Project ROLE: Its Effect on the Performance Level of Grade 11 CSS and EIM Students in Earth & Life Science

Alberto V. Espenida
Prieto Diaz National High School, Philippines
Corresponding Author e-mail: alberto.espenida@gmail.com

Abstract

AIM: Roles of teacher and students during the teaching-learning process could have effects on the academic performance. From this, the researcher implemented project ROLE to address the low performance level of selected TVL strands in Prieto Diaz National High School in Earth and life Science. Specifically, it sought to determine the performance level of grade 11 CSS and EIM students before and after the implementation of the project ROLE, test the significant difference, and determine the effectiveness of the project.

METHODOLOGY: This study employed pre-experimental design specifically, the one group pretest–posttest design. The participants were 38 grade 11 CSS and EIM students who were purposively taken (complete enumeration). It used teacher–made tests and questionnaire to gather data. *T-test* for dependent means, Performance Level (PL), and Average Weighted Mean were the statistical tools used to analyze the data.

RESULTS: Data analysis showed that the Performance Level (PL) of CSS and EIM students in pretest was 43.465% while their PL during their posttest was 80.643%. There was significant difference in the PL of the participants. An increased PL was also evident on the second quarter assessment. In a Likert Scale, the participants agreed with an average weighted mean of 4.16, that project ROLE improved their retention on concepts and consequently their PL.

CONCLUSION: Results of the study showed that the project ROLE was effective intervention to TVL students struggling to learn difficult concepts in Earth & Life Science.

Keywords: *Intervention Activities, Performance Level, R.O.L.E*

INTRODUCTION

Countries are gearing their path towards Sustainable Development goals. However, science education faces the challenge of the SDGs and Education for Sustainable Development (ESD) in different ways. Of these are 1) seeking new ways to integrate scientific knowledge and skills into real-world situations and elucidate ways to connect knowledge to sustainability-relevant values and attitudes; and (2) overcoming disciplinary boundaries to understanding a problem comprehensively and at the same time provide discipline-specific knowledge and skills to solve the problem (Kremir & Bauer, 2020). These problems seemed to be at higher level because there are still countries which deal with baseline or foundation problems in education.

In the Philippines, the Science Education Institute and Department of Science and Technology and University of the Philippines National Institute for Science and Mathematics Education (SEI-DOST & UPNISMED) said that the science education in the country is faced with many constraints such as the shortage of qualified science teachers, lack of quality textbooks, inadequate instructional materials and equipment, large classes, and lack of support from administrators. Further, it was found that the lack of instructional materials and equipment in school had been used to account for the poor performance of students. In support to this, Laya (2021) said that the Philippines occupied the 34th place among the 38 countries who participated in the Trends in International Mathematics and Science Study in 2003. Behiga (2022) said that there was no significant increase in science NAT result among grade 10 and 12 students

in SY 2016-2017 to 2017-2018. Grade 10 students had a NAT MPS of 35.68 to 36.52 while grade 12 students had 31.26 to 32.11.

The Prieto-Diaz National High School NAT results among Junior High School Students for the SY 2012-2013, 2013 – 2014 and 2014 – 2015 were 42.6, 62.49, and 37.86, respectively, and were below standards. The school had a target of 5% increase in the National Achievement test (NAT) during its implementation among the Grade 12 senior high school students. Teachers were encouraged to achieve a 75% PL in quarterly assessments because it may have a positive effect when students take NAT. It was noted that the Grade 11 Computer System Servicing (CSS) and Electrical Installation and Maintenance (EIM) combined as one class in Prieto Diaz National High School, had a very low PL of 25.05% during the First Achievement Test in Earth & Life Science. This was far below the target and called for an action.

Based on a survey questionnaire conducted in these two strands, the main cause of low performance level in Earth & Life Science during the first quarter examination was that some lessons for the first quarter in Earth & Life Science were not taught well. It was found out during the interview that some lessons were not supported with activities or something they could see or kept to strengthen their retention with the learned concepts/skills. Aside from these, the second highest answer gathered from the questionnaire was that they easily forgot the lessons they had learned. The latter answer could be the result of the former.

The Performance Level (PL) or Mean Percentage in DepEd Order No. 42 s. 2017 is an indicator of how much the students have learned after a time frame of instruction. It is not only an indicator of students' learning but also of the teacher's effectiveness in teaching. It enables us to measure or quantify one of the three key result areas in teaching and learning –the Quality. A 75% Performance Level or higher in a summative test or quarterly assessment is needed to claim a quality teaching-learning process.

The researcher believes that the teacher and the students have a role to do for the latter's performance in class. Anchored to this belief, project ROLE was outlined to increase the participants' retention – the identified cause of the low performance level in the subject. The project ROLE stands for Revisit, Offer, Look and Engage.

Theoretical Framework

The study used the Independent Variable – Dependent Variable (IV-DV) model because the focus of the problem was classified as situation-relating question and the model is used in experiment-based studies (Cristobal & Cristobal, 2017).

The Independent Variable was the implementation of the intervention "Project ROLE" among grade 11 CSS and EIM students. This project/intervention consisted of stages: Revisit, Offer, Look and Engage. According to Benney (2019), revisiting knowledge improves recall. He suggested to conduct spacing lesson. Spacing lessons were not about re-teaching information. Rather, they were opportunities for students to retrieve previously learned information after the gap. *Revisiting lesson* in this study worked similarly with spacing lesson because the intervention activities which were created and given to students after the difficult questions of the summative tests enabled them to retrieve the information they acquired during the lesson delivery.

In order for the students to revisit the difficult topics, the teacher - researcher ***O**ffered* intervention activities. These intervention activities were take-home activities which were checked and discussed within 1 – hour period the next few days it was given. With these intervention activities, previous learning was recalled, and difficult lessons were clarified. Garcia and Al Safadi (2014) stated that intervention activity is an excellent assistance to boost the academic performance of students.

Then, the proponent ***L**ooked for* simple ways wherein difficult topics could be easily understood by students during the checking and the re-discussion of the content of intervention activities. Simple ways included the use of signs or cues to recall a concept. Magill, in Henkil (2002) says that retention is especially enhanced when cues connect ideas to previously learned ideas in some way. Under this phase, the participants also prepared a portfolio (conformed to DepEd Order No. 42 s. 2017) that they will *look into* whenever they need to refresh on learned concepts. Through this, the possibility of longer retention was expected. According to Cimer (2011) portfolio process – especially combining self-reflection with weekly tests encouraged students to study regularly, increased retention and made learning more enjoyable.

Lastly, 100% active students were ***E**ngaged* in this study. Active students referred to those who did not incur frequent absences. As to the idea of performing one's *role,* each recipient of project ROLE

must give his share in the increase of the class Performance Level. Class participation provides the setting in which the learners can construct and shape identities as part of the classroom. Moreover, it is important in learner-centered curriculum for effective learning to take place. Participation also increases the likelihood that learners will study and have a sense of responsibility for their learning

The dependent variable was the Performance of grade 11 CSS and EIM students in Earth and Life Science subject. The performance before the intervention was below the standard PL of 75%. The intervention's goal was to increase the performance to the standard PL of 75%. It was expected that by increasing the retention level of the learners, the PL would also increase. The PL was measure in summative tests and Periodical Test.

Objectives

The study was conducted to improve the Performance Level of Grade 11 CSS and EIM students in Earth and Life Science. Specifically, it aimed to determine the Performance Level of Grade 11 CSS & EIM students in Earth & Life Science before and after the Project ROLE, test the significant difference in the performance level of Grade 11 CSS & EIM students in Earth & Life Science before and after the Project ROLE, and determine the effectiveness of the Project ROLE in increasing the Performance Level of Grade 11 EIM and CSS students in Earth and Life Science.

Hypothesis

The PL of grade 11 CSS and EIM students in Earth and Life Science will be significantly higher after the implementation of Project ROLE than their PL before the implementation. Project ROLE will be effective in increasing the students' PL in Earth and Life Science by increasing their retention level.

METHODS

Research Design

This study used Pre-Experimental Method. Pre-experimental enabled the researcher to observe either a single group of participants or multiple groups after some intervention or treatment which was presumed to cause change. It either included a pre-test, a control or a comparison group or both; in addition, no randomization procedures were used to control or extraneous variables (Salkind, 2010). Specifically, the study used pretest-posttest design. It is a type of research design that is most often utilized by behavioral researchers to determine the effect of a treatment or intervention on a given sample (Allen, 2017).

The design was suited in this study because the grade 11 CSS and EIM students were taken as one (1) group only who received the treatment. There was an experimental group only and no control group. The effectiveness of the intervention was measured on the difference that it had caused to the performance at the post test. One group pretest-posttest design was given by the illustration:

one group ➡ pretest ➡ treatment ➡ posttest

One group referred to the Grade 11 CSS and EIM students. These two strands were combined as one class because they were few in numbers. CSS were composed of 21 students and EIM students were composed of 17 students. For this reason, they were also combined as one group in the statistical analysis. The *pretest* was the first administration of the summative test 1 and 2. These were conducted before the intervention. The *treatment* was the intervention in this study, which is called, as a whole, "project ROLE". This intervention was an innovation of remedial process in the DepEd at the 5th week. ROLE is an intervention given at once to research participants who failed to obtain the PL of 75% during each summative test. *Posttest* referred to the re-administration of the summative tests after the project ROLE was implemented.

Research Participants

The participants of this study were Grade 11 CSS and EIM students which were combined as one (1) class. EIM strand was composed of 21 students and CSS strand was composed of 17 students. There were 38 total participants in this study. These strands were chosen as participants because they obtained the lowest Performance Level in the first quarter assessment among all the strands being handled by the researcher in the subject Earth & Life Science.

Data Gathering Methods

The researcher used test and survey questionnaire. The instruments went validation process. In validation, the question in each item was inspected of its alignment with the learning competencies. The level of questioning was also observed if suited to the grade level and the nature of participants. The validator gave suggestions to improve the instruments and the researcher made two revisions of these. The final revision of summative tests 1 and 2 obtained a mean of 4.8 and 5 respectively which indicated a high validity as shown from table 4.1.

The summative tests were administered to grade 11 STEM strand in order to establish its reliability. The test-retest reliability using Pearson r in SPSS was 0.923 for summative test 1 and 0.965 for summative test 2. Both results indicated a very high correlation which mean a high reliability.

The summative tests were instruments needed to answer research questions 1 and 2. There were only two summative tests in the second quarter due to the time constraints brought about by class disruptions. Summative test 1 was all about *Introduction to Life Science*. Summative test 2 was all about *Bioenergetics*. Both of these instruments were given twice to the participants as pretest and posttest. The project ROLE was given in-between the pretest and posttest and was expected to cause an increase in the Performance Level among its recipients on posttest. The result of pre-test and posttest were needed to answer research question no. 3.

Research question no. 4 needed quarterly assessment as instrument. Quarterly assessment was also a form of test. The result of the second quarter assessment with project ROLE as intervention was compared with the result of the first quarter assessment. They were compared based on the difference of Mean, PL and ML. The project ROLE was also expected to cause an increase in the performance level among the participants on the second quarter assessment.

Survey questionnaire was another instrument used to determine the participants' degree of agreement on how effective the Project ROLE was in the retention of their learned concepts/skills that had led to the increase of their Performance Level among the tests.

Ethical Consideration

The researcher collected privacy data such as personal information and academic which should be protected. Hence, the participants were given a consent form indicating their rights: e.g. rights to privacy protection, harm and to withdraw their participation or information given anytime during the study. The researcher also sought permission from the Division School Superintendent, school head, and the parents to conduct this study.

Data Analysis

statistical tools used in this study to analyze the data for sub-problems were T-test for dependent means, Performance Level or Mean Percentage Score, and Weighted Mean. However, Mastery Level (ML) and Class Mean were also used in the further of explanation.

For research questions 1 & 2, the Performance Level in summative test 1 and 2 before and after project ROLE was needed. As a general rule, 75% PL in class is needed in order to claim that a given treatment in a teaching-learning process was effective. The Performance Level was based on DepEd Order No. 42 s. 2017 and RPMS manual.

For research question no. 3, t-test for dependent means was used as statistical treatment in finding significant difference in the mean of pretest and posttest of each summative test. According to Broto (2006) the dependent t-test is used in determining significant difference in the mean of pre and posttest of the same group.

Note: for an easy computation of the dependent t-test, the data analysis will be used from the Microsoft Excel Software Application. To further validate the result of the t-test in Excel, SPSS will be used.

A significant difference in the mean before and after treatment at a constant (same) number of items would also signify a significant difference in the Performance Level because PL was taken out of the mean. Hence, as **mean** was needed in t-test, it was used instead of **PL** in order to answer the research question no. 3 which aimed to find significant difference in the Performance Level of the participants in the summative tests before and after treatment. T-test was used by stating a null and alternative hypothesis. If the computed t-value appeared *greater* or *beyond* the critical t-value, the null would be rejected. Otherwise, the null hypothesis would be accepted.

In research question no. 4, the difference in the Mean, Performance Level (PL) and Mastery Level (ML) of the first and second quarter assessment were used as basis to interpret the effectiveness of the project ROLE. The project ROLE as intervention/treatment would be considered effective if there is a positive increase/difference in the PL and Mean between the first & second quarter assessments.

In addition, survey questionnaire was also employed to the participants to help the researcher analyze the effect of treatment (intervention) in increasing their PL in the second quarter assessment. The Weighted Mean used to synthesize the level of agreement of the participants on project ROLE in each statement. The Mastery Level (ML) that also appeared in the analysis of data was helpful in analyzing the percentage of passers who took a test.

RESULTS and DISCUSSION
1. Performance Level in Summative Tests (PRETEST)
A. Pretest of Summative Test 1

The pretest of summative test was conducted on September 11, 2019. It was composed of 20 items on the content "Introduction to Life Science". The participants who took this test were twenty – one (21) Grade 11 CSS and seventeen (17) EIM students. The total participants, as one group, was thirty – eight (38).

Based on the *Pretest Data of Summative 1*, one (1) student from the CSS strand got a score of eighteen (18) which was the highest score. This student was exempted from re-taking the said summative test and from undergoing intervention activities. One (1) student from the EIM strand got a score of two (2) and this was the lowest score. There were thirty – seven (37) out of thirty – eight (38) students who become recipients of project ROLE because they fail to reach 75% PL. The score of that was exempted was automatically carried over to the posttest in the statistical analysis.

Table 1 shows the performance of the participants in summative test 1 before the treatment. The mean score of the Grade 11 CSS and EIM students (as one group) was 8.57. This value indicated that the average score of the participants fell below 50% of the total items of the summative test 1. The average Performance Level (PL) of 43.42% indicated a low performance level. It fell below the standard PL of 75%. An average Mastery Level (ML) of 2.63% indicated that only one (1) out of the thirty – eight (38) participants reached the 75% PL. It was the only participant who passed the summative test 1.

Table 1 Performance Level on Summative Test 1 Before Treatment (pretest)

Strand	N	# of item	HS	LS	Total Score	Mean	PL	ML
CSS	21	20	18	4	196	9.33	46.67%	4.76%
EIM	17	20	12	2	133	7.82	39.12%	0
As Group	38	20			329	8.57	43.42%	2.63%

Table 2 was the result of the item analysis on the pretest of the summative test 1. The table contained the topics/questions of items which were identified and interpreted as difficult. The learning competency codes were also given as reference for these topics. The common content standards were obtained out of these and were the following: *the historical development of the concept of life, the origin of the first life forms* and *the unifying themes in the study of life*. There were only five items taken from

these content standards which were difficult for the students. These became the bases of the researcher in constructing intervention activities. There were three (3) intervention activities made for the non-passers of the pretest of summative test 1. These were called intervention activity 1, 2, and 3 with a title *Overviews that support the Evolving Concept of Life*, *Classic Experiment that Model Early Earth Condition that Enable First Life Forms to Evolve* and *Feedback & Regulation* respectively.

Table 2 Difficult Items in Summative Test 1 Based on Item Analysis

Item no.	LC Code	Topic or Question
2	S11/12LT-IIa-1	Historical development on the evolving concept of life.
5	S11/12LT-IIa-2	How did Miller and Urey verify the primordial soup theory?
7	S11/12LT-IIa-2	What did Szostalk's experiment prove?
15	S11/12LT-IIa-3	Feedback & Regulation
17	S11/12LT-IIa-2	Arguments on disproving spontaneous generation
20	S11/12LT-IIa-1	Explanation on the role of gene changes in the evolution

After the intervention activities were accomplished/answered by the participants, one (1) hour – period was consumed on September 13, 2019 for the checking and review of these topics. There was also a review conducted with the participants about the topics related to the items not correctly answered even though they were not included in the difficult items.

B. Pretest of Summative Test 2

The pretest of summative test 2 was conducted on October 07, 2019. The test was composed of twenty – five (25) items on *"Bioenergetics"*. Based on the *Pretest Data of Summative Test 2*, there were still thirty – eight participants from CSS and EIM who took the test. One (1) student from the EIM strand got a score of 19 and was the highest score. There were another two (2) students from EIM strand who got a score of 18. These students were exempted from re-taking the said summative test and from answering intervention activities. Their scores were automatically carried over to the posttest for the statistical analysis. One student got a score of 3 and this was the lowest score. There were thirty – five (35) out of thirty – eight (38) students who became recipients of project ROLE because they fail to reach 75% PL. These recipients had retaken the summative test 2 as their posttest.

Table 3 shows the performance of the participants in the pretest of summative test 2. Based on the table, in a twenty – five (25) item test, the highest score was 19 and this came from EIM strand. The mean score of the Grade 11 CSS and EIM students (as one group) was 10.74. This value indicated that the average score of the participants fell below 50% of the total items of the summative test 2. The average Performance Level (PL) of 42.97% indicated a low performance level since it fell below the standard PL of 75%. An average Mastery Level (ML) of 7.89% indicated that only three (3) out of the thirty – eight (38) participants reached the 75% PL. They were the only participants who passed the pretest of summative test 2.

Table 3 Performance Level on Summative Test 2 Before Treatment (pretest)

Strand	N	# of item	HS	LS	Total Score	Mean	PL	ML
CSS	21	25	16	5	218	10.38	41.52%	0
EIM	17	25	19	3	201	11.82	47.29%	17.65%
As Group	38	25			419	10.74	42.97%	7.89%

Table 4 was the result of the item analysis of the pretest of summative test 2. It contained the topics/questions of items which were interpreted as difficult. Learning competency code were also given as reference for the identified difficult topics. Common content standards were obtained out of these and were the following: *the cell as the basic unit of life, how photosynthetic organism capture light energy to form sugar molecules and how organisms obtain and utilize energy*. The specific topic for these contents standards which the students found difficult were *Cell Parts and Function, Dark Reaction in Photosynthesis*, and *3 Fates of Pyruvate*. These had become the bases of the researcher in constructing intervention activities. These were called intervention activity 4, 5, and 6 which were entitled *WHERE DOES LIGHT REACTION OF PHOTOSYNTHESIS GET ITS ENERGY?, DESCRIBING A CELLULAR RESPIRATION, and HOW DO NADPH AND ATP HELP PRODUCE GLYCERALDEHYDE 3 PHOSPHATE – THE STARTING POINT IN THE SYNTHESIS OF GLUCOSE?* respectively.

Table 4 Difficult Items in Summative Test 2 Based on Item Analysis

Item no.	LC Code	Topic or Question
3	S11/12LT-IIbd-4	Basis of cell function
8	S11/12LT-IIbd-5	Light energy as fuel of light reaction in the photosynthesis
16	S11/12LT-IIbd-5	Reduction rxn of NADPH and ATP in the dark reaction
21	S11/12LT-IIbd-7	Describing Cellular Respiration
24	S11/12LT-IIbd-7	Flow of pyruvate in cellular respiration if no oxygen
25	S11/12LT-IIbd-7	Reason why red blood cell does anaerobic respiration

After the intervention activities were accomplished/answered by the participants, one (1) hour – period was consumed on October 09, 2019 for the checking and reviewing of these topics. There was also a review conducted with the participants about the topics related to the items that were not correctly answered even though they were not included in the identified difficult items. The consolidated pretest scores of summative tests 1 and 2 generated a Performance Level of 43. 462%. This was a low performance level and far below the standard.

2. Performance Level in Summative Tests (POSTTEST)
    A. Posttest of Summative Test 1
    The *posttest* of summative test 1 was conducted on September 20, 2019. Based on *Posttest Data of Summative Test 1*, one (1) student from the CSS strand got a score of twenty (20) which was the highest score. Two students, one from each strand, got a score of thirteen (13) and this was the lowest score.
    Based on table 5, the Grade 11 CSS and EIM strands (as one group) obtained an average Performance Level of 82.63%. Both strands were able to surpass the 75% PL. The group's performance level indicated that intervention activities were effective. A mean score of 16.53 from these two strands indicated that the average score of the class reached 75% of the total items of summative test 1. An average Mastery Level (ML) of 86.98% indicated further that out of thirty – eight (38) participants, thirty-three (33) had a passing score. The number of participants who failed the summative test 1 during the posttest were consisted of two (2) students from the CSS strand and two (2) students from the EIM strand. The score of one (1) student in the posttest was a carried over from pretest because he was exempted.

Table 5 *Performance Level on Summative Test 1 After Treatment (posttest)*

Strand	N	# of item	HS	LS	Total Score	Mean	PL	ML
CSS	21*	20	20	13	356	16.95	84.76%	85.71%
EIM	17	20	18	13	272	16.00	80.00%	88.24%
As Group	38	20			628	16.53	82.63%	86.98%

*included in the data was one exempted student from pretest.

Table 5 further implied a success of the treatment because both strands were able to reach the 75% PL in the posttest. The project ROLE with a content "Introduction to Life Science" which *revisited* difficult

topics found in five (5) items of summative test 1, *offered* intervention activities, *looked* for as cues in meanings and connections of ideas (please see sample on discussion on research question 4) in difficult topics and *engaged* all active students in the intervention was found to be effective.

B. Posttest of Summative Test 2

Based on the *Posttest Data of Summative Test 2*, in a twenty – five (25) item test, the highest score was 24 obtained by three (3) students; one from EIM strand and two (2) from CSS Strand. One (1) student from the EIM strand had a score of 14 and this was the lowest score. There were thirty – four (34) students who reach the 75% PL. Of these, three (3) had a carried over score from pretest because they were exempted. Four (4) students were still non passers from the posttest of summative test 2.

Table 6 showed that Grade 11 CSS and EIM students (as one group) obtained an average Performance Level of 83.44%. Both strands were able to reach the 75% PL. The group's performance indicated that a quality – teaching and learning took place. A mean score of 20.86 from the two strands indicated that the average score of the class reached 75% of the total items of summative test 2. An average Mastery Level (ML) of 89.47% indicated further that out of thirty – eight (38) participants, thirty-five (35) students had a passing score. The number of participants who failed the summative test 2 during the posttest were consisted of one (1) student from the CSS strand and three (3) students from the EIM strand.

Table 6 *Performance Level on Summative Test 2 After Treatment (posttest)*

Strand	N	# of item	HS	LS	Total Score	Mean	PL	ML
CSS	21	25	24	13	432	20.57	85.71%	95.24%
EIM	17*	25	24	15	319	18.76	75.06%*	82.35%*
As group	38	25			751	20.86	83.44%	89.47%

included in the data were three exempted students from pretest.

Table 6 further implied a success of the treatment because both strands were able to reach the 75% PL in the posttest. The project ROLE implemented in the content "Bionergetics" which revisited difficult topics found in the seven (7) items of summative test 2, offered intervention activities, looked simple ways on how the students would understand the lesson during the review/revisit and engaged all active students in the intervention was found to be effective.

The consolidated posttest scores of summative tests 1 and 2 generated a Performance Level of 80.643%. There was an increased class's performance level in the consolidated posttest scores of the two summative tests. Also, this has reached the standard PL of 75% and indicated that the intervention (ROLE) was effective.

The results of intervention activities in Summative Test 1 and Summative Test 2 have conformed to the following concepts in improving the performance: Revisiting knowledge improves recall (Benney, 2019). Offering intervention activities also helped among the participants. Garcia & Al Safadi, (2014) say that intervention activity is an excellent assistance to boost the academic performance of students. Looking for cues to connect ideas in previously learned concepts which are present in the intervention activities are also helpful. This was in consonance to Magill, 1993 in Henkil (2002) who says that retention is especially enhanced when cues connect ideas to previously learned ideas in some way. Lastly, engaging in a class participation provides the setting in which the learners can construct and shape identities as part of the classroom. All these concepts could have benefitted the project ROLE.

3. Finding Significant Difference in the Performance Level of the Summative Tests Before and After Treatment

A. Significant Difference in Pretest and Posttest of Summative Test 1

Based on table 7, twenty – one (21) Grade 11 CSS and seventeen (17) EIM students, as one group, took the summative test. The pretest was done before the treatment while the posttest was conducted after the treatment. A t-test for dependent means was used to determine if there was a significant

difference in the performance of the participants in the summative test 1 before and after the treatment using the statistics in Microsoft Excel.

Table 7 Sig. Difference in the Performance of the Participants in Summative Test 1

Administration	N	Item	Mean	Var.	Df	t-value	t-critical
Pre-test	38	20	8.68	10.27	37	-16.67*	2.02
Posttest	38	20	16.22	2.90			

*significant @ .05 level of significance

In table 7, the computed t-value of -16.67 was obtained. This computed t-value is beyond the t-critical value of 2.02 at .05 level of significance and with 37 degrees of freedom. The result meant a rejection of the null hypothesis and an interpretation that there was a significant difference in the pretest and posttest of summative test 1. This also meant that Grade 11 CSS and EIM students performed better in the first summative test after the treatment is given (posttest). Further, the result also implied that the treatment which involves giving of enrichment activities and re-discussion/review of these to the participants who did not reach the 75% PL during the pretest of the summative test 1 was effective. Similar result was obtained when the IBM SPSS version 20 was used in the analysis of these data using t-test for dependent means.

B. Significant Difference in Pretest and Posttest of Summative Test 2

Based on table 8, twenty – one (21) Grade 11 CSS and seventeen (17) EIM students, as one group, took the summative test 2. The pretest was done before the treatment. The posttest was conducted after the treatment was given. A t-test for dependent means was used to determine if there was a significant difference in the performance of the participants in the summative test 2 before and after the treatment. The computed t-value of -10.49 was obtained. This computed t-value is beyond the t-critical value of 2.02 at .05 level of significance and with 37 degrees of freedom. The result meant a rejection of the null hypothesis and an interpretation that there was a significant difference in the pretest and posttest of summative test 2.

Table 8 Sig. Difference in the Performance of the Participants in Summative Test 2

Administration	N	Item	Mean	Var.	Df	t-value	t-critical
Pretest	38	25	10.81	15.77	37	-10.49*	2.02
Posttest	38	25	19.76	5.54			

*significant @ .05 level of significance

The t-value from this table also indicated that Grade 11 CSS and EIM students performed better in summative test 2 after the treatment. The result further implied that the treatment which involves giving of enrichment activities and re-discussion/review of these to the participants who did not reach the 75% during the pretest of the first summative test 2 was effective. Similar result was obtained when the IBM SPSS version 20 was used in the analysis of these data using t-test for dependent means.

In a consolidated pretest scores of summative tests 1 and 2, compared with the consolidated posttest score of summative tests 1 and 2, the t computed value was -16.388. With a t critical value of 2.026, the null hypothesis was rejected. The result of the t-test implied that the project ROLE was effective in increasing the participants' performance level by treating their retention on identified difficult concepts.

4. On How Effective is the Treatment in Increasing the Performance Level of Grade 11 CSS and EIM Students in the Second Quarter Assessment.

There were two ways by which this research question was answered. First was by comparing the difference in Mean, PL and ML of the first and second quarter assessments. T-test cannot be used in finding significant difference in the mean of the first and second quarter assessments because the number of items and the content were different. Second was by having a survey to the participants to determine their level of agreement on how effective the treatment was in increasing their performance at the second quarter assessment. The weighted mean per statement in the survey as well as the general weighted mean was used in the analysis and interpretation of the result. The last part was the reflection of the researcher.

A. Mean, PL and ML of the First and Second Quarter Assessments

Based on table 9, the first and second quarter assessments were compared in terms of the Mean, PL and ML regardless of the difference in the content and the total number of items.

Table 9 Comparison of First and Second Quarterly Assessments

Assessment	N	# of item	HS	LS	Mean	PL	ML
First	38	50	17	5	12.33	25.05%	0
Second	38	45	41	25	34.33	77.31%	44.74%
Difference			24	20	22.00	52.26	44.74

Based on table 9, there was an increase in the mean, PL and ML during the second quarterly assessment. The mean score of the first quarter assessment did not even reach the 25% of the total number of items. The mean score of the second quarter assessment reached 75% of the total number of items. Further, it showed that the class had a low performance level on the first quarter assessment while a passing performance level was attained at the second quarter assessment. These data indicated that project ROLE was effective in increasing the Performance Level of the participants. This result could have been linked to Cimer (2011) which says that portfolio process – especially combining self-reflection with weekly tests encouraged students to study regularly, increased retention and made learning more enjoyable. The participants had their portfolio of intervention activities which they can easily access to and review in preparation for the second quarter examination.

B. Participants' Agreement on the Effectiveness of project ROLE

A survey questionnaire with 10 statements was conducted to the participants to determine the level of agreement on the effectiveness of the project ROLE in increasing their performance. The result of the survey was in table 10.

Table 10 Participants' Level of Agreement on the Effectiveness of Project ROLE

EFFECTIVENESS OF THE PROJECT ROLE IN INCREASING PERFORMANCE LEVEL	5	4	3	2	1	WM
1. The enrichment activities enhance my retention on learned concepts.	20	14	4	0	0	4.42
2. The enrichment activities given to me are simple and easy to understand.	14	18	6	0	0	3.68
3. The enrichment activities have illustrations that also helped me remember what the lesson was all about.	12	13	13	0	0	3.97
4. The enrichment activities helped me understand clearly the concepts/skills which were difficult from previous discussion.	13	17	8	0	0	4.13
5. The enrichment activities have become a competent bases of my answers on the summative tests given.	19	12	7	0	0	4.31
6. The enrichment activities have improved my score in the summative test.	20	11	7	0	0	4.34

7. I was able to reach the 75% in the summative test with the help of enrichment activities by enhancing what I learned from the lesson.	18	15	5	0	0	4.34
8. The portfolio has helped me refresh on faded learned concept of past lessons whenever I want to.	16	11	11	0	0	4.13
9. Revisiting and re-discussing past difficult lessons within a short period of time and by answering take-home enrichment activities further my learning in science.	12	20	6	0	0	4.16
10. What we had in Earth & Life Science now is comparably better than what we did during the first quarter. I learn more now in science than before.	16	10	11	1	0	4.07
Average Weighted Mean						4.16

Descriptive Rating:
- 5 (4.6 – 5)   – strongly agree
- 4 (3.6 – 4.5)   – agree
- 3 (2.6 – 3.5)   – neutral
- 2 (1.6 – 2.5)   – disagree
- 1 (1 – 1.5)   – strongly disagree

With the weighted mean ranging from 3.68 to 4.42, each statement which explains the effectiveness of the treatment in enhancing their retention and performance level fell within agree category. Further, based on the sum of rate in all categories and an average weighted mean of 4.16 implied that most of the participants agreed that project ROLE was constructed in ways (simple, with illustration, easy, helpful, avenue for revisit) that helped them improve their test score in the posttest of summative tests and eventually of the second quarter assessment. This happened because second quarter assessment was just a combination of the two summative tests. If they had an increase in the posttests of summative tests, the effect might continue up to the second quarter assessment. The outcome of the survey supported the claim that project ROLE was effective in increasing the Performance Level of the participants in the summative tests and the second quarter assessment.

The Effect of Project ROLE on the Performance Level of the Grade 11 CSS and EIM students in Earth & Life Science: The Researcher's Reflection

On the researcher's perception, the increase in the posttest of the two summative tests was due to the increased retention of the learned concepts and the understanding or re-learning of the difficult topics. This had happened and had paved way during the implementation of the project ROLE. Increasing retention was supported by each stage of the project ROLE as explained by the subsequent paragraphs.

In the **Revisit stage** of the project ROLE, difficult topics which were revealed by an item analysis of summative tests were recalled. This had provided an avenue for them to recall previously learned concepts. Recalling previously learned concepts strengthened the retention which was used just after a week to answer the posttest of summative tests. In fact, teaching the lesson and administering pretest took a longer length of time than revisiting the difficult topics and administering the posttest. This implied that students really had a strong retention of learned concepts before they had taken posttest. Thus, increased performance as indicated by their test scores was observed. Revisit stage also served similarly with "spacing lesson or study" which nurtured the participants' short –term and long-term memory. Bjotk and Bjork (2009) said that massing practice (for example cramming for exam) supported short – term memory while spacing practice (distributing presentation, study attempts or training trials) supports long term memory. Further, according to her, good test performance following an all-night cramming session is certainly rewarding, but little of what was recallable on the test will remain recallable over time. In contrast, study schedule that spaces study sessions on a particular topic can produce both good exam performance and good long-term retention. The revisit on difficult topics served similarly with space lesson or revisit – teaching because an interval had occurred before it was conducted.

In the **Offer stage** of the project ROLE, the researcher gave intervention activities to students who did not reach the 75% PL in the pretest. This stage actually took place before the *Revisit stage*. The intervention activities *(Annexes 7-12)* were constructed based on the difficult items in an item analysis. This activity provided an opportunity for the participants to relearn the concept through an easy way. Intervention activities were constructed as simple and direct as they could be. This claim was supported in a related study on *finding ways to increase the performance of students in Data Structure course*. Garcia, R. & Al Safadi, L. (2014) suggested to use intervention strategies because this type of strategy is an excellent assistance to boost the academic performance of students.

In the **Look stage** of project ROLE, looking and giving cues, sign or indicator to easily remember concepts were helpful especially when there was a time constraint in the re-discussion. Helping students how to understand statements in the questions and how to look for possible answer in different ways (by elimination method or by finding cues) would help them find the correct answer. Magill, 1993 in Henkil (2002) says that retention is especially enhanced when cues connect ideas to previously learned ideas in some way.

In the **Engaged stage** of project ROLE, the increase in the PL and ML of the group would not have been obtained if the treatment were given to only a few or a portion of them. Each has a role to function. Each has to contribute. In an attempt to gather and engage all of them, there were lots of instances that the researcher would have to encourage the group that they can improve the result of their summative tests' score by answering and understanding intervention activities, by attending the review, and by re-taking the tests. There were students who frequently commit absences in class but remained recipients of project ROLE. But there were really three students (1 CSS and 2 EIM) who could not be included because their absences were extreme that enjoining them in the study would raise a question of why and how they became a part of the study. Class participation provides the setting in which the learners can construct and shape identities as part of the classroom. Moreover, it is important in learner-centered curriculum for effective learning to take place. Participation also increases the likelihood that learners will study and have a sense of responsibility for their learning.

The Project ROLE was implemented in a Pre-Experimental Design where the lack of control and comparison group did not allow for a strong establishment of cause-and-effect relationship (between the Independent and Dependent Variables). This intervention was also done in a short period of time among small scale respondents.

Conclusions

The performance level of Grade 11 CSS and EIM students in Earth & Life Science before the implementation of project ROLE was below the standard PL of 75%. The performance level of Grade 11 CSS and EIM students in Earth & Life Science after the implementation of project ROLE was above the standard PL of 75%. There was a significant difference in the PL in Earth and Lie Science among Grade 11 CSS and EIM students before and after the implementation of the Project ROLE. The Likert Scale has indicated that the participants agreed the project ROLE was effective in increasing their retention level and consequently their performance level. An immediate feedback and intervention among student who failed the summative tests is effective in attaining the standard class PL. Results of the study showed that the project ROLE was effective intervention to TVL students struggling to learn difficult concepts in Earth & Life Science.

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