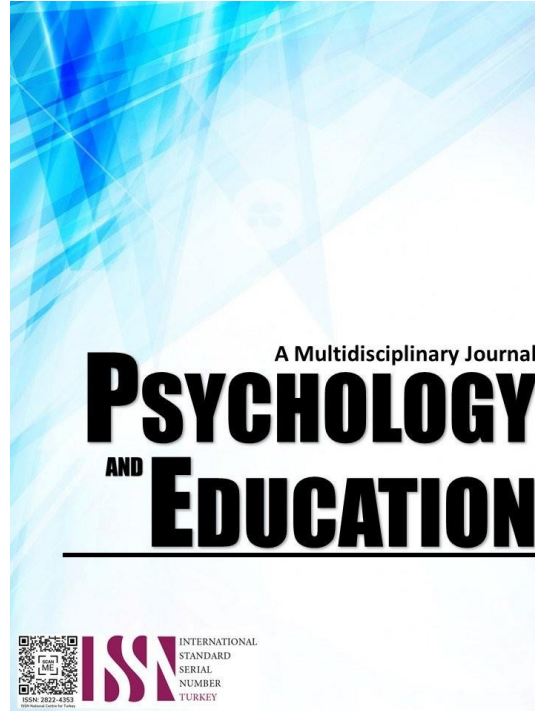


**DEVELOPMENT AND EVALUATION OF  
SUPPLEMENTARY LEARNING MATERIALS  
IN EARTH AND LIFE SCIENCE**



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## Development and Evaluation of Supplementary Learning Materials in Earth and Life Science

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### Abstract

This study aimed to develop and evaluate the supplementary learning materials for the least mastered competencies of senior high school students in Earth and Life Science in San Roque National High School in Marikina City during the school year 2021 – 2022. The method of research used in the study was the descriptive type with the survey questionnaire as the data gathering instrument. The gathered data were treated statistically using ranking, weighted mean, independent-sample t test, and paired-sample t test. The findings showed that the least mastered topics based on the summative test results for the last two years were used in the developed supplementary learning materials. The Science teacher respondents obtained the overall weighted mean of 3.56 with verbal interpretation of Very Satisfactory, while the Science expert respondents got an overall weighted mean of 3.40 which is verbally interpreted as Satisfactory. Regarding accuracy and up-to-datedness of information, the Science teachers and Science experts' respondents got the overall weighted means of 3.71 and 3.77 which were both verbally interpreted as Not Present. In addition, there was a significant difference between the pretest and posttest mean scores of the respondents. Comments and suggestions were given by the respondents to further enhance the developed material.

**Keywords:** *earth science, life science, supplementary learning materials, evaluation*

### Introduction

Learning materials are very necessary to be provided by the teachers because these aids them to deliver quality instructions during the teaching-learning process. Thus, through the appropriate materials, total teaching and learning would be inevitable.

As mentioned by Adeogun (2019), the teachers who can use various instructional teaching materials effectively are likely to have good performances compared to those who do not utilize instructional materials. With these ideas, it was suggested that schools should teach their employees to have quality teaching and learning by way of designing instructional materials and tools which can be used by their students.

Thus, students will converge and have similar learning outcomes; however, it is not that simple. We need to account for inclusion, which naturally brings a divergence of student learning styles and challenges. Teachers are being called upon to produce greater similarity in learning outcomes, despite greater diversity in student populations.

The information circulates from the idea that quality instructional materials are contributory to providing quality learning. It simply indicates that educators ensure that their learners would learn the necessary skills through the effective utilization of the different instructional resources and/or learning materials. As

posited by Akande (2020), productive learning certainly occurs by way of having meaningful conversation and interaction with other learners. Hence, there must be an assurance that all teaching resources provided are effective enough to provide meaningful experiences for the students.

Understanding and instructional resources are real, substantial vehicles for aiding quality instruction. High-level characteristic LTMs are created on principles and curricular contexts that link subjects with significant ideas, topics, and theories, and are the outputs of thorough field assessment and improvement. Concerns strategy and teaching designers must bear in mind when choosing on LTMs are: the link with results, choice, subject area and grade level suitability, and listing of LTMs in resource-controlled settings.

In the content article of Ministry of Education, Guyana entitled: "The Importance of Learning Materials in Teaching" which states: Teaching materials can support student learning and increases student success. Ideally, the teaching materials will be tailored to the content in which they're being used.

Likewise, learning materials are important because they can significantly increase student achievement by supporting student learning where a worksheet may provide students with important opportunities to practice a new skill gained in class. Learning materials, regardless of what kind, all have some function in student learning.

In addition, learning materials can assist teachers in an important professional duty: the differentiation of instruction where tailoring of lessons and instruction to the different learning styles and capacities within the classroom environment.

On the other hand, senior high school students of the division of Marikina city are being confronted with such issues which may lead to their incompetency in Science as the discipline of learning. With such interventions, students may still need assistance in bridging the gap. One of these is through developing a supplementary material which would cater their learning needs and knowledge modification so that they can understand better with the guidance of the science teachers.

It is on these significant points that the researcher was encouraged to conduct this study on the development and evaluation of Supplementary learning materials in Earth and Life Science to help the teachers make their strategies in teaching more effective through the use of the developed supplementary learning material, and to help the Senior High School students grasp immediately the lesson through the effective and efficient use of the modified, enhanced learning materials in Science.

### Research Questions

This study aimed to develop and validate the supplementary learning materials for the least mastered competencies of senior high school students in earth and life science in Grade 11 at San Roque National High School in Marikina City during the school year 2021 – 2022. More specifically, it sought answers to the following questions:

1. What are the least mastered topics that can be subject of development of supplementary learning materials in Earth and Life Science based on the summative test results for the last three years?
2. What is the evaluation of the science experts and the science teachers on the developed supplementary learning materials in terms of the following criteria:
  - 2.1. Content;
  - 2.2. Format;
  - 2.3. Presentation and Organization; and
  - 2.4. Accuracy and Up – to – datedness of Information?
3. Is there a significant difference in the evaluation of the two groups of respondents on the developed supplementary learning materials in terms of the aforementioned criteria?
4. What is the level of academic performance of the

student respondents before and after using the developed supplementary learning materials based on their pre-test and post-test mean score?

5. Is there a significant difference between the pre-test and post-test mean score of the respondents?

6. What are the comments and suggestions of the teacher respondents to further improve the developed supplementary learning materials?

### Literature Review

Supplementary learning resources as presented by Lewis (2018) refer to the educational resources that educators utilize to achieve the set objectives. In the teaching-learning process, teachers should employ various learning resources to encourage active participation among learners.

According to Antofina (2020), the supplementary learning resources and facilities are tools used by educators in delivering the lessons properly.

As stated by the UNESCO's International Institute for Educational Planning by Lewis (2018), instructional materials are real vehicles for aiding the learning of the students. It is established on the guidelines set by the curriculum that connects subjects with big ideas and concepts, and a product of study. Various factors are given in making instructional materials such as relationship with learning results, content, appropriateness, access and storage, and prioritization in the resource environment.

Mamais (2018) noted ideas on the supplementary aids in Science which can enhance the internal enthusiasm of the students for understanding and maintain their interest. Many students demonstrate persistent curiosity and participate in the given endeavor. This is important because understanding concepts cannot immediately be given to students, hence readiness must be evident first. Also, instructional resources must create diversity and must promote the critical thinking abilities of the students to analyze ideas considering unique dispositions.

As stated by Samuel (2020), supplementary materials indicate a different way of communication which the teachers used to provide instructions and pieces of information to the learners. In developing learning materials, it should not only extend the range of senses that pupils use to learn but also expand the selection of materials used for communicating the information through those senses. Instructional materials, thus, represent the interchange of media through which

information is assisted in the middle of the teacher and the students.

The teaching-learning process changes on the instructional materials used by the teacher. If the resources are freely accessible and students can get into all of it, learning is highly feasible. On the other hand, absence of instructional materials such as books and modules may run to a low attainment rate of the learners. Instructional materials are a vital part of the learning process (Seven and Engin, 2019).

One of the studies that are linked to the current study was performed by Parales (2019). He created a work text in Physics which revealed very important findings in improving the academic performance in Physics of fourth year students. The experimental group or those learners taught with the use of the improved work text in Physics got a higher mean percentage score linked to the control group or those students taught using the textbook from DepEd.

Nigeria Farombi (2019) conducted a survey on resource concentration, consumption, and management as linked with learners learning results in Oyo State. He found that instructional resources in certain schools were very inadequate. He stated examples of schools without chalkboard, absence of ceiling, some roofing sheets not in place, windows and doors removed among others, a situation which the researcher regarded as hazardous to healthy living for the learners.

In the studies done by Abdelraheem, Al-Rabani, and Ibe-Bassey (2020) about the concept of improvised media of low technological materials and resource-centered learning can add to the inadequate understanding center of any course of study and enhance teaching to a certain value. It can also give strategies that deliberately ensure the incorporation of technology in the educational process of basic science education. With their results, these are in agreement with the results of Dodge (2017) who stated that using technologies like simulation devices begin new horizons for personal learning tools, the environment resources and services.

Another study conducted by De Gulan (2018) explored the use of videotapes as an instructional strategy in Biology and its effect on achievement, retention, and attitude towards Science. The subjects in this study were thirty matched pairs of Biology students from two special Science classes and thirty from two regular Science classes. The control groups used some visual materials like charts and diagrams while the experimental groups used videotapes. A 40 – item

achievement test was administered as pretest, posttest, and retention test. Based on achievement test and attitude scale scores, there was a significant difference between groups only between the two special Science classes. However, there was no significant difference between the control and the experimental groups in the regular Science classes. Hence, considering the results in this study, it is worth extending its findings in order to determine if instructional strategies such as Graphic Organizer use can substitute for videotape viewing which is economically demanding. Furthermore, this research was done within of 14 days only with only one topic, the human organ systems.

## Methodology

The researcher utilized the descriptive method and quasi-experimental design which aimed to assess the supplementary learning material in science. The descriptive method is suited in obtaining facts, events, current condition and the ability of every teacher in specific school organization.

As cited by Aljawder and Rani, according to Cassandra McNeill (2018), it is a methodology that is not exclusive to market researchers but one that can apply to a variety of research methods used in healthcare, psychology, and education.

A quasi-experimental design aims to establish a cause-and-effect relationship between an independent and dependent variable. However, unlike a true experiment, a quasi-experiment does not rely on random assignment. Instead, subjects are assigned to groups based on non-random criteria. Quasi-experimental design is a useful tool in situations where true experiments cannot be used for ethical or practical reasons.

## Participants of the Study

The main sources of data were the Science teachers and Science experts. There were twenty (20) Science teachers and ten (10) Science experts sourced from the selected public secondary schools in District I namely; Barangka National High School, Calumpang National High School, Dela Peña National High School, Marikina Science High School, Tañong High School, San Roque National High School and Sta. Elena High School in the schools division office - Marikina city during the school year 2021 - 2022.



Table 1. *Distribution of Science Teachers and Science Experts-Respondents by School*

School	Science Teacher Respondents		Science Experts Respondents	
	Frequency	Percentage	Frequency	Percentage
Barangka High School	3		1	
Calumpang National High School	3		1	
Dela Peña National High School	2		1	
Marikina Science High School	4		2	
Tañong High School	2		1	
San Roque National High School	2		1	
Sta. Elena High School	4		2	
Total	20	100.00	10	100.00

**Instruments of the Study**

This research utilized the modified questionnaire which served as the main instrument that aims to generate information about the respondents. The survey questionnaire or evaluation sheet was adapted from the Department of Education (DepEd) under Learning Resources Management and Development System (LRMDS) Assessment and Evaluation.

Part of the said survey questionnaire is the evaluation of the supplementary learning materials which has factors 1 – 4 with the descriptive rating of Very Satisfactory (VS), Satisfactory (S), Poor (P) and Not Satisfactory (NS).

**Procedures**

The following was the step-by-step procedure made by the researcher in gathering the data: First, a letter of permission to conduct a study was submitted to the Schools Division Superintendent through the school head. Second, the pre-test and post-test were given before and after the conduct of the study. Third, the retrieval of the questionnaires from the teacher respondents and the data consisting of their assessment on the supplementary learning materials were tabulated and analyzed.

Lastly, the results of the pre-test and post-test were treated to determine the significant difference between the abovementioned tests.

**Ethical Considerations**

The researcher herself explained and gave the informed consent to each participant before the conduct of the study. She ensured them that the information would be used with utmost confidentiality and within the purpose of the study only.

**Results and Discussion**

Least Mastered Topics that Can Be Subject of Development of Supplementary Learning Materials in Earth and Life Science Based on the Summative Test Results for the Last Two Years

Table 2. *Least Mastered Competencies of Earth and Life Science*

Learning Competencies (First Grading Period)	S.Y 2018-2019 RANK & MEAN Scores	S.Y 2019-2020 RANK MEAN Scores	S.Y 2018-2019; 2020-2021 RANK & Total MEAN Scores
State the different hypotheses explaining the origin of the universe.	14 – 3.45	15-3.40	14-3.43
Describe the different hypotheses explaining the origin of the solar system.	15- 3.41	14-3.42	15-3.42
Recognize the uniqueness of Earth, being the only planet in the solar system with properties necessary to support life.	10 – 3.57	5- 3.74	6-3.66
Explain that the Earth consists of four subsystems, across whose boundaries matter and energy flow.	11- 3.55	9- 3.60	10-3.58
Explain the current advancements/information on the solar system	12- 3.48	10- 3.57	11-3.53
Show the contributions of personalities/people on the understanding of the earth systems	13- 3.46	12-3.49	13-3.48
Identify the layers of the Earth (crust, mantle, core).	3.85	4- 3.75	1-3.8
Differentiate the layers of the Earth.	3.74	6- 3.69	5-3.72

Identify common rock-forming minerals using their physical and chemical properties	5- 3.69	3.79	4-3.74
Classify rocks into igneous, sedimentary, and metamorphic	3.71	1 – 3.87	2-3.79
explain how the products of weathering are carried away by erosion and deposited elsewhere	7- 3.65	7- 3.64	7-3.65
Describe how rocks behave under different types of stress such as compression, pulling apart, and shearing	6- 3.68	2- 3.82	3-3.75
Explain how the movement of plates leads to the formation of folds and faults	3.72	11-3.52	8-3.62
Explain how the seafloor spreads	8- 3.60	8- 3.62	9-3.61
Explain how relative and absolute dating were used to determine the subdivisions of geologic time	9- 3.58	13-3.46	12-3.52



Learning Competencies (Third Grading Period)	S.Y 2018-2019 RANK	S.Y 2019-2020 RANK	S.Y 2018-2019-2020-2021 RANK & Total MEAN Scores
Explain the evolving concept of life based on emerging pieces of evidence	4-3.73	9-3.38	7-3.56
Describe how unifying themes (e.g., structure and function, evolution, and ecosystems) in the study of life show the connections among living things and how they interact with each other and with their environment	1-3.93	2-3.70	1-3.82
Explain how cells carry out functions required for life	5-3.70	4-3.63	4-3.67
Explain how photosynthetic organisms use light energy to combine carbon dioxide and water to form energy-rich compounds	8-3.60	3-3.67	5-3.64
Trace the energy flow from the environment to the cells.	3-3.85	1-3.78	1-3.82
Describe the different ways of how plants reproduce	6-3.68	8-3.43	7-3.56
Illustrate the relationships among structures of flowers, fruits, and seeds	7-3.65	6-3.49	6-3.57
Describe the different ways of how representative animals reproduce	2-3.87	5-3.59	3-3.73
Explain how the information in the DNA allows the transfer of genetic information and synthesis of proteins	9-3.59	7-3.45	9-3.52
Describe the process of genetic engineering	10-3.55	11-3.27	10-3.41
Conduct a survey of the current uses of genetically modified organisms	12-3.35	10-3.30	12-3.33
Evaluate the benefits and risks of using GMOs	11-3.42	12-3.25	11-3.34

The topics presented in the table were the least mastered topics in Earth Science which were ranked from 1-15, (1 being the most difficult and 15 being the least difficult; and Life Science were also ranked from 1-12, (1 being the most difficult and 12 being the least difficult.

The least mastered skills during the last three years (2018-2021) were identified by the Science teachers of Grade 11. These were given importance by way of doing a rank list to identify the most and least difficult competencies. The identified least mastered topics were: 1.) Earth: Origin and Structure of the Earth, 2.) Life Science: Perpetuation of Life.

Validation of the Science Experts and the Science Teachers on the Developed Supplementary Learning Materials in Earth and Life Science

As shown on Table 3, the Science teacher-respondents got an overall weighted mean of 3.49, while the Science expert-respondents got 3.41. Both the overall weighted means were verbally interpreted as Satisfactory.

This simply implies that both groups of respondents share a parallel perception as regards the content of the developed supplementary learning materials. Although most of the mentioned indicators were evaluated very Satisfactory, the findings, as evidently seen in the computed overall weighted means suggest that there is a need for the SLM in Science to be enhanced in terms

of content specifically on the points of integrating ideological, cultural, religious, racial, gender biases and prejudices, and also on the development of desirable values.

Table 3. Respondents' Validations on the Developed Supplementary Learning Materials as Regards Content

	Respondents			
	Science Teachers		Science Experts	
	WM	VI	WM	VI
1. The content is suitable to the student's level of development.	3.65	VS	3.60	VS
2. Material contributes to the achievement of specific objectives of the subject area and grade level for which it is intended.	3.75	VS	3.50	VS
3. Material provides for the development of higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem solving, etc.	3.50	VS	3.50	VS
4. Material is free of ideological, cultural, religious, racial, and gender biases and prejudices.	3.65	VS	3.40	S
5. Material enhances the development of desirable values and traits such as: (Put a check mark only to the applicable values and traits)	2.60	S	2.60	S
6. Material has the potential to arouse interest of target reader	3.80	VS	3.60	VS
7. Adequate warning / cautionary notes are provided in topics and activities where safety and health are of concern.	3.50	VS	3.70	VS
Overall Weighted Mean	3.49	S	3.41	S
Standard Deviation	0.27		0.18	

As revealed on Table 4, the Science teacher-respondents obtained an overall weighted mean of 3.61 which was verbally interpreted as Very Satisfactory, while the Science expert-respondents obtained an overall weighted mean of 3.36 which was verbally interpreted as Satisfactory.

This means that the two groups of respondents displayed different perceptions in terms of the format of the developed supplementary learning materials in Science.



Table 4. Respondents' Validations on the Developed Supplementary Learning Materials as Regards Format

	Respondents			
	Science Teachers		Science Experts	
	WM	VI	WM	VI
1. Prints				
1.1 Size of letter is appropriate to the intended user.	3.75	VS	3.60	VS
1.2 Spaces between letters and words facilitate reading.	3.80	VS	3.40	S
1.3 Font is easy to read.	3.55	VS	3.20	S
1.3 Printing is of good quality (i.e., no broken letters, even density, correct alignment, properly placed screen registration)	3.65	VS	3.30	S
2. Illustrations				
2.1 Simple and easily recognize	3.60	VS	3.30	S
2.2 Clarify and supplement the text	3.60	VS	3.40	S
2.3 Properly labelled or captioned (if applicable)	3.65	VS	3.10	S
2.4 Realistic / Appropriate colors	3.60	VS	3.30	S
2.5 Attractive and Appealing	3.55	VS	3.30	S
2.6 Culturally relevant	3.55	VS	3.60	VS
3. Design and Layout				
3.1 Attractive and Pleasing to look at	3.65	VS	3.50	VS
3.2 Simple (i.e., it does not distract attention to the reader)	3.60	VS	3.30	S
3.3 Adequate illustration in relation to text	3.75	VS	3.50	VS
3.4 Harmonious blending of elements (e.g., illustration and texts)	3.30	S	3.30	S
Overall Weighted Mean	3.61	VS	3.36	S
Standard Deviation	0.11		0.14	

It further explains that on the part of the Science expert-respondents, there is a strong need for the SLMs to improve its format such that the materials adhere to the correct / accurate presentation of prints, illustrations, design and layout.

As shown in Table 5, the Science expert-respondents got an overall weighted mean of 3.42 which was verbally interpreted as Satisfactory, while the Science teacher-respondents got 3.58 which was verbally interpreted as Very Satisfactory.

Table 5. Respondents' Validations on the Developed Supplementary Learning Materials as Regards Presentation and Organization

	Respondents			
	Science Teachers		Science Experts	
	WM	VI	WM	VI
1. Presentation is engaging, interesting and understandable	3.55	VS	3.40	S
2. There is a logical and smooth flow of ideas	3.70	VS	3.40	S
3. The test items are suitable to the comprehension level of the Grade 11 students.	3.60	VS	3.50	VS
4. Vocabulary level is adapted to the target reader's likely experience and level of understanding	3.45	S	3.40	S
5. Length of sentences is suited to the comprehension level of the target reader	3.60	VS	3.40	S
Overall Weighted Mean	3.58	VS	3.42	S
Standard Deviation	0.17		0.20	

With the dissimilar views shown by the two groups of respondents, enhancement of the SLMs in terms of presentation and organization needs to be given due attention / focus. Although the Science teacher-respondents showed a Very Satisfactory perception, there is still a need to look into the mentioned aspect because on the perception of the Science expert-respondents, the SLMs in Science need to be properly presented and organized such that the ideas included would bring out students' active engagement, interest, and it will enable the students grasp immediately the concept presented. In other words, the students and teachers will find the materials easy to understand.

Table 6. Respondents' Validations on the Developed Supplementary Learning Materials as Regards Accuracy and Up-to-Datedness of Information

	Respondents			
	Science Teachers		Science Experts	
	WM	VI	WM	VI
1. Conceptual errors.	3.70	NE	3.80	NE
2. Factual errors.	3.75	NE	3.70	NE
3. Grammatical errors.	3.65	NE	4.00	NE
4. Computational errors.	3.70	NE	3.70	NE
5. Obsolete information.	3.65	NE	3.70	NE
6. Typographical and other minor errors (e.g., inappropriate or unclear illustrations, missing labels, wrong captions, etc.).	3.80	NE	3.70	NE
Overall Weighted Mean	3.71	NE	3.77	NE
Standard Deviation	0.21		0.21	



As seen on Table 6, both groups of respondents obtained the overall weighted means of 3.71 and 3.77 respectively. Both the overall weighted means were verbally interpreted as Not Evident.

This simply connotes that the Science teachers and Science experts share the same view as regards the accuracy and up-to-datedness of information. It further elaborates that the SLMs in Science do observe correctness.

As displayed on Table 7, the Science teacher-respondents obtained a grand weighted mean of 3.56 which was verbally interpreted as Very Satisfactory, while the Science expert-respondents obtained 3.40 which was verbally interpreted as Satisfactory.

Table 7. Summary of Respondents' Validations on the Developed Supplementary Learning Materials in Earth and Life Science

	Respondents			
	Science Teachers		Science Experts	
	OWM	VI	OWM	VI
a. Content	3.49	S	3.41	S
b. Format	3.61	VS	3.36	S
c. Presentation and Organization	3.58	VS	3.42	S
Grand Weighted Mean	3.56	VS	3.40	S
d. Accuracy and Up-to-Datedness of Information	3.71	NE	3.77	NE

This generally means that the developed supplementary learning materials in Science need to be improved in terms of content, format, and presentation and organization, giving respect to the perception of the Science experts.

As regards the accuracy and up-to-datedness of information, both groups of respondents agreed in one parallel idea, the overall weighted means of 3.71 and 3.77 were verbally interpreted as Not Evident. This certainly means that the SLMs in Science are accurate and updated.

Significant Difference in the Validations of the Two Groups of Respondents on the Developed Supplementary Learning Materials in Earth and Life Science

Table 8 presented that the computed t value of 0.83 is less than the critical t value of 2.05 with 28 degrees of freedom. At 5% significance level, the statistical decision is not to reject the null hypothesis.

Table 8. Test of Significant Difference Between the Evaluations of the Two Groups of Respondents on the Developed Supplementary Learning Materials as to Content

Respondents	n	OWM	S	Computed t Value	Critical t value	Decision	Interpretation
Teachers	20	3.49	0.27	0.83	2.05	Fail to reject the H <sub>0</sub>	Not Significant
Experts	10	3.41	0.18				

This indicates that there is no significant difference between the validations of the two groups of respondents on the developed supplementary learning materials in Earth and Life Science in terms of content.

This implies that the developed supplementary learning materials in Science are somehow acceptable in terms of content, however, considering the perceptions of the two groups of respondents, the SLMs in Science still need to consider various aspects to make these more understandable, more appropriate, and more acceptable.

Table 9. Test of Significant Difference Between the Evaluations of the Two Groups of Respondents on the Developed Supplementary Learning Materials as to Format

Respondents	n	OWM	S	Computed t Value	Critical t value	Decision	Interpretation
Teachers	20	3.61	0.11	5.36	2.05	Reject the H <sub>0</sub>	Significant
Experts	10	3.36	0.14				

Analysis of Table 9, the computed t value of 5.36 is greater than the critical t value of 2.05. At 5% significance level, the statistical decision is to reject the null hypothesis. As a result, there is a significant difference between the validations of the two groups of respondents on the developed supplementary learning materials in Earth and Life Science in terms of format.

This means that there is a need to reconsider fixing the SLMs in Science following the prescribed format. Hence, adhering to the prescribed format and indicators would certainly make the developed SLMs more appealing, and easy to use.

Table 10. Test of Significant Difference Between the Evaluations of the Two Groups of Respondents on the Developed Supplementary Learning Materials as to Presentation and Organization

Respondents	n	OWM	S	Computed t Value	Critical t value	Decision	Interpretation
Teachers	20	3.58	0.17	2.29	2.05	Reject the H <sub>0</sub>	Significant
Experts	10	3.42	0.2				



As displayed in Table 10, the computed t value of 2.29 is above the critical t value of 2.05. Thus, this leads that the null hypothesis can be rejected. At 5% level of significance, this suggests that there is a significant difference between the validations of the two groups of respondents on the developed supplementary learning materials in Earth and Life Science in terms of presentation and organization.

This elucidates that the supplementary learning materials in Science need to be presented and organized in a manner that the ideas and concepts included are engaging, interesting, logical, and can easily be adapted.

Table 11. *Test of Significant Difference Between the Evaluations of the Two Groups of Respondents on the Developed Supplementary Learning Materials as to Accuracy and Up-to-Datedness of Information*

Respondents	n	OWM	S	Computed t Value	Critical t value	Decision	Interpretation
Teachers	20	3.71	0.21	0.72	2.05	Fail to reject the H <sub>0</sub>	Not Significant
Experts	10	3.77	0.21				

It can be viewed in Table 11 that the computed t value of 0.72 is smaller than the critical t value of 2.05. Consequently, the statistical decision is not to reject the null hypothesis. At 5% level of significance, this shows there is no significant difference between the validations of the two groups of respondents on the developed supplementary learning materials in Earth and Life Science in terms of accuracy and up-to-datedness of information.

This implies that the supplementary learning materials in Science evaluated by the two groups of respondents were found to be very useful for these considered and observed the correctness and up-to-datedness of the information included.

Table 12 depicted that the validations of teachers and expert respondents on the developed supplementary learning materials in Earth and Life Science with respect to content, and accuracy and up-to-datedness of information do not indicate significant differences as shown by the corresponding computed t values which are less than the critical t value.

Table 12. *Summary of Test of Significant Difference Between the Validations of the Two Groups of Respondents on the Developed Supplementary Learning Materials in Earth and Life Science*

	Teachers		Experts		t <sub>computed</sub> Value	Decision	Interpretation
	OWM	s	OWM	s			
Content	3.49	0.27	3.41	0.18	0.83	Fail to Reject the H <sub>0</sub>	Not Significant
Format	3.61	0.11	3.36	0.14	5.36	Reject the H <sub>0</sub>	Significant
Presentation and Organization	3.58	0.17	3.42	0.2	2.29	Reject the H <sub>0</sub>	Significant
Accuracy and Up-to-datedness of Information	3.71	0.21	3.77	0.21	0.72	Fail to Reject the H <sub>0</sub>	Not Significant

But in terms of format, and presentation and organization, respondents' evaluations are not the same.

This simply elaborates that the two groups of respondents made a thorough validation on the developed supplementary learning materials in Science. And considering their different perceptions in the aspects – format, presentation and organization, there is really a need to enhance more the developed SLMs in Science to make these materials become easier to use, and comprehensive enough which can help the students to develop more their higher order thinking skills in Earth and Life Science.

#### Level of Academic Performance of the Student Participants Before and After Using the Developed Supplementary Learning Materials Based on Their Pretest and Posttest Mean Scores

Table 13. *Frequency and Percentage of Pretest and*

Score	Descriptive Level	Pretest		Posttest	
		Frequency	Percentage	Frequency	Percentage
15 - 20	Mastery	2	10	6	30
14 - 10	Near Mastery	18	90	14	70
0 - 9	Non-Mastery	0	0	0	0
	Total	20	100	20	100
	Mean Score		12.65		15.25
	Standard Deviation		1.42		1.21

#### Posttest of the Student Participants

It could be gleaned on Table 13 that in the pretest, eighteen (18) out of twenty (20) or 90 % of the students with scores ranging from 10-14 belong to the Near Mastery Level. Two (2) or 10 % of the students with scores ranging from 15-20 belong to the Mastery Level. The posttest results had shown that those who



got scores ranging from 10-14 decreased from 18 or 90 % to 14 to 70%. On the other hand, students who had Mastery Level increased from 2 or 10% to 6 or 30%.

This means that the performance level of the students increased from the mean score of 12.65 (pretest) to 15.25 (posttest), thus, after they used the supplementary learning materials, the students reached 30 % Mastery Level ascent of 4% as shown on the table.

Table 14. *Test of Significant Difference Between the Pretest and Post test Mean Scores of the Student Participants in Earth and Life Science*

	Mean	s	Computed t Value	Critical t Value	Decision	Interpretation
Pretest	12.65	1.42	15.42	2.09	Reject the Ho	Significant
Posttest	15.25	1.21				

Perusal to Table 14, at 5% significance level and 19 degrees of freedom, the critical t value 2.09, and the computed t value is 15.42. As the computed t value is more than the critical t value, the statistical decision is to reject the null hypothesis. This concludes that there is a significant difference between the pretest and posttest mean scores of the student participants in Earth and Life Science.

This generally means that there is an improvement in the performance of the students after having utilized the developed supplementary learning materials in Science.

The comments and suggestions offered by the respondents to further improve the developed supplementary learning materials are hereby offered:

**Comments:** The developed supplementary learning materials in Earth and Life Science are helpful aids for teachers to make their learning activities more engaging, more interesting, and more comprehensive and these could be considered as significant teaching instruments that can help the students increase their learning performance. Thus, the SLM’s play a vital role in helping the students more develop their higher order thinking skills.

**Suggestions:** The developed supplementary learning materials in Earth and Life Science should include more activities which consider the various learning styles of the students. It should be utilized not only as teaching aids but also as tools to encourage students’ active engagement in the learning process.

Furthermore, it should be made more accurate, and more comprehensive to ensure that the set objectives of the lessons will be achieved and it should be distributed to all teachers to assess and ensure effectiveness.

### Conclusion

Based on the findings of the study the following conclusions are made: (1) Supplementary learning materials could be developed by the Science teachers and Science experts to be used in teaching the least mastered topics in Earth and Life Science. (2) The developed supplementary learning materials in Earth and Life Science are somehow acceptable to the Science teachers and Science experts, hence, there is a need to improve in terms of content, format, and presentation and organization.

The following recommendations are hereby offered: (1) The developed supplementary learning materials in Earth and Life Science may be used as teaching aids to help the students boost their interest and love in learning essential skills in Earth and Life Science. (2) Other Science teachers may be encouraged to create supplementary learning materials in the other topics of Earth and Life Science. (3) Future researchers may conduct similar studies for validation purposes. (4) Further studies on supplementary learning materials integrating various activities and considering the learning styles of the students are also suggested to be conducted which would test the quality of the teaching and learning results to enhance the class standing or performance of the students.

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