SUPPLEMENTARY MATERIAL IN INTERMEDIATE MATHEMATICS

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Abstract

In the K-12 curriculum, mathematics plays a significant role and is given specific attention. To keep up with the pace, teachers need have a set of teaching options, including not simply chalk talk but also other methods and tactics for gaining students' attention and imparting knowledge. Reducing the learning competencies by 60 the prescribed module may not be sufficient to the learners to achieve a variety of objectives and ideas or skills that our learners expected to master's in mathematics. Providing supplementary material that anchor in MELCs to promote motivation, interest, skill practices and to fill the gap in the topics.

This study determined the acceptability and effectiveness of supplementary material in intermediate mathematics in Duhat Elementary School, School Year 2021-2022. It sought to answer the following questions: 1. the level of acceptability of supplementary material in intermediate mathematics in terms of component with regards to objectives, content, language used and activity; 2. the level of acceptability of supplementary material in intermediate mathematics in terms of characteristics with regards to adaptability, appropriateness; aesthetic value and usability; 3. the extent of learner's mathematical performance in the pretest and posttest in using supplementary material in terms of arithmetic skill, geometric skill and higher order thinking skill (HOTS) 4. Do the learner's mathematical performance have significant difference in terms of pretest and posttest? The study's research design was quasi-experimental. Purposive sampling was utilized, which is a non-probability sample that is chosen based on population characteristics and the study's objective. The selected fifty – eight (58) Grade 4 Learners of Duhat Elementary School are the one whose answered the pretest and posttest while the twenty – four (24) teachers from Division of Laguna answered the survey questionnaire. All these learners are modular distant learning as their mode of learning.

The findings revealed the majority of teachers who evaluated the supplementary material found its component which are objectives, content, language used, and activity to be highly acceptable and for its characteristics which are adaptability, appropriateness, aesthetic value and usability to be highly acceptable as well it indicates the usefulness of supplementary material to continue the education and motivates the learner to attain the desired competencies in mathematics. The learners scores in pre-test in terms arithmetic skills and higher order thinking skills got proficient, approaching proficiency respectively as same result in the posttest while the geometric skills got approaching proficiency on pretest and received the proficient in posttest. This indicates that the learner's mathematical performance improved after using supplementary material despite of small scale of mean increase it shows improvement. The study shows that supplementary material affects the mathematical performance in terms of arithmetic skills, geometric skills and higher order skills (HOTS). Therefore, there is a significant difference between learner's mathematical performance in pretest and posttest scores in using supplementary material.

Keywords: Supplementary Material, Components, Characteristics, Performance, Arithmetic Skill, Geometric Skill and Higher Order Skills (HOTS).

1. Main Text

Introduction

New normal is a challenging task where the COVID - 19 pandemic widely affected education across the world and bring out unknown scenarios that required quick responses. The pandemic came on top of changes in the education system along with different methods/strategies and also the learning modalities.

Various academic subjects including Mathematics are too difficult to teach and discuss to the students using the modular approach this time of pandemic. Students may either study the lessons by themselves or with the help of their parents or guardians who are not knowledgeable enough to teach specific lessons. Learning in this kind of method is too challenging for the students because of the lack of assistance and lack of resources like internet, books, and other likes.

Teachers, therefore, should select and use certain supplementary material based on their learners' learning styles and needs (Riasati & Zare, 2012). It also one of the key factors influencing learning. Teachers during in the midst of health crisis should not forget to ensure the quality of education for the students by providing appropriate, valid, reliable, and effective learning materials.

In this study, the researcher purpose is to come up with an idea and develop a supplementary material that will help to enhance the mathematical skills of the learners. The supplementary material provides additional content to fill the gap in the topics, suitable material for learners' particular need and interest and also extra skill practices. Depending on the result, the researcher aims to recommend effective ways to improve supplementary material in Mathematics. The data, that the researcher will be gathered and processed, could be used for other research and studies related in improving supplementary material.

Background of the Study

The first school year of modular distance learning was very tough. Encountering insufficient learning content and examples, typographical errors in solution and answer and some learning tasks is too complex for learners that cause poor performance in the mathematics. This problem challenges both the student and the teachers. Student faces different struggles in taking subjects through modules. They might encounter difficulties in understanding lessons because of the lack of clear and well-organized instructions. Students are not well guided on their learning process. Also, modules are not applicable for all student since they have different learning style. On the other hand, teachers should assure the alignment of the activities and lectures to the most essential competency and should meet the capability level of the students. In the given modules prepared by the Department of Education (DepEd), the lessons were too limited and not detailed leading the students to misunderstand the lesson. Also, there are corrections in the content such as having a correct solution but the process or the final answer is wrong. In the mentioned problems, teachers must provide a well-organized and efficient supplementary material by ensuring that the content and activities are suited to the desire outcome for the students.

The researcher thought of utilizing supplementary material aligned with MELCs because she believes with the use of supplementary material the learners can improve their performance in Mathematics correspond to enhanced basic education act. Through the use of supplementary material, teachers can give follow-up reading materials and activities that may improve and continue the learning of the students in their own paces.

The Enhanced Basic Education Act establishes the Enhanced Basic Education Program, which espouses the following objectives: give every student an opportunity to receive quality education that is globally competitive based on pedagogically sound curriculum that is at par with international standards and make education learner-oriented and responsive to the needs, cognitive and cultural capacity, the circumstances and diversity of learners, schools and communities through the appropriate languages of teaching and learning, including the mother tongue as a learning resource (Sec. 2).

This supplementary material should complement or supplement curricula and be relevant to the course's learning outcomes and content. As much as possible the resources developed should be produced locally whenever. They must be content-appropriate as well as appropriate for the students' emotional development, aptitude level, learning style, social development, and age.

Theoretical Framework

This study is anchored on the theories on individualizing instruction through supplementary material. Bušljeta, R. (2013) state the purpose of utilizing teaching and learning resources in class is to assist the teacher with the presentation and transmission of educational content and the achievement of educational objectives, whilst aiding the students in acquiring knowledge and profiling different abilities and values. Therefore, we can list the following examples of their common goals: 1. Student motivation, 2. Developing creativity, 3. Evoking prior knowledge, 4. Encouraging the process of understanding, decoding, organising and synthesising the educational content, logical thinking and reasoning, communication and interaction, and 5. Contributing to the development of different skills and the acquisition of values of students, as well as the retention of desirable knowledge, skills and attitudes.

Stanny, C. J. (2016) is very helpful in writing learning objectives for the cognitive (knowing), psychomotor (doing: skill), and affective (attitude) domains. Much of the medical school curriculum focuses on the cognitive domain, which Bloom categorized into 6 levels, starting from simple recall or recognition of facts (knowledge) level, through increasingly more complex and abstract mental levels, to the highest order (evaluation.)

Teaching technique plays an important role in students learning process. This study lends on the theory of Bruner revised by McLeod (2019) which explained that students may perform better as long as appropriate guidance and learning resources that will fit their needs are given to them. In the mathematics class, aside from the teachers, the mathematically inclined students may serve as a guide for he students during the exploratory activities.

According to Cahyaningruma, D. et al (2016) developing supplementary materials as well as the other supplementary materials based on constructivism principles for students effective learning is an effort to create an effective learning environment for the students learning. In this case, the focus is on the learner in thinking about learning or it is not on the subject/lesson to be

taught. The extended reading/materials here are designed to provide sufficient exposure and opportunities for practices, accommodating the strength of the constructivism principles for students' effective learning. Learning materials that are locally relevant with diversity of students' condition and needs and meaningful for their learning are one of some factors influencing the students' achievement.

Supplementary instructional materials include, but are not limited to, instructional materials that are designed to serve one or more of the following purposes: (Education Code 60010) 1. To provide more complete coverage of one or more subjects included in a given course 2. To meet the various learning ability levels of students in a given age group or grade level 3. To meet the diverse educational needs of students with a language disability in a given age group or grade level 4. To meet the diverse educational needs of students reflective of a condition of cultural pluralism 5. To use current, relevant technology that further engages interactive learning to curriculum objectives and compatible with District goals and objectives may be used in the classroom and beyond.

Utilizing supplementary material in class to assist teacher as well as the learners on the educational content and achievement of the objectives. Focusing on the basic knowledge to a long-term knowledge and engagement. Supplementary material locally relevant with diversity of learners and factors influencing learner's performance.

Statement of the Problem

This study aimed to identify the acceptability and effectiveness of Supplementary Material in Intermediate Mathematics
It seeks to answer the following questions:

1. What is the level of acceptability of supplementary material in intermediate mathematics in terms of component with regards to:
    1.1 Objectives;
    1.2 Contents;
    1.3 Language used; and
    1.4 Activity?
2. What is the level of acceptability of supplementary material in intermediate mathematics in terms of characteristics with regards to:
    2.1 Adaptability;
    2.2 Appropriateness;
    2.3 Aesthetic Value; and
    2.4 Usability?
3. What is the extent of learner's mathematical performance in the pretest and posttest in using supplementary material in terms of:
    3.1 Arithmetic Skills;
    3.2 Geometric Skills; and
    3.3 Higher Order Thinking Skills (HOTS)?
4. Do the learner's mathematical performance has significant difference in terms of pretest and posttest?

2. Research Methodology

This research presents the method of research used in this study. The discussion includes research design, respondents of the study, research procedure, research instrument and statistical treatment of the data.

Research Design

The research design that will be employed in this study is experimental, specifically the Quasi-experimental Research Design. In quasi-experiments, participants are not randomly assigned, therefore they are used in situations when randomization is problematic or impossible. The term "experimental research design" refers to the process of creating research with a high level of causal (or internal) validity. The accuracy of statements about cause-and-effect relationships is called causal validity.

Abraham & MacDonald (2011) state "Quasi-experimental research is similar to experimental research in that there is manipulation of an independent variable. It differs from experimental research because either there is no control group, no random selection, no random assignment, and/or no active manipulation."

In this study the response experience similar leaning modalities which is modular they are homogeneous group. Utilized the quasi-experimental research design to gather the required primary data on the homogenous group that undergone a pre-examination or initial test and a post-examination or final test both containing mathematical skills. Applying the pretest-posttest design in this research is the right approach as the score results collected from the initial and final test would be the primary data that was compared in the final procedure.

Population and Sampling Technique

The respondents of the study are the selected fifty – eight (58) Grade 4 Learners of Duhat Elementary School, Santa Cruz, Laguna to test the effectiveness of supplementary material in intermediate mathematics twenty – four (24) teachers from Division of Laguna to determine the acceptability of the developed supplementary material. The selection of respondents is their availability and purpose in this study.

Crossman (2020) A purposive sample is a non-probability sample that is selected based on characteristics of a population and the objective of the study. The samples were purposively taken for the convenient of the researcher especially in conducting her research study.

Research Procedure

In order to conduct the study, the researcher identify the problem in looking for the important gap to fill in. Formulate the objectives, hypothesis, framework and procedure to develop a supplementary material.

Sought for the permission and approval of the school division superintendent, public school district school superintendent and school principal of Duhat Elementary School to conduct the study. The validity of the supplementary material was rated by the Mathematics Master Teachers.

The learners administered pretest and posttest, the supplementary material covered the topics in 3rd Quarter (week 1 to week 5) in Mathematics 4. A 30 items for the pretest given to the group of the learners. The data collected were tabulated and analyzed to determine the effectiveness and acceptability of the supplementary material.

Research Instrument

The researcher made used the teacher's made test. The instrument is the 30 items test cover the 3rd quarter (week 1 to week 5) of Mathematics 4 to determine the extent of learner's mathematical performance in pretest and posttest scores. A survey questionnaire form given to the validators of developed supplementary material compose of questions about the supplementary material in terms of their components and characteristics.

A research instrument that collects information from participants through a series of questions or statements, the choices that response may choose is in the form of the Likert scale, a type of rating to measure the opinion regarding the statements given in the form. The researchers used this to determine the level of acceptability of Supplementary Material as rated by the Math teachers and experts.

Ratings	Scale	Remarks/Verbal	Interpretation
5	4.21-5.00	Strongly Agree	Highly Acceptable
4	3.41-4.20	Agree	Acceptable
3	2.61-3.40	Neutral	Slightly Acceptable
2	1.81-2.60	Disagree	Less Acceptable
1	1.00-1.80	Strongly Disagree	Not Acceptable

It used to determine the extent of mathematical performance of the learners.

Scale	Description	Interpretation
9 – 10	Outstanding	Advanced
7 – 8	Very Satisfactory	Proficient
5 – 6	Satisfactory	Approaching Proficiency
3 – 4	Fair	Developing
0 – 2	Needs Improvement	Beginning

Statistical Treatment of Data

Statistical treatment of data of the present study is shown in the table below.

Statement of the Problem	Statistical Tool
To determine the level of acceptability of supplementary material in intermediate mathematics in terms of component with regards to (1) Objectives; (2) Contents; (3) Language used; and (4) Activity?	Mean and Standard Deviation
To determine the level of acceptability of supplementary material in intermediate mathematics in terms of characteristics with regards to (1) Adaptability; (2) Appropriateness; (3) Aesthetic Value; and (4) Usability?	Mean and Standard Deviation
To determine the extent of learner's mathematical performance in the pretest and posttest in using supplementary material in terms of (1) Arithmetic Skills; (2) Geometric Skills; and (3) Higher Order Thinking Skills (HOTS)?	Mean and Standard Deviation

To identify whether the learner's mathematical performance has a significant difference in terms of pretest and posttest	T-test

3. Results and Discussion

Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Component with regards to Objectives, Contents, Language Used and Activity

The level of acceptability of supplementary material in intermediate mathematics in terms of component with regards to objectives, contents, language used and activity were measured based on teacher's questionnaire checklist and revealed in the following tables, which shows the average mean, standard deviation, and remarks.

Table 1. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Component with regards to Objectives

The objectives of the supplementary material…	**MEAN**	**SD**	**REMARKS**
…were aligned with the lesson of the week.	5.00	0.00	Strongly Agree
…target improvement and answer the specific need.	5.00	0.00	Strongly Agree
…were realistic and achievable based on available resources.	5.00	0.00	Strongly Agree
…were measurable and allow measurable progress.	5.00	0.00	Strongly Agree
…were attainable and time bounded.	4.79	0.41	Strongly Agree

Overall Mean = 4.96
Standard Deviation = 0.83
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of component with regards to objectives attained a mean score of 4.96 and a standard deviation of 0.83 and was Highly Acceptable among the respondents. The study revealed that the objective of the supplementary material is highly acceptable by the respondents. The result implies that the objectives are stated SMART (Specific, Measurable, Attainable, Realistic and Time - Bound). It means objective of supplementary material was fully presented the context, that the students have interacted with and that they can describe them to anyone.

According to Brockway, D. (2016) stated the objectives are SMART (Specific, Measurable, Achievable, Realistic and Timed). They are declarations of what you intend to educate. Teachers are expected to create objectives that follow Bloom's Taxonomy. Bloom classified learning into three types: cognitive (thinking), affective (emotional and attitude), and psychomotor (doing) (physical movement). Each group is further segmented, beginning with the simplest and progressing to the most complex. The premise is that learning is developmental, and that learners advance toward a deeper understanding through time. The goals are SMART (Specific, Measurable, Achievable, Realistic and Timed). They are declarations of what you intend to educate.

Table 2. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Component with regards to Contents

The contents of the supplementary material…	**MEAN**	**SD**	**REMARKS**
…contains skills and concepts that are logically related to each other.	4.79	0.41	Strongly Agree
…provides tasks that relate directly to the objective of the lessons.	4.88	0.34	Strongly Agree
…reflects on the objectives that are attainable in each problem/ lesson.	5.00	0.00	Strongly Agree
…focuses on the goal, which is the development of learner's performance.	5.00	0.00	Strongly Agree
…conforms with the lesson and most essential learning competencies as given in Mathematics 4	5.00	0.00	Strongly Agree

Overall Mean = 4.93
Standard Deviation = 0.11
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of component with regards to contents attained a mean score of 4.93 and a standard deviation of 0.11 and was Highly Acceptable among the respondents. The study revealed that the content of the supplementary material is highly acceptable by the respondents. The result implies that the content of a supplementary material must correspond to the learning experiences, and each lesson must have a clear goal and to reach the most essential learning by the end of the course. It means that contents are the instruction parts that are valued and crucial for students' overall and consistent development.

According to Hamweete, W. (2012) stated the Miami-Dade County public schools says content is evaluated in terms of its connection with curricular requirements, level of treatment, experience in content generation, content accuracy, currency, and authenticity. It implies that contents are the teaching/learning subjects that are seen to be valuable and important for students' comprehensive and coherent growth.

Table 3. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Component with regards to Language Used

The language used in the supplementary material…	**MEAN**	**SD**	**REMARKS**
…contains vocabulary used is suitable to the comprehension level of students.	4.71	0.46	Strongly Agree
…uses words correctly to convey content.	4.79	0.41	Strongly Agree
…instructions are clear and easy to understand and follow.	4.75	0.44	Strongly Agree
…contains lessons that are presented in paragraphs/sentences that are grammatically correct.	4.54	0.51	Strongly Agree
…matches language to the situation accompanied by clear and specific directions for their use.	4.75	0.44	Strongly Agree

Overall Mean = 4.71
Standard Deviation = 0.28
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of component with regards to language used attained a mean score of 4.71 and a standard deviation of 0.28 and was Highly Acceptable among the respondents.The study revealed that the language used of the supplementary material is highly acceptable by the respondents. The result implies that the language used of a supplementary material stated information that's important to know, and to write clearly, simply and comprehensive to learners, since it is independent or self-study materials.

As Madrazo AL and Dio R. V. (2020) stated the modules are written in a clear and simple way. The vocabulary level is adequate for the learners' experiences and comprehension. New, technical, or challenging words are explained in a strategic, clear, and systematic way. The sentence length was appropriate for the target audience.

Table 4. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Component with regards to Activity

The activity of the supplementary material…	**MEAN**	**SD**	**REMARKS**
…provides items that are congruent to the objectives.	5.00	0.00	Strongly Agree
…which has level of difficulty.	5.00	0.00	Strongly Agree
…uses activity that can be easy to understand and answer.	5.00	0.00	Strongly Agree
…includes item/s which measure higher-order thinking skills (HOTS).	4.63	0.49	Strongly Agree
…covers the essential competencies to be developed.	5.00	0.00	Strongly Agree

Overall Mean = 4.92
Standard Deviation = 0.10
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of component with regards to activity attained a mean score of 4.92 and a standard deviation of 0.10 and was Highly Acceptable among the respondents. The study revealed that the activity of the supplementary material is highly acceptable by the respondents. The result implies that the activity of a supplementary material matches the objectives and provides learning task that appropriate for the learners. It also explained to learners about the activities or tasks towards acquiring knowledge of a concept. This implies that the activity reflects a certain level of difficulty for the learners to attained.

Furthermore, Mathumbu, Rauscher, Braun (2014) stated a well-planned class must include a clearly stated lesson objective. It is critical to emphasize the necessity of clear lesson objectives, as well as the fact that assessments for such classes should closely match the objectives. Some class objectives derived from planned assessment activities placed greater demands on the cognitive domain of learners.

Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Characteristic with regards to Adaptability, Appropriateness, Aesthetic Value, and Usability

The level of acceptability of supplementary material in intermediate mathematics in terms of component with regards to

adaptability, appropriateness, aesthetic value, and usability were measured based on teacher's questionnaire checklist and revealed in the following tables, which shows the average mean, standard deviation, and remarks.

Table 5. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Characteristics with regards to Adaptability

The supplementary material…	MEAN	SD	REMARKS
…versatile that can be used across curriculum.	4.75	0.44	Strongly Agree
…aligned to the various learning styles of the students.	4.75	0.44	Strongly Agree
…contains problems that can be done on target learners of different aptitude levels.	4.92	0.28	Strongly Agree
…can be revised to fit to the purposes.	4.79	0.41	Strongly Agree
…encourages the students to become actively involved in the learning activities.	4.67	0.48	Strongly Agree

Overall Mean = 4.77
Standard Deviation = 0.18
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of characteristics with regards to adaptability attained a mean score of 4.77 and a standard deviation of 0.18 and was Highly Acceptable among the respondents. The study revealed that the adaptability of the supplementary material as a characteristic is highly acceptable by the respondents. The result implies that the adaptability of the supplementary material as a characteristic developed an environment in which the learner enjoys learning, engages in meaningful learning activities, and succeeds because he or she is valued because of various learning style used.

According to Cabual R.A. (2021) explained if problems cause the learning process to be delayed or stopped, understanding will not be achieved. An active learning approach will address these issues, resulting in learning that is suited to the specific of the learner. As a result of inadequate approaches, techniques, and tactics with the learners, the mismatch will deepen. Recognize the learner's style and preferred learning modes to achieve successful teaching and student learning.

Table 6. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Characteristics with regards to Appropriateness

The supplementary material…	MEAN	SD	REMARKS
…suited to the objectives of each lesson.	5.00	0.00	Strongly Agree
…presented problems based on real - life contexts.	4.54	0.51	Strongly Agree
…assess objectively the level of the knowledge of the target learners.	4.83	0.38	Strongly Agree
…contains problems that are suitable, interesting, current, and up to date.	4.67	0.48	Strongly Agree
…takes into consideration the varying attitudes and capabilities of the learners.	4.58	0.50	Strongly Agree

Overall Mean = 4.73
Standard Deviation = 0.20
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of characteristics with regards to appropriateness attained a mean score of 4.73 and a standard deviation of 0.20 and was Highly Acceptable among the respondents. The study revealed that the appropriateness of the supplementary material as a characteristic is highly acceptable by the respondents. The result implies that the appropriateness of the supplementary material as a characteristic provide resources that are contextually relevant to the level of knowledge of the learners, so that students are engaged in learning that suitable in their interest, capabilities and also reflect in current issues.

As Cahyaningruma, D. et al (2016) explained learning materials are adjusted to provide resources that are contextually relevant to the diversity of students' conditions and needs, as well as significant for their learning, so that students are engaged in learning what is desired and make the best progress possible.

Table 7. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Characteristics with regards to Aesthetic Value

The supplementary material…	MEAN	SD	REMARKS
…contains an icon that is visual – pleasing and easy to understand.	4.88	0.34	Strongly Agree
…uses appropriate text, font, size, and type.	4.79	0.41	Strongly Agree

...contains visuals that fit the level of interests, knowledge, and skills of the target learners.	4.88	0.34	Strongly Agree
...incorporate illustrations that simplify complex concepts to acquire mathematical skills.	4.92	0.28	Strongly Agree
...make use of illustrations which are interesting and suited to the problems.	4.88	0.34	Strongly Agree

Overall Mean = 4.87
Standard Deviation = 0.19
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of characteristics with regards to aesthetic value attained a mean score of 4.87 and a standard deviation of 0.19 and was Highly Acceptable among the respondents. The study revealed that the aesthetic value of the supplementary material as a characteristic is highly acceptable by the respondents. The result implies that the aesthetic value of the supplementary material as a characteristic appeal learner's drive to learn. This implies incorporate illustrations, fonts, photos and many more as aesthetic value influence motivation and engagement.

Furthermore, Järvelä & Renninger (2014) stated aesthetic visual the learner's engagement and drive to learn and accomplish long-term development in their educational goals is further influenced by his or her level of attention and interest. The following part will go over each of these emotional states: interest, attention, engagement, and motivation.

Table 8. Level of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Characteristics with regards to Usability

The supplementary material...	**MEAN**	**SD**	**REMARKS**
...provides tasks which sharpen the target learner's mathematical skills.	4.88	0.34	Strongly Agree
...contains problems that are relevant to the target learners' personal experiences	4.75	0.44	Strongly Agree
...offers various word problems.	4.50	0.51	Strongly Agree
...illustrates real – life experiences that can be a basis for comprehension.	4.47	0.51	Strongly Agree
...serves as supplement for learner's who find the topic difficult to understand.	5.00	0.00	Strongly Agree

Overall Mean = *4.72*
Standard Deviation = 0.23
Verbal Interpretation = Highly Acceptable

Overall, the level of acceptability of supplementary material in intermediate Mathematics in terms of characteristics with regards to usability attained a mean score of 4.72 and a standard deviation of 0.23 and was Highly Acceptable among the respondents. The study revealed that the usability of the supplementary material as a characteristic is highly acceptable by the respondents. The result implies that the usability of the supplementary material as a characteristic serves as interactive learning material. The learners can apply what they've learned in real-life situations and ease of learning difficulty and serve as efficient material.

Furthermore, Molina, O. et al (2022) stated Holmes explained the relevance of assessing the usability of interactive learning modules, including the criteria of ease of learning, efficacy, and efficiency is discussed.

Extent of Leaner's Mathematical Performance in the Pretest and Posttest in using supplementary material in terms of Arithmetic Skills, Geometric Skills and Higher Order Thinking Skills (HOTS)

The extent of learner's mathematical performance using supplementary material in terms of arithmetic skills, geometric skills and higher order thinking skills (HOTS**)** was measured based on pretest and posttest which shows the mean, standard deviation and interpretation.

Table 9. Extent of Leaner's Mathematical Performance in the Pretest and Posttest in using supplementary material in terms of Arithmetic Skill

	Pretest		Interpretation	Posttest		Interpretation
	Mean	SD		Mean	SD	
Arithmetic Skill	6.63	2.28	Proficient	7.71	1.82	Proficient

Legend:

Scale	Description	Interpretation
9 – 10	Outstanding	Advanced
7 – 8	Very Satisfactory	Proficient
5 – 6	Satisfactory	Approaching Proficiency
3 – 4	Fair	Developing
0 – 2	Needs Improvement	Beginning

Table 9 the extent of leaner's mathematical performance in the pretest and posttest in using supplementary material in terms of arithmetic skill pretest got a *(M=6.63, SD=2.28)* it was interpretated as Proficient while the posttest received *(M=7.71, SD=1.82)* interpreted as Proficient**.** The study revealed that the pretest and posttest of arithmetic skills got Proficient. It implies that the score means are closely to each other. In a sense that arithmetic skill requires understanding there is more to solving arithmetic problems than memorizing processes.

As Landerl K. (2013) explained although numerical processing has been shown to be linked to arithmetic abilities, our understanding of the development of the essential cognitive mechanisms is inadequate. The construct of numerical processing is still underspecified: first, there are a variety of tasks; second, empirical information on the development of basic numerical skills is primarily based on cross-sectional studies.

Table 10. Extent of Leaner's Mathematical Performance in the Pretest and Posttest in using supplementary material in terms of Geometric Skill

	Pretest		Interpretation	Posttest		Interpretation
	Mean	SD		Mean	SD	
Geometric Skill	5.21	2.27	Approaching Proficiency	6.86	2.27	Proficient

Legend:

Scale	Description	Interpretation
9 – 10	Outstanding	Advanced
7 – 8	Very Satisfactory	Proficient
5 – 6	Satisfactory	Approaching Proficiency
3 – 4	Fair	Developing
0 – 2	Needs Improvement	Beginning

Table 10 the extent of leaner's mathematical performance in the pretest and posttest in using supplementary material in terms of geometric skill the pretest got a *(M=5.21, SD=2.27)* it was interpretated as Approaching Proficiency while the post-test received *(M=6.86, SD=2.27)* interpreted as Proficient. The study revealed that after using supplementary material under geometric skill got higher mean score and interpreted as proficient. This implies it helps pupils not only increase their cognitive abilities, but also change concrete thinking into abstract thinking.

As Riastutia, Mardiyanab & Pramudyac (2017) explained the study of different shapes is the mathematical part of geometry. Geometry not only improves students' cognitive capacities, but it also helps them transform concrete thinking into abstract thinking. Geometry teaches students how to evaluate and comprehend the world around them while also providing them with tools to use in other areas of mathematics.

Table 11. Extent of Leaner's Mathematical Performance in the Pretest and Posttest in using supplementary material in terms of Higher Order Thinking Skills (HOTS)

	Pretest		Verbal Interpretation	Posttest		Verbal Interpretation
	Mean	SD		Mean	SD	
Higher Order Thinking Skill (HOTS)	4.50	1.84	Approaching Proficiency	6.00	2.26	Approaching Proficiency

Legend:

Scale	Description	Interpretation
9 – 10	Outstanding	Advanced
7 – 8	Very Satisfactory	Proficient
5 – 6	Satisfactory	Approaching Proficiency
3 – 4	Fair	Developing
0 – 2	Needs Improvement	Beginning

Table 11 the extent of leaner's mathematical performance in the pre-test and post-test in using supplementary material in terms of arithmetic skill. The higher order thinking skill (HOTS) pretest got *(M=4.50, SD=1.84)* it was interpretated as Approaching Proficiency while higher order thinking skill (HOTS) the posttest received *(M=6.00, SD=2.26)* interpreted as

Approaching Proficiency. The study revealed that the higher order thinking skill (HOTS) got approaching proficient in pre-test and post-test. It implies that the score means are closely to each other. extends beyond simple data recall, such as appraisal and creation, allowing students to retain material and apply problem-solving solutions to real-world challenges.

According to Kings, Goodson, and Rohani (2013), HOTS are higher-order thinking talents that demand more than just the ability to remember. When students face novel challenges, uncertainties, questions, or dilemmas, their HOTS talents are engaged.

Significant Difference between Learner's Mathematical Performance in Pretest and Posttest Scores

The table shows the significant difference between in learner's mathematical performance in the pre-test and post-test scores in using supplementary material. The data were statistically treated using Paired t-test. The following shows estimation for mean, mean difference, standard deviation, p-value, and its analysis.

Table 12. Significant Difference between Learner's Mathematical Performance in Pretest and Posttest Scores

Mathematical Skills	Test	Mean	Mean Diff	Computed t – value	P-value	df	Critical t – value	Analysis
Arithmetic Skill	Pre Post	6.60 7.71	1.11	4.364	0.000	57	2.0025	Significant
Geometric Skill	Pre Post	5.20 6.86	1.66	7.033	0.000	57	2.0025	Significant
HOTS	Pre Post	4.50 6.00	1.50	5.731	0.000	57	2.0025	Significant

α = 0.05

Table 12 revealed the significant difference between learner's mathematical performance in pretest and posttest scores in using supplementary material. It shows that the arithmetic skill with ($t = 4.364$, $p < .05$), geometric skill with ($t = 7.033$, $p < .05$) and higher order thinking skill (HOTS) with ($t = 5.731$, $p < .05$) which were all higher than (0.05) level of significance which supported the result of the analysis are all Significant.

Based on the data, it is shown that there is a significant difference in score of mathematical skills before and after using supplementary material at 0.05 level of significance. It shows that the null hypothesis "There is no Significant Difference between Learner's Mathematical Performance in Pre-Test and Post-Test Scores in Using Supplementary Material is being rejected".

Furthermore, Africa C. (2019) explained the proposed supplemental materials are intended to provide students with highly engaging and entertaining exercises that will help them understand concepts, facts, and ideas in mathematics, as well as introduce them to new ways of learning and foster positive interdependence among students. These supplemental materials were created as a resource and guidance for mathematics teachers in order to arouse students' interest.

4. Summary of Findings

This chapter includes the presentation of a summary, findings, conclusion based on the hypothesis, and the corresponding recommendations.

Summary

This study determined the acceptability and effectiveness of Supplementary Material in Intermediate Mathematics in Duhat Elementary School, School Year 2021-2022. The information on related literature and studies were gathered to formulate the objectives of the studies. Specifically, the information is found in books, journals, documents, published and unpublished materials like thesis, journals, and the internet.

It sought to answer the following questions: 1. the level of acceptability of supplementary material in intermediate mathematics in terms of component with regards to objectives, content, language used and activity; 2. the level of acceptability of supplementary material in intermediate mathematics in terms of characteristics relative to adaptability, appropriateness; aesthetic value and usability; 3. the extent of learner's mathematical performance in the pretest and posttest in using supplementary material in terms of arithmetic skill, geometric skill and higher order thinking skill (HOTS) 4. Do the learner's mathematical performance in pre-test and post-test scores has a significant difference in using supplementary material?

The study's research design was quasi-experimental. Purposive sampling was utilized, which is a non-probability sample that is chosen based on population characteristics and the study's objective. This is appropriate for this study because the researcher compiled data using a pre- and post-test. In a pretest-posttest design, the dependent variable is measured twice: once before and after the treatment is implemented.

Based on the gathered data. The following findings are hereby presented:

1. **Level Of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Component with regards to Objectives, Content, Language Used and Activity**

The level of acceptability of the supplementary material in intermediate mathematics in terms of component gathered an overall mean of 4.96 in terms of objectives, 4.93 in terms of contents, 4.71 in terms of language used and 4.92 in terms of activity. This further implies that most of the respondents agreed that the components of supplementary material were highly acceptable.

2. **Level Of Acceptability of Supplementary Material in Intermediate Mathematics in terms of Characteristics with regards to Adaptability, Appropriate; Aesthetic Value and Usability**

The level of acceptability of the supplementary material in intermediate mathematics in terms of characteristics gathered an overall mean 4.77 in terms of adaptability, 4.73 in terms of appropriateness, 4.87 in terms of aesthetic value and 4.72 in terms of usability. This further implies that most of the respondents agreed that the characteristics of supplementary material were highly acceptable.

3. **Extent of Learners Mathematical Performance in the Pretest and Posttest in using Supplementary Material in terms of Arithmetic Skills, Geometric Skills, and Higher Order Thinking Skills (HOTS)**

The extent of learner's mathematical performance in pretest and posttest in using supplementary material gathered (M=6.63, SD=2.28), (M=7.71, SD=1.82) interpreted both proficient in terms of arithmetic skills, (M=5.21, SD=2.27), (M=6.86, SD=2.27) interpreted as approaching proficient and proficient respectively in terms of geometric skills and (M=4.50, SD=1.84) (M=6.00, SD=2.26) interpreted both approaching proficient in terms of higher order thinking skill (HOTS).

4. **Significant Difference between Learner's Mathematical Performance in Pretest and Posttest Scores in Using Supplementary Material**

The test of significant difference between learner's mathematical performance in pretest and posttest scores in using supplementary material. It shows that the arithmetic skill with ($t = 4.364$, $p > .05$), geometric skill with ($t = 7.033$ $p > .05$) and higher order thinking skill (HOTS) with ($t = 5.731$, $p > .05$) which were all higher than (0.05) level of significance which supported the result of the analysis are all Significant. The study shows that supplementary material improves the mathematical performance in terms of arithmetic skills, geometric skills and higher order skills (HOTS).

Conclusion

In the light of the summary of finding of this study, the following conclusions were drawn: components of supplementary material in intermediate mathematics in terms of objectives, content, language used, and activity were perceived by the respondents as highly acceptable. The characteristics of supplementary material in intermediate mathematics in terms of adaptability, appropriateness, aesthetic value and usability were perceived by the respondents as highly acceptable as well it indicates the usefulness of supplementary material to continue the education and motivates the learner to attain the desired competencies in mathematics. The significant difference between learner's mathematical performance in pre-test and post-test scores was all significant it stated that the null hypothesis is "rejected". Therefore, there is significant difference between learner's mathematical performance in pre-test and post-test.

Recommendations

Based on the results and conclusion posted in the study, the following recommendation was formulated to the following.

1. Mathematics teacher can utilize the developed supplementary material as additional references in teaching Grade 4 it may help the learners to support their independent learning so that there will no gap during the learning process. It is also good material for learners undergoing modular distant learning.
2. This material can be converted as a video lesson as a script so that the learners can access and create a more engaging sensory experience than using print materials alone. Teachers may add other activities that can fit in to the skills and knowledge of their learner with the use of develop supplementary material teachers can improve the No Left behind System of Department of Education.
3. For SDO Laguna, the researcher is willing to submit, and the said materials will undergo in the evaluation and revision of LRMDS. Mathematics experts may conduct further studies regarding improvement in mathematical skill especially in higher order thinking skill (HOTS).
4. Future researcher may perform similar studies that give improvement in mathematical skills, variety of variables aside from what had been used in this study. Innovate in order to increase the improvement in mathematical skill. They may also use more respondents to gain precise result.

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