monoxide that contributes to the greenhouse gases in the atmosphere.				
12. Cutting of trees has an impact on climate change.				
13. The changes of sun release of energy or radiation contribute to the warming of the Earth's surface and affect the ozone layer.				
14. Changes in the weather bring more rainfall in some countries while others experience drought.				
15. People should plant more trees to lessen the carbon dioxide in the atmosphere.				

**First two items are adapted from Bogan & Kromrey (1996)*

1. Write the number of statements (1-15) that you DID NOT discuss in class.
   (Piliin mula sa bilang 1-15 ang hindi natalakay sa klase)

   _____

2. Given the chance, would like your teacher to discuss them in the class? Why?
   (Kung bibigyan ka ng pagkakataon, gusto mo bang talakayin ito sa klase? Bakit?)

   _____

   _____

   _____

3. What other topics about the environment would you like your teacher to discuss with you? Why?
   (Anu-anong mga paksa tungkol sa environment *ang gusto mo pang talakayin ng guro sa klase? Bakit?)*

   _____

   _____

   _____

Appendix E
Pro-Environmental Consumer Behavior Scale (PECBS)

Name (Optional): _____
Grade and Section: _____ Age: _____ Gender: Male [ ] Female [ ]

(This scale is intended to measure pro-environmental behavior of a consumer.)

Direction: Please indicate how often you do each of the following actions by putting a (✓) mark on your choice. Make sure you answer all the statements and the question below. You may write your answer at the back. ☺
The corresponding points are:

Always=4 **Most of the Time=3** **Sometimes=2** **Never=1**

Statement	Always	Most of the Time	Sometimes	Never
1. I buy products with labels that say they help save the environment.				
2. I **do not** buy a product that I know will cause an environmental problem (example: will cause pollution)				
3. I read products labels to know about the product's environmental impact.				
4. I buy products that are in reusable containers.				
5. I use plastic bags that are labelled as biodegradable.				
6. I spend some time looking for products that are made of environmentally-friendly materials.				
7. I use reusable bags when buying.				
8. I find out how the products I buy are made of.				
9. I reuse some of the packaging materials of the products I buy.				
10. I buy products that are in refillable containers.				
11. I buy products packaged in recycled materials.				
12. I buy goods in bulk to reduce too much materials in packaging (example: buying in bottles rather than in sachets)				
13. I buy products that are wrapped with reusable materials.				
14. I buy products made from recycled materials.				
15. I read the ingredients of the products I buy.				

Adapted from the study of Espina (2017)

Aside from those listed, what other activities do you do as a **consumer or buyer** that you think can help save the environment? List them. ☺
(Maliban sa mga nakalista sa itaas, anu-ano pang mga gawain ang ginagawa mo bilang isang consumer o mamimili na sa tingin mo ay nakakatulong sa kapaligiran. Ilista ang mga ito. ☺)

_____

_____

_____

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Appendix F

(Raw Data Entry from the ERTA Group)

7-JASMINE (ERTA Group)

SN	EKS PRETEST	EKS POSTTEST	EK Summative Test	Point Diff.	PECB PRETEST	PECB POSTTEST	Point Diff.
1	34	48	40	14	38	57	19
2	52	57	41	5	50	49	-1
3	44	55	32	11	48	55	7
4	37	46	31	9	40	43	3
5	44	45	39	1	42	40	-2
6	41	41	47	0	31	32	1
7	43	44	39	1	46	40	-6
8	47	54	42	7	45	41	-4
9	46	52	49	6	38	51	13
10	52	59	57	7	42	46	4
12	48	56	52	8	46	52	6
13	46	52	40	6	44	54	10
15	43	50	48	7	34	45	11
16	46	51	48	5	38	37	-1
17	44	45	30	1	55	47	-8
18	44	49	60	5	48	50	2
19	38	43	39	5	56	60	4
20	50	54	54	4	42	43	1
21	42	53	47	11	34	29	-5
22	37	45	33	8	42	49	7
23	40	41	32	1	40	42	2
24	39	41	35	2	47	40	-7
26	40	46	33	6	40	57	17
27	40	42	35	2	45	45	0
28	37	43	33	6	40	47	7
29	43	47	35	4	44	51	7
30	35	56	28	21	37	42	5

Appendix G

(Raw Data Entry from the CTA Group)

7-LILY (CTA Group)

SN	EKS PRETEST	EKS POSTTEST	EK Summative Test	Point Diff.	PECB PRETEST	PECB POSTTEST	Point Diff.
1	50	51	47	1	48	47	-1
2	57	59	46	2	60	60	0
3	44	52	28	8	40	41	1
4	44	41	36	-3	47	50	3
5	42	48	39	6	42	45	3
6	39	42	28	3	40	43	3
7	44	46	41	2	43	46	3
8	43	54	45	11	43	44	1
9	52	41	33	-11	46	41	-5
10	44	54	31	10	44	52	8
11	44	48	30	4	53	45	-8
12	50	56	45	6	50	55	5
13	43	52	44	9	43	53	10
14	48	47	38	-1	41	43	2
15	39	37	42	-2	58	46	-12
16	41	42	33	1	32	35	3
17	44	40	27	-4	32	34	2
18	41	49	40	8	46	45	-1
19	42	50	28	8	31	41	10
20	54	52	52	-2	45	51	6
21	41	43	35	2	52	49	-3
22	40	41	36	1	34	46	12
24	43	50	27	7	40	52	12
26	45	45	39	0	41	53	12
28	57	58	28	1	34	41	7
29	36	41	32	5	41	41	0
30	38	46	24	8	39	41	2

Appendix H

Lesson Plan Structure

	Experiential-Reflective Teaching Approach (ERTA)	Conventional Teaching Approach (CTA)
I. Objectives		
A. Content Standards	The learners demonstrate an understanding of the relation of the geographical location of the Philippines to its environment	The learners demonstrate an understanding of the relation of the geographical location of the Philippines to its environment
B. Performance Standards	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons
C. Learning Competencies/ Objectives Write the LC code for each	The learners shall be able to recognize that soil, water, rocks, coal, and other fossil fuels are Earth materials that people use as resources (S7ES-IVb-3)	The learners shall be able to recognize that soil, water, rocks, coal, and other fossil fuels are Earth materials that people use as resources (S7ES-IVb-3)
II. Learning Resources		
A. Content (Presentation of the Environmental Issue)	**Soil Resources**	**Soil Resources**
B. Focus	Learner-centered	Teacher and learner-centered
C. Total Lesson Time	1 hour	1 hour
D. Reference	Science 7 pp. 101-104	Science 7 pp. 101-104
III. Procedure		
A. Review (Engage)	***Pass the message*** "*The soil is the great connector of lives, the source, and destination of all."* (5 minutes)	***Pass the message*** "*The soil is the great connector of lives, the source, and destination of all."* (5 minutes)
B. Establishing Lesson Purpose (Explore)	***Experiential Activity (Gallery Walk)*** The teacher will ask the students to proceed to their respective group. Instructions will be given before the	***Lecture Method and Individual Activity*** The teacher will ask the students to get the science book. Students will

	activity. Each group will be given 2-4 minutes to move around the hallway where the papers are posted on the post. The students will read the description and draw their interpretation of the processes of soil formation. The sample questions in the activity are: 1. How long does the soil form? 2. What are the factors that act together on rocks to form soil? (20 minutes)	work on the activity involving the process of soil formation. They will draw the process depending on the description of their notebook. (20 minutes)
C. Presenting Examples/ Instances of the lesson (Explain)	***(Cognitive Processing)*** Each group will present and share their output with the class. After the presentation, the teacher will facilitate the discussion using the prepared slides about soil resources. Note-taking and participation of the students are highly encouraged. (10 minutes)	***(Class Discussion)*** The teacher will discuss the lesson about the formation of soil and its agents. The students will be asked to get their notebook for note-taking. Class participation is highly encouraged. (10 minutes)
D. Developing Mastery (Elaborate)	***Reflective Activity (Analysis of the Issue)*** The following are the guide questions to facilitate reflection/discussion of the students in the class. Each group will assign 2-3 representatives to answer and share their ideas about the topic tackled. 1. How does weathering affect the soil? 2. Are there ways to protect the soil resources? 3. As a consumer, are you in favor of or against the burrowing of soil for waste dumping? 4. How do you feel about it after the activity?	***(Elaborate it Further!)*** The teacher will ask the students about their ideas on physical and chemical weathering. Also, let them list down the ways on how to protect the soil. (15 minutes)

	(15 minutes)	
E. Evaluating Learning (Evaluate)	A 10-item seatwork will be given to the class. (5 minutes)	A 10-item seatwork will be given to the class. (5 minutes)

Lesson Plan Structure

	Experiential-Reflective Teaching Approach (ERTA)	**Conventional Teaching Approach (CTA)**
I. Objectives		
A. Content Standards	The learners demonstrate an understanding of the relation of the geographical location of the Philippines to its environment	The learners demonstrate an understanding of the relation of the geographical location of the Philippines to its environment
B. Performance Standards	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons
C. Learning Competencies/ Objectives Write the LC code for each	The learners shall be able to recognize that soil, water, rocks, coal, and other fossil fuels are Earth materials that people use as resources (S7ES-IVb-3)	The learners shall be able to recognize that soil, water, rocks, coal, and other fossil fuels are Earth materials that people use as resources (S7ES-IVb-3)
II. Learning Resources		
A. Content (Presentation of the Environmental Issue)	Conserving and Protecting Natural Resources	Conserving and Protecting Natural Resources
B. Focus	Learner-centered	Teacher and learner-centered
C. Total Lesson Time	1 hour	1 hour
D. Reference	Science 7 pp. 115-118 https://www.sustainable.org/environment	Science 7 pp. 115-118
III. Procedure		
A. Review (Engage)	Ask: Is the Philippines rich in natural resources? Why is that so?	Ask: Is the Philippines rich in natural resources? Why is that so?

	Elicit answers from the students. (5 minutes)	Elicit answers from the students. (5 minutes)
B. Establishing Lesson Purpose (Explore)	***Experiential Activity (Station Rotation Activity)*** The teacher will ask the students to proceed to their respective group. Each of them will move from one station to another until they finished. 1. *Reduce and Reuse Waste* ➢ The students will be given a 1-liter coke bottle. Their task is to insert the garbage (such as paper and plastic inside). They will be asked how many paper and plastic are inserted in the bottle. 2. *Recycle Materials* ➢ The students are given a milk carton, scissors, yarn. Let them think about how to recycle the materials by reinventing or creating new material. 3. *Conserving Natural Resources* ➢ They will be given a dipper with leak/holes at different parts of a dipper. The task of the students is to transfer the water from one pail to another using the leaked dipper by strategizing on how to transfer the water without wasting it. (20 minutes)	***Lecture Method and Groupings*** The teacher says, "In this chapter, we are going to talk about protecting and conserving the natural resources. We are going to start by listing down the ways on how to reduce waste, reusing materials, recycle materials, and conserving natural resources. Write your answer in a manila paper." The students will now proceed to their respective group and the teacher will provide the manila paper. (20 minutes)
C. Presenting Examples/ Instances of the lesson	Each group will present and share their output with the class. After the presentation, the teacher will facilitate the discussion using	The teacher will discuss the lesson about conserving and protecting the natural resources to the students. The students will be asked to get their

(Explain)	the prepared slides. Participation of the students is highly encouraged. (10 minutes)	notebook for note-taking. Class participation is highly encouraged. (10 minutes)
D. Developing Mastery (Elaborate)	***Reflective and Cognitive Processing*** **(Analysis of the Issue)** The following are the guide questions to facilitate oral reflection/discussion of the students in the class. Each group will assign 2-3 representatives to answer and share their ideas about the topic tackled. 1. What do you think will happen if the garbage is disposed of properly and accordingly? 2. As an environmental steward at your age, how would you protect and conserve the resources that are available in your community? 3. How do you feel about it after the activity? 4. What is your simple plan of action about the proper segregation of waste and conserving water in the community? (15 minutes)	***(Elaborate it Further!)*** The teacher will ask the students to list down the waste materials that can be found inside the house. Also, allow them to list down the simple actions that they usually do to conserve water and electricity in the house. After that, they will share to the class, how they reduce waste, segregate the waste, and conserve water and energy. (15 minutes)
E. Evaluating Learning (Evaluate)	A 10-item seatwork will be given to the class. (5 minutes)	A 10-item seatwork will be given to the class. (5 minutes)

Lesson Plan Structure

	Experiential-Reflective Teaching Approach (ERTA)	**Conventional Teaching Approach (CTA)**
I. Objectives		
A. Content Standards	The learners demonstrate an understanding of the different	The learners demonstrate an understanding of the different

	phenomena that occur in the atmosphere	phenomena that occur in the atmosphere
B. Performance Standards	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons
C. Learning Competencies/ Objectives Write the LC code for each	discuss how energy from the Sun interacts with the layers of the atmosphere (S7ES-IVd-5)	discuss how energy from the Sun interacts with the layers of the atmosphere (S7ES-IVd-5)
II. Learning Resources		
A. Content (Presentation of the Environmental Issue)	**Layers of the Atmosphere**	**Layers of the Atmosphere**
B. Focus	Learner-centered	Teacher and learner-centered
C. Total Lesson Time	1 hour	1 hour
D. Reference	Science 7 pp. 119-121 https://scied.ucar.edu/activity/12559/print-all	Science 7 pp. 119-121
III. Procedure		
A. Review (Engage)	***Fix it Out!*** The teacher will hand over the cut letters to students. The students will arrange the jumbled letters per group: ozone, oxygen, meteor, satellite, weather, cloud (5 minutes)	***Spell it Out!*** The teacher will show the jumbled letters on the television. The students will arrange the jumbled letters. Words are ozone, oxygen, meteor, satellite, weather, and cloud. (5 minutes)
B. Establishing Lesson Purpose (Explore)	***Experiential Activity (Color-Coded Model #layerbylayer)*** The teacher will ask the students to proceed to their respective group. Each group will be given the materials such as 1000mL plastic graduated cylinder and colored sand. The teacher will assign the color for each atmospheric layer. (Note: Keep in mind that these are relative	***Lecture Method and Pairing*** The teacher will ask the students to look for a pair. A worksheet about the Layers of the Earth's Atmosphere will be given to them. The worksheet contains the graph and the illustration of atmospheric layers. The students will use the ruler and pen and answer the corresponding questions on the

<table>
<tr>
<td></td>
<td>proportions and not exact points of departure/parting for the different layers. In this scale model, each milliliter of volume represents one kilometer of atmosphere layer thickness (for example, the troposphere is 10 km thick and of by 10 ml of sand or gravel in the graduated cylinder).

<table>
<tr><th>Atmospheric Layer</th><th>Color Code</th><th>Thick ness</th><th>Top of Layer</th></tr>
<tr><td>Troposphere</td><td>Color 1</td><td>10 mL</td><td>10</td></tr>
<tr><td>Stratosphere</td><td>Color 2</td><td>40 mL</td><td>50</td></tr>
<tr><td>Mesosphere</td><td>Color 3</td><td>35 mL</td><td>85</td></tr>
<tr><td>Thermosphere</td><td>Color 4</td><td>915 mL</td><td>1000</td></tr>
</table>

Sample Questions:
1. Which layer is the thinnest? the thickest?
2. How much thicker is the stratosphere compared to the troposphere?
3. Why do think is the atmospheric layer has different thinness or thickness?

(20 minutes)</td>
<td>worksheet.

(20 minutes)</td>
</tr>
<tr>
<td>C. Presenting Examples/ Instances of the lesson (Explain)</td>
<td>(Cognitive Processing)
Each group will present and share their output with the class.
After the presentation, the teacher will facilitate the discussion using the prepared slides about Earth’s atmosphere and the characteristics of different layers of the atmosphere. Note-taking and participation of the students are highly encouraged.

(10 minutes)</td>
<td>(Class Discussion)
The teacher will discuss the lesson about the atmosphere and the characteristics of different layers of the atmosphere. The students will be asked to get their notebook for note-taking. Class participation is highly encouraged.

(10 minutes)</td>
</tr>
<tr>
<td>D. Developing Mastery (Elaborate)</td>
<td>Reflective Activity (Analysis of the Issue)
The following are the guide questions to facilitate reflection/discussion of the students</td>
<td>(Elaborate it Further!)
The teacher will ask the students: Why do you think that it is important to know the different layers of the atmosphere?</td>
</tr>
</table>

	in the class. Each group will assign 2-3 representatives to answer and share their ideas about the topic tackled. 1. Why do you think that it is important to know the different layers of the atmosphere? 2. As a student, how would you minimize the pollution that affects the air or gases in the atmosphere? 3. How do you feel about it after the activity? (15 minutes)	(15 minutes)
E. Evaluating Learning (Evaluate)	A 10-item seatwork will be given to the class. (5 minutes)	A 10-item seatwork will be given to the class. (5 minutes)

Lesson Plan Structure

	Experiential-Reflective Teaching Approach (ERTA)	**Conventional Teaching Approach (CTA)**
I. Objectives		
A. Content Standards	The learners demonstrate an understanding of the different phenomena that occur in the atmosphere	The learners demonstrate an understanding of the different phenomena that occur in the atmosphere
B. Performance Standards	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons	The learners shall be able to analyze the advantage of the location of the Philippines in relation to the climate, weather, and seasons
C. Learning Competencies/ Objectives Write the LC code for each	discuss how energy from the Sun interacts with the layers of the atmosphere (S7ES-IVd-5)	discuss how energy from the Sun interacts with the layers of the atmosphere (S7ES-IVd-5)
II. Learning Resources		
A. Content (Presentation of the Environmental	**Greenhouse Effect and Global Warming**	**Greenhouse Effect and Global Warming**

Issue)		
B. Focus	Learner-centered	Teacher and learner-centered
C. Total Lesson Time	1 hour	1 hour
D. Reference	Science 7 pp. 122-126 https://www.teachengineering.org/activities/view/cub_air_lesson07_activity2	Science 7 pp. 122-126
III. Procedure		
A. Review (Engage)	***Guess me not!*** Each group will guess the greenhouse gases that are flashed on the television 1. water 2. carbon dioxide 3. methane 4. ozone 5. CFCs (5 minutes)	***Guess me not!*** Each group will guess the greenhouse gases that are flashed on the television 1. water 2. carbon dioxide 3. methane 4. ozone 5. CFCs (5 minutes)
B. Establishing Lesson Purpose (Explore)	***Experiential Activity (It's Getting Hot in Here!)*** The teacher will ask the students to proceed to their respective group. Each group will be given the materials to make an improvised model that pertains to the greenhouse effect. The students will make a coastline (using clay) on a paper plate, then a block of ice will be placed on top of it, and cover it with plastic wrap (The plastic wrap represents the layer of greenhouse gases (mostly CO_2) around the Earth.). Place the model on the warm area and ask the students to make predictions on what is going to happen to their models as the ice melts. These are the sample questions from the activity: 1. What are your observations to the ice and the plastic wrap after it is placed in the warm area?	***Lecture Method and Group Activity*** The teacher will ask the students "Do you think Global Warming exist?" The students will now proceed to their group and students will make a poster on how the following will look like in 10^{th} year time: 1. river 2. forest After the activity, the students will present their output to the class. (20 minutes)

	2. Do you think the heat is retained inside the model? Why or why not? 3. What do you think is the effect of global warming as observed in your model? (20 minutes)	
C. Presenting Examples/ Instances of the lesson (Explain)	***(Cognitive Processing)*** Each group will present and share their output with the class. After the presentation, the teacher will facilitate the discussion using the prepared slides about the greenhouse effect and global warming. Note-taking and participation of the students are highly encouraged. (10 minutes)	***(Class Discussion)*** The teacher will discuss the lesson about the greenhouse effect and global warming. The students will be asked to get their notebook for note-taking. Class participation is highly encouraged. (10 minutes)
D. Developing Mastery (Elaborate)	***Reflective Activity (Analysis of the Issue)*** The following are the guide questions to facilitate reflection/discussion of the students in the class. Each group will assign 2-3 representatives to answer and share their ideas about the topic tackled. 1. Is the Earth getting warmer? Why or why not? 2. What human activities affect the warming of the Earth? 3. As a student, what is your task to help in preventing global warming? 4. How do you feel about it after the activity? (15 minutes)	***Elaborate it Further!*** The teacher will ask the students: What kind of fossil fuels are used in the Philippines? Are we as also contributing to the increase in carbon dioxide concentration in the atmosphere? Why or why not? The students will write their answers on their notebook. (15 minutes)
E. Evaluating Learning (Evaluate)	A 10-item seatwork will be given to the class. (5 minutes)	A 10-item seatwork will be given to the class. (5 minutes)

EDWIN BAGUIO CONEL

PERSONAL INFORMATION

Date of Birth:	October 10, 1989
Place of Birth:	Esperanza, Masbate
Present Address:	24B Eugenio Compound, Sanville Subdivision, Tandang Sora, Quezon City
Mobile Nos.:	09052282229
Office/Company:	U.P. Integrated School
Office Address:	A. Ma. Regidor cor Quirino St. UP Diliman Campus, Diliman, Quezon City
E-mail address:	edwinconel@gmail.com

EDUCATION

LET Passer: 82.40 % (September 2012)

PHILIPPINE NORMAL UNIVERSITY-MANILA Manila
Master of Arts in Science Education, April 2016-September 2019
Major in General Science

UNIVERSITY OF THE PHILIPPINES LOS BAÑOS Laguna
Bachelor of Science in Mathematics and Science Teaching, November 2010
Major in Biology
Thesis: "*Factors Causing Absenteeism Among the Third Year Students of Parañaque National High School and Parañaque Science High School"*
Adviser: Associate Professor Ivan Marcelo A. Duka, Master in Genetics
Member: UP Genetic's Society, Inducted 2009
UP SAMAEKO, Inducted 2009
UP Volleyball Club, Inducted 2010

SANTOS E. CONAG NATIONAL HIGH SCHOOL Esperanza, Masbate
with high honors, Class of 2006
Recipient: Science Investigatory Project (Division Level) Silver Medal

PABLO M. CONAG CENTRAL SCHOOL Esperanza, Masbate
with high honors, Class of 2002
Recipient: Science Quiz Bee (Division Level) and MTAP (Division Level)

EMPLOYMENT

UP Integrated School Quezon City, Manila
Faculty Member (Science Department) May 2014- Present

Subjects Taught:
- Science 3
- Science 4
- Science 8 Biology (1st Quarter)

Other Responsibilities:
- Elementary Science Club Adviser
- Vice – President Faculty Club
- Supervising Teacher for Student Teachers
- Troop Leader BSP (Coordinator for Grade 4-6 Boy Scouts)
- Grade Level Coordinator (Grade 3)
- Facilitator in BSP Camporee (October)
- Facilitator in BSP Annual Camp
- Member, Student Progress Committee
- Member, Extension Committee
- Member, Documentation Committee (Recognition)
- Member, Gender and Development Committee
- Member, Scholarship Committee
- Member, Alumni Committee

PACE Academy Quezon City, Manila
Faculty Member (Science Department) April 2013 – April 2014

Subjects Taught:
- Science 5
- Science 9 Chemistry

Other Responsibilities:
- Homeroom Adviser

The Palmridge School, Inc. Bacoor City, Cavite
Faculty Member (Science Department) April 2011 - March 2013

Subjects Taught:
- Science 5
- Science 9 Chemistry

Other Responsibilities:
- Homeroom Adviser
- Performing Arts Adviser

Masaya National High School Bay, Laguna
(Practicum) November 2009- March 2010
UP Rural High School Bay, Laguna
(Practicum) June 2009- October 2009

PROJECTS

- Content Developer, E-lessons for C & E Publishing, Inc. (2014)
- Editorial Consultant for Biology, C & E Publishing, Inc. (2017-2018)

SEMINARS/WORKSHOPS ATTENDED

- Regional Examiner, *UPCAT 2019*, October 26, 2018, Aparri, Cagayan
- Participant, *Promoting the Human Right to Reproductive Health: Training Seminar for Public School Teachers and Guidance Counselors*, March 19, 2018, UP Law Center, Diliman, Quezon City
- Participant, *Disaster Preparedness Seminar-Workshop*, February 5, 2018, UP Integrated School, UP Diliman, Quezon City
- Resource Speaker, *District Upgrading Instructional Skills of Teachers (UPIS Teach) IV*, January 10, 2018, Carmona, Cavite
- Regional Examiner, *UPCAT 2018*, October 26, 2017, Balanga City, Bataan
- Participant, *Integrasyon sa UPIS: Pagbabaliktanaw at Pagpapatibay ng Makabagong Panahon (Part 2)*, November 11, 2016, UP Integrated School, UP Diliman, Quezon City
- Organizer and Facilitator, *UPIS BEST: Energy in Focus II* in cooperation with TransAsia Oil and Energy Dev't Corporation, September 6-7, 2016, UP Integrated School, Diliman, Quezon City
- Examiner, *UPCAT 2017*, August 2016, UP Diliman, Quezon City
- Participant, *Integrasyon sa UPIS: Pagbabalik-tanaw at Pagpapatibay ng Makabagong Panahon (Part 1)*, July 5-8, 2016, UP Integrated School, UP Diliman, Quezon City
- Participant, *Teaching Effectiveness Course*, June 13-17, 2016, Office for the Advancement of Teaching, UP Diliman, Quezon City
- Participant, *Integrasyon sa UPIS: Pagbabalik-tanaw at Pagpapatibay sa Makabagong Panahon*, November 9, 2015, UP Integrated School, UP Diliman, Quezon City
- Facilitator, *Ugnayan ng Pahinungód* , April 27- May 3, 2015, Polillo Island, Quezon Province
- Participant, *It's All Relative: Discovering the Filipino Identity through Forensic Science*, April 15, 2015, Asian Institute of Management, Makati City, Philippines
- Participant, *Project WET (Water Education for Teachers)* EMB – DENR and Nestle Phils., March 19, 2015, DENR Compound, Visayas Ave., Quezon City
- Participant, *Reading Film: Film Literacy Lecture – Workshop*, February 18, 2015, Cine Adarna, College of Mass Communication, UP Diliman
- Participant, *G – Learning: Math Planet the Revolution Guide Book by Contents Management Institute*, November 10, 2014, UP Integrated School, Diliman, Quezon City

- Organizer and Facilitator, *UPIS BEST: Energy in Focus II* in cooperation with TransAsia Oil and Energy Dev't Corporation, September 6-7, 2014, UP Integrated School, Diliman, Quezon City
- Examiner, *UPCAT 2015 and 2016*, August 2015, UP Diliman, Quezon City
- Participant, *"LEARNING and the ADHD CHILD"* August 30, 2014, Wordlab School, Inc., Quezon City
- Participant, *8th International Conference on Teacher Education "Diversity in Education: Perspectives, Challenges, and Collaborative Actions"*, August 21-23, 2014, Crowne Plaza Hotel, Quezon City, Philippines
- Participant, *Basic Training Course for Troop Leaders (BTC-TL 2014-007)* August 8-10, 2014, Claret School of Quezon City, Quezon City
- Participant, Phoenix Publishing House, *Formative Assessment in Science-HS*, November 10-11, 2012, Subic Bay, Freeport Zone, Zambales
- Participant, *Lingua-Il Canto della Vitta*, October 24-25, 2011, The Palmridge School, Inc., Bacoor, Cavite
- Participant, Center for Educational Measurement, Inc., *Classroom Test Construction*, June 2, 2011, Montessori de Manila, Inc. Las Piñas, Manila