Enhancing Junior High School Students' Environmental Knowledge Using Experiential-Reflective Instruction

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Abstract

This study investigated the use of experiential-reflective instruction on the environmental learning of Grade 7 students. A quasi-experimental method was employed, with one group assigned to conventional instruction (CI) while the other engaged to experiential-reflective instruction (ERI). The researchers developed, adapted, and validated the scale. Using independent sample mean tests and paired t-test, results revealed that there is no significant difference in post test mean scores of the students who underwent the ERI. However, findings showed a significant difference in the summative, gain of scores, and paired t-test. These results indicate that ERI assisted to enhance their knowledge and understanding of environmental topics. This finding is further supported by the students' perceptions that experiential learning enables them to gain cooperative learning, have fun, activate retention, and participate actively in class. Succeeding studies may explore ERI in senior high school and consider the curriculum review of environmental topics in the K-12 curriculum.

Keywords:

conventional instruction, environmental knowledge, experiential-reflective instruction, students' perceptions, summative test

Introduction

Education, as one facet of the Sustainable Development Goals of the 2030 Agenda, targets to be equal, and inclusive; and governs fair opportunities for all. It focuses on the engagement of students to read, write, and learn the basic science and mathematical processing skills that are essentials to life. Based on the United Nations Educational, Scientific and Cultural Organization (UNESCO) 2020 data, six out of 10 children lack the ability to read, write, and comprehend. This lacking functional literacy of learners affects their competency in all subject areas particularly english, science, and mathematics (UNESCO, 2020). In the Philippines, science competency is low and the country was found to lag behind others, as assessed by international standards. For instance, data from Programme for International Student Assessment (PISA) in 2018 showed that the Philippines ranked 77th among the 79 countries in science (OECD, 2019). The same poor performance was observed by Trends in International Mathematics and Science Study (TIMSS) in 2019, which revealed that the Philippines, out of 58 countries, occupied the last place in primary science (Mullis et al., 2020).

These alarming statistics emphasize the need to improve the science competency of students in the Philippines. Ensuring that the youth possess high science competency and are equipped with adequate environmental knowledge seems to be necessary with the pressing environmental problems faced by the country and the world today. Schools and teachers are expected to facilitate the development of the

student's potential to be advocates of a sustainable environment since they are vulnerable to worsening environmental problems (Ahmad et al., 2010). With proper environmental education honed by academic institutions, students will possess the knowledge and skills needed for the protection and conservation of the environment.

The implementation of the K-12 program has improved Environmental Education (EE) in the country, with the integration of environmental topics in the science curriculum of primary and secondary education. With this change in the curriculum, teachers are expected to utilize new approaches and examine if these approaches help improve students' learning.

Widely used in education research, experiential learning has been found to yield positive results (Sattler & Peters, 2013). Students exposed to experiential learning became participative in science activities and related tasks, and both their critical thinking and learning performances were enhanced. Their academic scores also improved (Cheng et al., 2019; Dolotallas & Nagtalon, 2015; Weinberg et al., 2011). However, using experiential learning also poses several challenges such as lack of learning support, engagement, and in-depth thinking (Cheng et al., 2019; Shen et al., 2016). In the study of Kaur Sidhu et al. (2010), journal writing as part of reflective learning became an effective tool to assess the learner's retention because students can monitor and review the pace of their learning. In addition, journal writing enhanced the self-growth and understanding of the students and reflective learning improved their organizational and writing skills while taking a new language or course (Chang & Lin, 2014; Liao & Wong, 2010). However, previous studies indicate that reflective learning does not produce desirable educational results because it is only enhanced if integrated with the knowledge, learning process, and comprehension (Al-Rawahi & Al-Balushi, 2015).

Theory of Experiential Learning

This study used the experiential learning theory that was proposed and improved by Kolb (1984; 2005; 2014). In this learning theory, Kolb mandates that learning is a long-term process which is interrelated and interconnected with the physical environment, and that it entails formation of new concepts and eventually, enhancement of these new ideas. The long-term process mediates the step-by-step transfer of learning from the facilitator to the learner using experiential activity. The involvement of the physical environment and the learner maximizes the creativity of learning and exposes the students to different situations. Different learning areas allow the learner to create a new concept based on the encountered situation which results in the formation of new concepts. Based on the concepts formed and the experiences gained, new ideas will be refined by the learner.

Experiential Learning and Instruction

Experiential learning is one of the approaches used to facilitate the students' learning capabilities (Cheng et al., 2019). Experiential learning is student-centered which means that it focuses on the action and experiences of learners. Kolb (2014) states that experiential learning encompasses learnings in every situation; then the solution is formed based on the acquired learning and experience. These experiences are then transformed into knowledge, skills, values, emotions, and senses. One study from de Freitas and Oliver (2006, as cited by Cheng et al., 2019) indicates that experiential learning assists learners in complex situations to formulate a simple solution. Likewise, Konak et al. (2014) and Orus et al. (2016) specify that experiential learning has great potential in enhancing students' cognitive tasks and decision-making. Moreover, activity-based learning such as learning by experience or hands-on tasks are valued and produce more desirable results because the learners achieve a motivating force to execute certain environmental actions (Greenwood, 2013).

Reflective Learning and Instruction

Reflective learning is collective knowledge obtained from various sources, ranging from personal experiences to real-life situations (Colomer et al., 2013). It allows the individual to assess their learning based on their pacing, determine the purpose and aim of the subject, and be physically and mentally involved in the learning process (Demir, 2015). Reflection is a component of reflective learning which has a strong link to observation, action, and reaction. It also promotes learners' accomplishment in the class (Chang & Lin, 2014). Choy and Oo (2012) studied the reflective practice of teachers and its influence on their teaching. Their study revealed that teachers

applied the reflection component to determine the knowledge of students in the class. Zhan et al. (2011) investigated the content learned in class through an online set-up. They found that learners in the reflective group had shown an improvement in their learning performance.

Environmental Knowledge

Knowledge, as a component in solving problems in environmental issues, plays an important role in students' learning. Environmental knowledge refers to one's awareness and understanding of environmental problems (Zsoka et al., 2013). Lacroche et al. (2001, as cited in Vicente-Molina, 2013) mentioned that environmental knowledge is categorized into actual and subjective knowledge. Actual knowledge refers to the familiarity of one person with the product and issues related to the environment while subjective knowledge refers to the cognition or perception of the products or issues.

As pointed out by Kos et al. (2016), environmental education may focus on the capacity of an individual to increase understanding over a long duration. Over time, environmental education can affect the attitude, behavior, and general worldviews of individuals as an outcome. The success of environmental education depends on factors such as cognitive development, environmental knowledge, affective, and actual behavior.

Based on the literature review, both experiential learning and reflective learning were studied separately and had not been fully explored in science education especially in teaching environmental topics. There have also been very few local studies which focused on environmental issues. Some of them were explored in the mid-90s in some schools in different regions across the country. With the pressing environmental concerns, it seems imperative for the youth to widen their knowledge of the environment (Guerrero, 2016). Also, environmental topics and issues have garnered attention due to the adverse impacts of climate change, especially in vulnerable countries like the Philippines (Climatelinks, 2017).

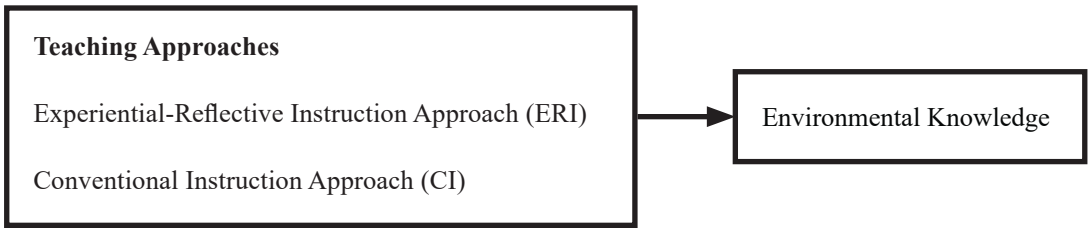
This study sought to assess the potential of a combination of experiential and reflective learning approaches in teaching about the environment. Experiential learning, as defined by Luckmann (1996, as cited in Bagh, 2018), is a process of a learner's construction of knowledge, skill, and value through experience. On the other hand, reflective learning is incorporated in the writing exercises assigned to students after doing a task or reading learning materials. This study examined the effect of experiential-reflective instruction in increasing the environmental knowledge of the junior high school, particularly Grade 7 students, in the Philippines. Thus, the researchers were interested to examine the potential of experiential-reflective instruction in science teaching here in the country.

Conceptual Framework

This research investigated the environmental knowledge of students who were exposed to the experiential-reflective instruction approach. The researcher used Kolb's experiential learning theory which consists of four processes, namely, experience, deliberate attention, understanding of experience, and application (Kolb, 2014). Experiential-reflective instruction was assessed as an alternative approach to teaching Science. It was assumed that this approach would have a significant influence on the environmental knowledge of Grade 7 students. Shown in Figure 1 is the conceptual framework of the study.

Figure 1

Conceptual Framework



Two instructional approaches, namely the experiential-reflective instruction (ERI) and conventional instruction (CI) served as independent variables of the study. Under the experiential-reflective instruction approach, there are three sub-teaching features: experiential activity, reflective practice, and cognitive processing. On the other hand, the conventional instruction consists of two components, namely lecture and note taking. The students' environmental knowledge was the dependent variable in this study. Vicente-Molina et al. (2013) defined environmental knowledge as the general knowledge of facts, concepts, and relationships concerning the environment.

Purposes of the Research

This study aimed to determine the influence of experiential-reflective instruction as an alternative teaching strategy in increasing the environmental knowledge of junior high school students in a public school. The following are the specific research questions.

1. Do students exposed to the Experiential-Reflective Instruction (ERI) have higher mean post test scores in environmental knowledge than those who were exposed to the Conventional Instruction (CI)?

2. What are the perceptions of students on the Experiential-Reflective Instruction (ERI) in the class?

Hypothesis of the study

1. The post test mean scores of the group exposed to the Experiential-Reflective Instruction (ERI) are significantly higher than the group exposed to the Conventional Instruction (CI) .

Methodology

Design of Study

This study used a quasi-experimental method with pretest and post test designs. This method gathers data for observation and analysis and determines the effect of the intervention (Loewen & Plonsky, 2016). In addition, the researchers used descriptive statistics to analyze the scores of the students. For the quasi-experimental method, two groups were exposed to different instruction approaches. Specifically, a control group was exposed to Conventional Instruction (CI) while the experimental group was taught using the Experiential-Reflective Instruction (ERI). In analyzing and interpreting the data, a t-test of independent samples and paired sample t-test were used. These tests were utilized to determine whether there is a change in pretest and post test scores after the intervention. The method of testing is considered as follows:

ERI	O_1	X_1	$O_{1'}$
CI	O_1	X_2	$O_{1'}$

Where:

O_1= Environmental Knowledge Scale as the pretest

$O_{1'}$= Environmental Knowledge Scale as post test

X_1= Experiential-Reflective Instruction (ERI)

X_2= Conventional Instruction (CI)

Participants of the Study

The researchers selected Grade 7 students since their science curriculum covers mostly environmental topics during the fourth quarter of the school year. There were 54 participants in this study from two Grade 7 heterogeneous classes in a public high school in Quezon City, Philippines.

Method

Before implementing the alternative instruction, the two classes were pretested using the Environmental Knowledge scale. Data analysis using a two-tailed independent sample t-test revealed that there was no significant difference between their mean scores which indicated that the two groups are comparable.

To assign the class which will belong either to the control or the experimental group, one of the researchers tossed a coin. The control group was exposed to the Conventional Instruction (CI) approach while the experimental group was taught using the Experiential-Reflective Instruction (ERI) approach. Each group was composed of 27 students.

Environmental Knowledge Scale

The study used a 15-item Environmental Knowledge scale with a reliability index of .805 (Cronbach alpha measure), indicating validity and acceptability of the instrument. The content, structure, and format of the instrument were patterned after the studies conducted by Espina (2017) and Bogan and Kromrey (1996).

To pilot-test the four-point Likert scale, Grade 8 students in the same school who had prior knowledge of the topic were asked to answer the scale.

After the intervention, the scores of each student were added. A high score signifies that the student has increased his/her knowledge of environmental topics before and after the intervention. Interviews with selected students were also conducted to gain a better understanding of the student's experience in learning environmental topics using ERI. These interviews were done after administering the post-test.

Experiential-Reflective Instruction (ERI)

This research involved the intervention called Experiential-Reflective Instruction (ERI) which consisted of three sub-teaching components: experiential activity, reflection, and cognitive processing.

Data Collection

The study lasted for six weeks which included the following activities: the administration of the pretest, activity on environmental topics, administration of the post test, and conduct of the interviews. The researchers, who are not affiliated with the chosen school, sought the permission of the school head before the conduct of the study. The participants and the teachers consented to become research participants and they were provided with an orientation on the objectives and guidelines.

The researchers administered the pretest on environmental knowledge to both the experimental and control groups. After the pretest, one of the researchers handled the classes on environmental topics during the fourth quarter of the academic year 2018-2019. The subject teacher was there to monitor each session. The lesson plans used by the researcher adhered to the curricular standards set by the Department of Education. These lesson plans were also assessed and approved by the subject teacher before the researcher implemented them.

Each teaching session handled by one of the researchers has the following components: a review of the previous lesson, an introduction of concepts, experiential activity, and reflective practice. After the concepts were tackled, hands-on activities through station rotation were performed per group. The station rotation included the following experiential activities: laboratory experiments, simulations, games, gallery walks, situational role-playing, and playing videos related to the topics. Guide questions were included in the worksheet for every activity. This was done for twenty minutes. The students are then divided into groups to discuss the science concepts and environmental issues taught by the researcher. They were also asked to present their group outputs and share the highlights of their discussion to the whole class. The teacher intently listened to the discussion and took note of the insights, as well as the students' reactions to the issue during the presentation. The time limit of fifteen minutes was imposed so the researcher can provide clarifications of the lesson and additional inputs.

The students are given ten to twenty minutes to reflect on the topics discussed and to write it as a journal entry. Guide questions were provided by the researcher to assist the students in composing this journal entry. They were also allowed to continue writing these entries and also add their observations on their immediate environment at home. Before the class ended, seatwork or quizzes with the same content and objectives were given to both the control group and the experimental group.

After delivering all the classes on environmental topics, one of the researchers administered the post test. He also randomly selected students who were interviewed about their experiences and knowledge gained.

Data Analysis

The Statistical Social Package for the Social Sciences (SPSS) software was used for data analysis. A p-value of .05 (level of significance) was set for all statistical treatments. First, a t-test of independent samples was used to treat and analyze the pretest scores of each

class to determine the validity of the two comparable groups. Second, a t-test of independent samples was executed after the intervention period for their post-assessment test and summative test. Third, a paired sample t-test was used to analyze the pretest and post-test mean scores within the group. Finally, the collected transcripts from the interview were reviewed and organized into common themes to provide supplemental evidence to the results of the study.

Results and Discussion

Influence of Experiential-Reflective Instruction on Knowledge in Environment

Table 1

Comparison of Pretest CI and ERI in Environmental Knowledge Scale

Measure	Group	Mean	SD	N	t	p (one-tailed)
Pretest	CI	44.6296	5.49229	54	-1.395	**.169**
	ERI	42.6667	4.82780			

Table 1 shows the sample t-test of the pretest mean scores of the CI and ERI group. Results showed no remarkable difference between the pretest mean scores of the CI and ERI group, $t(54)=-1.395$, $p=.169$. As shown in Table 1, the ERI had a lower pretest mean score ($M=42.6667$) compared to the CI pretest mean score of ($M=44.6296$). The possible supposition on non-significant results of pretest could be that the environmental topics in science subjects from previous grade level were few for discussion and students found it difficult to remember the learning material. Moreover, Weinberg et. al (2011) indicate that topics in science were no longer considered to have a strong linkage to what the learner uses to identify his or her sense of self in recollecting the ideas of science topics as time passed by. Based on the result, the two groups are comparable in terms of environmental knowledge prior to the experiential-reflective instruction. This result implies that the groups are acceptable and compatible to use for study.

Table 2

Comparison of Post test CI and ERI in Environmental Knowledge

Measure	Group	Mean	SD	N	t	p (one-tailed)
Post-test	CI	47.5926	5.93075	54	.712	**.478**
	ERI	48.7037	5.52487			

As shown in Table 2, the results of the sample t-test show no significant difference between the post-test mean scores of the CI and ERI group. However, students who underwent experiential-reflective instruction had higher post-test scores ($M=48.7037$, $SD=5.52487$) than the students in the CI group in general, $t(54)=.712$, $p=.478$. This result suggests that the intervention does not enhance the students' environmental knowledge. One factor to consider that the intervention did not affect the knowledge of students in environmental knowledge is because of the sample size and limited time of the study. In the conduct of the study, only 27 participants per group were considered for assessment. With the calculation of the standard deviation on the CI group, the result yields an effect size value of .02. This value is very small in terms of effect size in a study (McLeod, 2019). Another study assumed that to attain a higher level of knowledge in a specific area, such as environmental topics, instructional time on the topic must be increased (Erhabor & Don, 2016). Given the time constraint in the participating school, this research took only six weeks to implement the intervention.

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 3 shows the summative scores of students in both groups. This assessment was given only after the duration of the topics. As shown in Table 3, the results of the sample t-test showed a significant difference between the post-test mean scores of ERI and CI. Students who underwent experiential-reflective instruction had higher summative test scores ($M=40.7037$, $SD=8.78292$) than the students

in the CI group in general, $t(54)=2.084$, $p=.042$. The result indicates that the experimental group showed an increase in scores after the summative test was administered. The positive results can be attributed to the following factors during the intervention period: active participation in class discussion, eagerness to work with the group, and reflective discussion. One of the students mentioned "*Kapag may recitation at reflection activity, mas nalalaman ko yung mga sagot sa tanong ni teacher. Mas natuto ako kapag nagrerecite at may group activity sa klase*." (When there is a class recitation and reflection activity, I know more about the answers to the teacher's question. I learn more when I recite and if there is a group activity during a class.) When a teacher interacts and asks students to recite, this could be a form of encouragement, as the teacher is able to engage the students and promote their way of thinking (Shumow & Schmidt, 2014). Moreover, Brown (2001, as cited in Choy & Oo, 2012) indicated that group work allows the students to become more responsible for action and progress and when students are in groups, they feel more secure. After the intervention, the ERI group showed an increase in summative scores. Since the intervention placed importance on engaging the students and promoting classroom interaction, these contributed to the improvement of their environmental knowledge scores.

Table 3

Comparison of Summative Test Scores between CI and ERI in Environmental Knowledge

Measure	Group	Mean	SD	N	t	p (one-tailed)
Summative Test	CI	36.0741	7.49321	54	2.084	**.042***
	ERI	40.7037	8.78292			

*$p < .05$

As displayed in Table 4, the results of the sample t-test show a significant difference between the gain of scores of ERI and CI. Students who underwent experiential-reflective instruction had a higher gain of scores (M=6.0370, SD=4.55295) than the students in the CI group in general, $t(54)=2.349$, $p=.023$. The result indicates that the intervention group showed an increase in scores after the test was conducted. This supports that after the intervention, the ERI group showed an increase in the gain of scores over the duration of the study.

Table 4

Independent t-test of CI and ERI in Post test and Pretest gain of scores in the Environmental Knowledge Scale

Measure	Group	Mean	SD	f	t	p (one-tailed)
Gain of Scores	CI	2.9630	5.04961	1.098	2.349	**.023***
	ERI	6.0370	4.55295			

*$p < .05$

By looking at the summative test and the gain of scores, the results suggest that the intervention helped the students to gain environmental knowledge. Students pointed out that their enhanced scores in environmental topics can be attributed to their ability to process the lessons. "*Mas nalalaman ko yung leksyon lalo na kapag may group activities. Kapag may mga puzzles at games, mas natutunan ko yung mga lessons na kailangan at nagiging masaya po ang klase.*" (I tend to learn more if there is a group activity. The puzzles and games allowed us to further understand the lessons and these activities made the class enjoyable). Additionally, the students actively participated and understood the lesson through experiential-reflective activities. Based on the interview with the participants, group work, games, and hands-on activities fostered their learning, and motivated them to learn, and value group cooperation. These findings affirmed the findings of Greenwood (2013), which revealed that hands-on tasks and activity-based learning motivated learners to perform better in certain environmental situations. This is also aligned with the study of Dolotallas and Nagtalon (2015) which found that knowledge is engraved in the students if there is an interaction and integration of activities in the learning process.

Comparison Between the Within-Group Scores of Students in Environmental Knowledge

As displayed in Table 5, CI has a higher post-test mean score (*M*=47.5926) than its pretest mean score (*M*=44.6296) and the ERI group had a higher post-test mean score (*M*=48.7037) than the pretest mean score (*M*=42.6667). This indicates that the CI and ERI group increased their scores in the post-test. Results showed that there is a significant difference between these mean scores *t*=-3.049, *p*=.005 for the CI group and *t*=-6.890, *p*= .000 for the ERI group. These suggest that the knowledge of students who were exposed to CI and ERI groups significantly improved.

Table 5

Paired sample t-test of CI and ERI in Pretest and Post test Mean Scores in the Environmental Knowledge Scale

Group	Measure	Mean	SD	Mean Difference	N	t	p (one-tailed)
CI	Pretest	44.6296	5.49229	-2.96296	27	-3.049	**.005****
	Post-test	47.5926	5.93075				
ERI	Pretest	42.6667	4.82780	-6.03704	27	-6.890	**.000*****
	Post-test	48.7037	5.52487				

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

Looking at the mean scores of the CI and ERI group in their post-test scores, both groups increased their knowledge on environmental topics. The significant changes suggest that students from both groups attained higher post-test mean scores. Results of the interview gave more context on these findings, wherein the students emphasized how fun group activities such as games and puzzle-making enabled them to enjoy while learning. "*Nakakatulong po ang group activity, kasi nagkakaroon po kami ng cooperation sa group. Natututo pong magtulungan ang bawat isa at nakakapag-communicate sa kaklase*." (Group activities helped because it fostered cooperation among the group members. We learned to help each other and communicate with our classmates.) This result was affirmed by Doris (2013) who stated that the use of a fun activity and hands-on activity, compared with utilizing self-learning and audio-visual materials, is the most effective approach to developing knowledge and awareness in the environment.

Students' Perceptions in Experiential-Reflective Learning

Based on the responses of the students, experiential-reflective learning allowed them to cooperate with others while having fun in learning. Students learned to work with the group while doing the task and enjoyed the activity. *"Nalalaman ko kung ano ang sagot o ideya nila [classmates], nadadagdag mo sa isip mo, nakakatulong din ito upang mahasa yung kaalaman ng sarili at kagrupo."* (I learned some answers or ideas from them [classmates], and this increased my knowledge, as well as that of my groupmates). Moreover, they expressed that "*Sa group activity, naaalala yung mga lesson pati dun kami sumisigla kapag may group activity. Kapag may games, mas lalo po kaming ginaganahan matuto. Sa mga group activity, nalalaman ko ang mga sagot sa tanong. Tapos kapag may puzzles or 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 motivated to learn. The group activity also enables me to know the answers. Puzzles and games enable me to further understand the lesson and these activities allow the class to have fun.) These insights are affirmed by the study done by Wang and Hwang (2012), which revealed that the collective input of group members motivated students to work collaboratively and produced significant improvement in activity. In this manner, collaborative learning is manifested.

Reflective tasks served as a platform for the students to express their feelings and process their difficulty in understanding the lessons. These tasks include essays, a diary, or a journal entry. Through the essay, learners can express their thoughts after the activity. In a diary or journal, they easily expressed their ideas and opinions on the issues and topics

discussed. They mentioned that "*Yung pagsagot sa essay, 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 akong mag-isip. Sa diary ko sinusulat kung ano yung nangyayari sa buong araw at tungkol sa mga sekreto."* (In writing the essay, the teacher assessed if I can answer the questions, or if I can provide deep or elaborate answers. It also helps me determine if I can think deeply about the topic. I write about my daily life and secrets in the diary.) The same findings were found by Basol and Gencel (2013) which stated that reflecting on the learning or the situation helps the students achieve their learning goals leading to repeat the desirable behavior.

Similarly, experiential-reflective learning fostered retention and participation in the class. Students mentioned that through participation and recitation, they became interested in the class discussion. They also practiced waste segregation in school and at home and realized how to protect the environment. This finding is similar to the study of Lin and Tsai (2013), indicating that involvement in tasks allows the students to express their desire to put in more input and their confidence is improved, leading to the completion and success of the learning task. Moreover, Moore et al. (2010) emphasized that critical thinking with reflection can be incorporated with experiential learning.

Conclusion

This study aimed to examine the influence of experiential-reflective instruction in enhancing the environmental knowledge of students and their perceptions on this type of teaching approach.

Based on the findings of the study, the following conclusions were drawn. First, experiential-reflective instruction has no significant difference in the post-test mean scores in students' environmental knowledge. Secondly, experiential-reflective instruction has a significant difference in increasing students' environmental knowledge based on the gain of scores in the summative tests. In addition, it had an effect on students' environmental knowledge within the group. Lastly, the student's perception of experiential learning enables them to gain cooperative learning, increase their enjoyment, and foster both lesson retention and active participation. Reflective learning allows the students to express and assess the lesson while increasing their knowledge on the environment.

The study provides a new paradigm in teaching Earth Science, specifically environmental topics, to Grade 7 students. The combination of experiential and reflective instruction is an improved approach to address the students' learning gap and learning development when it comes to environmental concepts and issues. However, it poses the following challenges to science teachers: longer preparation of learning materials, lack of facilities, huge class size, and tedious planning.

Recommendations

In developing the environmental science curriculum, teachers must consider the commitment and interest of the students in environmental and sustainable development issues to ensure that their approaches can effectively enhance the students' knowledge and attitude towards environmental topics.

The main theme of environmental education is aligned across grade levels with an emphasis on sustainable living and the involvement of students in solving local environmental concerns. The school, together with the teachers, needs to focus on holistic collaboration to encourage and support the students who are willing to share their knowledge in community-based environmental projects. This may be done through forming strategic partnerships with government agencies such as the Department of Environment and Natural Resources (DENR) and Local Government Units (LGUs) in the conduct of community-based projects to increase awareness and address environmental issues. Future researchers may consider exploring the ERI in senior high school curriculum and reviewing the transition of teaching environmental topics in the K-12 curriculum.

Limitations

Several factors served as limitations of the study. Among these are the short duration of the study, small laboratory space, class attendance during the intervention, and the students' learning motivation and commitment.

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