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SUPPLEMENTARY MATERIALS AS A TOOL IN IMPROVING LEARNERS' SELF-EFFICACY AND MATHEMATICAL SKILLS

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ABSTRACT

The purpose of the study is to determine the significant correlation of using the supplementary materials on learners' self-efficacy and the difference between formative and summative assessment and mathematical skills. Specifically, it aims to determine the level of supplementary materials component and features; learners' self-efficacy; and mathematical skills. The research also determines the significant difference between learners' mathematical skills in formative and summative assessment. Moreover, the significant correlation of using supplementary materials on learners' self-efficacy was also tested.

The research design utilizes in this study is descriptive correlational and purposive sampling techniques was used to select the respondents. Eighty-eight (88) learners of Magdalena Integrated National High School were the respondents of this study. A 40-item test and questionnaire was used to collect data. Weighted mean, t-test, and Pearson product-moment correlation coefficient was the statistical tools used.

The results indicate a very high level of validity for the supplementary materials in terms of components and features. Learners' self-efficacy was also rated as very high. However, the learners' mathematical skills varied, with comprehension, analytical thinking, and critical thinking being fairly satisfactory during the formative assessment, while problem-solving did not meet expectations. Upon the introduction of the supplementary materials, there was an improvement in mathematical skills in summative assessment being very satisfactory and satisfactory respectively. The study reveals significant differences in learners' mathematical skills between formative and summative assessments. However, most indicators of the components and features of the supplementary material do not have correlation in learners' self-efficacy.

The study revealed the significant difference in learners' mathematical skill between formative and summative assessment leading to the rejection of null hypothesis. Additionally, the study reveals that there is no significant correlation and negligible relationship between the components and features of the supplementary materials and learners' self-efficacy leading to the acceptance of null hypothesis.

The researcher proposes seminars for teachers focused on creating supplementary materials. Likewise, there is an active monitoring system for parents to track their children's progress. Furthermore, future researchers may include other variables as part of learners' self-efficacy.

KEYWORDS: *supplementary materials; learners' self-efficacy; mathematical skills*

1. INTRODUCTION

Supplementary materials play a crucial role in enhancing students' self-efficacy in learning mathematics. Self-efficacy in mathematics is closely linked to students' motivation, effort, performance, and future career choices (Street et al., 2024). When students have access to supplementary materials that support their learning, such as additional practice problems, interactive tools, or explanatory videos, they are more likely to develop a positive perception of their abilities in mathematics. This, in turn, can boost their confidence in tackling mathematical challenges and improve their overall performance in the subject (Street et al., 2024).

Moreover, mathematics self-efficacy encompasses students' beliefs about their past achievements, their evaluation of their capabilities, and their expectations of future performance on mathematical tasks. It is a critical factor that influences students' engagement with mathematics content. By providing students with supplementary materials that cater to different learning styles and abilities, educators can support the development of students' self-efficacy in mathematics. These materials can help students build confidence in their problem-solving skills, deepen their understanding of mathematical concepts, and foster a positive attitude towards learning mathematics.

With this the researcher intended to create supplementary material in radicals to improve their mathematical skills. The researcher strongly believed that in doing this, students will be able to apply what they learned in higher mathematics including algebra, geometry, trigonometry, and statistics.

The researcher engaged in this study to help the mathematics teachers of Magdalena Integrated National High School to help on one of their projects called Project Fun where the non-numerate students were being taught by volunteer teachers the fundamentals of mathematics which then they could use if this study proved to be useful in other topics of mathematics. This study can help the volunteer teachers have standardized learning material to teach the learners.

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1.1 Statement of the Problem

Specifically this research also answers the following questions:

1. What is the level of supplementary materials in terms of component with regards to:
   - 1.1 Objectives;
   - 1.2 Content;
   - 1.3 Activities; and
   - 1.4 Assessment?
2. What is the level of supplementary materials in terms of features with regards to:
   - 2.1 Clarity;
   - 2.2 Appropriateness;
   - 2.3 Adaptability; and
   - 2.4 Ease of Use?
3. What is the level of learners' self-efficacy in terms of:
   - 3.1 Self-confidence;
   - 3.2 Self-regulation; and
   - 3.3 Self-monitoring?
4. What is the level of learners' mathematical skills in terms of formative and summative with regards to:
   - 4.1 Comprehension;
   - 4.2 Analytical thinking;
   - 4.3 Critical thinking; and
   - 4.4 Problem solving?
5. Is there a significant difference between the learners' mathematical skills in terms of formative and summative?
6. Is there a significant correlation of using the supplementary materials on the learners' self-efficacy?

2. METHODOLOGY

The research design used in this study was descriptive correlational research. According to Firduas (2019) research method is used to generate numerical data and hard facts, by employing statistical, logical, and mathematical techniques. It refers to a set of strategies, techniques and assumptions used to study psychological, social, and economic processes through the exploration of numeric patterns. Descriptive correlational research gathers a range of numeric data. This study includes methodology such as researcher-made questionnaire, supplementary material, and self-made formative and summative test.

3. RESULTS AND DISCUSSION

This chapter reviews the presentation, interpretation, and analysis of the quantitative findings of the study. The findings are also discussed considering previous research findings and available literature, where applicable, to identify similarities and differences between this study and previous studies and literature.

Level of Validation of Supplementary Material in terms of Component

In this study, the level of supplementary materials in terms of components with regards to objectives, content, activities, and assessment were shown.

The following table shows the statement, mean, standard deviation, remarks, and verbal interpretations of the supplementary materials in terms of component with regards to objectives, content, activities, and assessment.

The result shows that the objectives of the supplementary materials were specific, measurable, attainable, relevant, and time bound (M=4.77, SD=0.42), in line with the K-12 curriculum outline (M=4.72, SD=0.54), congruent with the content (M=4.64, SD=0.55), specify what learners undertake to demonstrate their understanding (M=4.75, SD=0.48), and sufficiently challenging for the students to achieve (M=4.74, SD=0.46).

Overall, the level of validation of the supplementary materials in terms of component with regards to objective is interpreted as *Very High* with the weighted mean of 4.72 and the standard deviation of 0.50.

Table 1 presents the level of supplementary materials in terms of component with regards to objectives.

Table 1 Level of the Supplementary Material's Component in terms of Objectives

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
The objectives are specific, measurable, attainable, relevant, and time bound.	4.77	0.42	Strongly Agree	Very High
The objectives are in line with the K-12 curriculum outline.	4.72	0.54	Strongly Agree	Very High
The objectives are congruent with the content.	4.64	0.55	Strongly Agree	Very High
The objectives specify what learners will undertake to demonstrate their understanding.	4.75	0.48	Strongly Agree	Very High
The objectives are sufficiently challenging for the students to achieve.	4.74	0.46	Strongly Agree	Very High
Weighted Mean	*4.72*			
SD	*0.50*			
Verbal Interpretation	*Very High*			

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Table 2 shows the level of supplementary materials in terms of component with regards to content.

Table 2 Level of the Supplementary Material's Component in terms of Content

STATEMENT	*MEAN*	*SD*	*REMARKS*	*VERBAL INTERPRETATION*
The content corresponds to the objectives and activities.	4.86	0.34	Strongly Agree	Very High
The content includes topics that are logically connected to one another.	4.76	0.48	Strongly Agree	Very High
The information and tips provided in the content are adequate.	4.45	0.74	Strongly Agree	Very High
The content is concise and neither redundant nor dull.	4.61	0.59	Strongly Agree	Very High
The heading title is comprised of key words that describe the contents or functions of the next text.	4.47	0.69	Strongly Agree	Very High
Weighted Mean	*4.63*			
SD	*0.61*			
Verbal Interpretation	*Very High*			

Table 2 shows that the content corresponds to the objectives and activities (M=4.86, SD=0.34), includes topics that are logically connected to one another (M=4.76, SD=0.48), is concise and neither redundant nor dull (M=4.61, SD=0.59). The heading title is comprised of key words that describe the contents or functions of the next text (M=4.47, SD=0.69) and the information and tips provided in the content are adequate (M=4.45, SD=0.74).

Overall, the level of supplementary material's component in terms of content was interpreted as *Very High* with the weighted mean 4.63 and standard deviation of 0.61.

Table 3 tells us the level of supplementary materials in terms of component with regards to activities.

Table 3 Level of the Supplementary Material's Component in terms of Activities

STATEMENT	*MEAN*	*SD*	*REMARKS*	*VERBAL INTERPRETATION*
The supplementary materials activities adhere to learning objectives.	4.44	0.75	Strongly Agree	Very High
The supplementary material allows you to learn on your own time.	4.73	0.52	Strongly Agree	Very High
The supplementary material helps students improve their mathematical skills.	4.72	0.56	Strongly Agree	Very High
The supplementary material offers activities that are appropriate for the users' skill level.	4.30	0.76	Strongly Agree	Very High
The supplementary material includes questions that help students improve higher order thinking skills.	4.66	0.56	Strongly Agree	Very High
Weighted Mean	*4.57*			
SD	*0.66*			
Verbal Interpretation	*Very High*			

The supplementary materials activities adhere to learning objectives (M=4.44, SD=0.75), allowed you to learn on your own time (M=4.73, SD=0.52), helped learners improve their mathematical skills (M=4.72, SD=0.56), offers activities that are appropriate for the users' skill level (M=4.30, SD=0.76), included questions that help students improve higher order thinking skills(M=4.66, SD=0.56). Overall, the level of supplementary material's component in terms of activities is interpreted as *Very High* and had a weighted mean of 4.57 and standard deviation of 0.66.

Table 4 presents the level of the supplementary materials in terms of component with regards to Assessment.

Table 4 Level of the Supplementary Material's Component in terms of Assessment

STATEMENT	*MEAN*	*SD*	*REMARKS*	*VERBAL INTERPRETATION*
The assessment fits in with the learning objectives.	4.78	0.44	Strongly Agree	Very High
The instruction for the assessment instrument and the assessment conditions are clearly provided.	4.36	0.69	Strongly Agree	Very High
The assessment difficulty level is appropriate for the capabilities being assessed.	4.35	0.67	Strongly Agree	Very High

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The assessment can be completed in the time allotted to the students.	4.78	0.44	Strongly Agree	Very High
The questions are well-phrased, clear, and grammatically correct.	4.74	0.49	Strongly Agree	Very High
Weighted Mean	*4.60*			
SD	*0.59*			
Verbal Interpretation	*Very High*			

The supplementary material's assessment fitted with the learning objectives (M=4.78, SD=0.44), difficulty level was appropriate for the capabilities being assessed (M=4.35, SD=0.67), was completed in the time allotted to the students (M=4.78, SD=0.44). The instruction for the assessment instrument and the assessment conditions were clearly provided (M=4.36, SD=0.69) and the questions are well-phrased, clear, and grammatically correct (M=4.74, SD=0.49). Overall, the level of the supplementary material's component in terms of Assessment is interpreted as *Very High* with the weighted mean of 4.60 and standard deviation of 0.59.

Indeed, assessment is essential in the teaching and learning process. This is supported by Chinn (2020) who believed that it needs to be the first step to instruction.

Level of Validation of Supplementary Material's Features

In this study, the level of supplementary materials in terms of features with regards to clarity, appropriateness, adaptability, and ease of use were shown.

The following table shows the statement, mean, standard deviation, remarks, and verbal interpretations of the supplementary materials in terms of features with regards to clarity, appropriateness, adaptability, and ease of use.

Table 5 indicates the level of the supplementary materials in terms of features with regards to clarity.

Table 5 Level of the Supplementary Material's Features in terms of Clarity

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
The supplementary material is beautifully written in every section.	4.82	0.39	Strongly Agree	Very High
The text's significance is evident to the students.	4.84	0.37	Strongly Agree	Very High
Learners are given explicit directions for the activities.	4.74	0.46	Strongly Agree	Very High
The supplementary materials format is simple to grasp.	4.32	0.76	Strongly Agree	Very High
Consistent with the supplementary materials content, the table of contents offered content and its associated page number.	4.43	0.69	Strongly Agree	Very High
Weighted Mean	*4.63*			
SD	*0.60*			
Verbal Interpretation	*Very High*			

The supplementary material is beautifully written in every section (M=4.82, SD=0.39), format was simple to grasp (M=4.32, SD=0.76), the table of contents offered content and its associated page number (M=4.43, SD=0.69), the text's significance was evident to the students (M=4.84, SD=0.37), and learners were given explicit directions for the activities(M=4.74, SD=0.46). The level of the supplementary material's features in terms of clarity was interpreted as *Very High* with the weighted mean of 4.63 and standard deviation of 0.60.

Table 6 Level of the Supplementary Material's Features in terms of Appropriateness

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
The entire supplementary material piques the learners' interest.	4.85	0.41	Strongly Agree	Very High
There are no ideological, cultural, religious, racial, or gender biases or prejudices in the supplementary material.	4.80	0.43	Strongly Agree	Very High
The overall supplementary material is appropriate for the learners' age, maturity, and experience.	4.80	0.50	Strongly Agree	Very High
The material is relevant and appropriate to the problems that the targeted users are facing.	4.73	0.49	Strongly Agree	Very High

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In its content and approach, the material considers the target audience's diversity.	4.80	0.48	Strongly Agree	Very High
Weighted Mean	*4.79*			
SD	*0.47*			
Verbal Interpretation	*Very High*			

The entire supplementary material piqued the learners' interest (M=4.85, SD=0.41), there are no ideological, cultural, religious, racial, or gender biases or prejudices (M=4.80, SD=0.43), appropriate for the learners' age, maturity, and experience (M=4.80, SD=0.50), relevant and appropriate to the problems that the targeted users are facing (M=4.73, SD=0.49), and considered the target audience's diversity (M=4.80, SD=0.48). Overall, the the level of Validation of Supplementary Material's Features in terms of Appropriateness is interpreted as *Very High* with a weighted mean of 4.79 and standard deviation of 0.47.

Table 7 Level of the Supplementary Material's Features in terms of Adaptability

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
The material's content is relevant and may be tailored to meet individual demands.	4.88	0.33	Strongly Agree	Very High
Users have the freedom to select the approaches or strategies that best fit their needs.	4.77	0.47	Strongly Agree	Very High
The material is simple to integrate into various intervention frameworks.	4.41	0.70	Strongly Agree	Very High
The supplementary material may be adapted to various grade levels.	4.47	0.66	Strongly Agree	Very High
Changes or updates to the material are made in response to changing user demands.	4.84	0.40	Strongly Agree	Very High
Weighted Mean	*4.67*			
SD	*0.57*			
Verbal Interpretation	*Very High*			

The material's content is relevant and may be tailored to meet individual demands (M=4.88, SD=0.33), Users had the freedom to select the approaches or strategies that best fit their needs (M=4.77, SD=0.47), simple to integrate into various intervention frameworks (M=4.41, SD=0.70), may be adapted to various grade levels (M=4.47, SD=0.66), and changes or updates to the material were made in response to changing user demands (M=4.84, SD=0.40). Overall, the level of Validation of Supplementary Material's Features in terms of Adaptability was interpreted as *Very High* with the weighted mean of 4.67 and standard deviation of 0.57.

Table 8 represents the level of supplementary materials in terms of features with regards to ease of use.

The information offered in the supplementary material was simple and straightforward (M=4.82, SD=0.39), the main ideas offered in the supplementary material were simple to understand (M=4.84, SD=0.37), the supplementary material content successfully engaged the audience (M=4.74, SD=0.46), was simple to go through the information to discover specific sections (M=4.32, SD=0.76), and the content offers practical solutions that were used in real-world situations (M=4.43, SD=0.69). Overall, the level of Validation of Supplementary Material's Features in terms of Ease of Use is interpreted as *Very High* with the weighted mean of 4.63 and standard deviation of 0.60.

Table 8 Level of the Supplementary Material's Features in terms of Ease of Use

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
The information offered in the supplementary material is simple and straightforward.	4.82	0.39	Strongly Agree	Very High
The main ideas offered in the supplementary material are simple for me to understand.	4.84	0.37	Strongly Agree	Very High
The supplementary material content successfully engages the audience.	4.74	0.46	Strongly Agree	Very High
It is simple to go through the information to discover specific sections.	4.32	0.76	Strongly Agree	Very High
The content offers practical solutions that may be used in real-world situations.	4.43	0.69	Strongly Agree	Very High

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Weighted Mean	*4.63*
SD	*0.60*
Verbal Interpretation	*Very High*

Level of Learners' Self-Efficacy

In this study, the level of Learners' Self-efficacy in terms of self-confidence, self-regulation, and self-monitoring were shown.

The following table shows the statement, mean, standard deviation, remarks, and verbal interpretations of the learners' self-efficacy in terms of self-confidence, self-regulation, and self-monitoring.

Table 9 shows the level of learners' self-efficacy in using the supplementary material in terms of self-confidence.

The material included practical ways for increasing self-confidence (M=4.60, SD=0.49), self-confidence had improved as a result of the supplementary materials (M=4.63, SD=0.48), the learners feel more confident and capable (M=4.57, SD=0.50), the learners feel the ideas presented in the content helped improve different elements of his/her life (M=4.51, SD=0.50), the content contains ideas that helped with continued self-confidence growth (M=4.56, SD=0.67).

Table 9 Level of Learners' Self-Efficacy in Using the Supplementary Material in terms of Self-Confidence

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
My self-confidence has improved as a result of the supplementary materials.	4.63	0.48	Strongly Agree	Very High
As a result of working with the material, I feel more confident and capable.	4.57	0.50	Strongly Agree	Very High
The material includes practical ways for increasing self-confidence.	4.60	0.49	Strongly Agree	Very High
I feel the ideas presented in the content can help me improve different elements of my life.	4.51	0.50	Strongly Agree	Very High
The content contains ideas that might help with continued self-confidence growth.	4.56	0.67	Strongly Agree	Very High
Weighted Mean	*4.57*			
SD	*0.53*			
Verbal Interpretation	*Very High*			

Overall, the level of Learners' Self-Efficacy in Using the Supplementary Material in terms of Self-Confidence is interpreted as *Very High* with the weighted mean of 4.57 and standard deviation of 0.53.

Table 10 presents the level of learners' self-efficacy in using the supplementary material in terms of self-regulation.

Table 10 Level of Learners' Self-Efficacy in Using the Supplementary Material in terms of Self-Regulation

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
I feel the ideas presented in the content can help me improve different parts of my life through self-regulation.	4.69	0.53	Strongly Agree	Very High
The material's content is important to my personal and professional development in terms of self-regulation.	4.61	0.53	Strongly Agree	Very High
The content includes practical ways for developing self-regulation abilities.	4.03	0.93	Agree	High
As a result of interacting with the content, I feel more in control of my behaviors and actions.	4.73	0.49	Strongly Agree	Very High
The supplementary material has improved my capacity to control my thoughts and emotions.	3.55	1.31	Agree	High
Weighted Mean	*4.32*			
SD	*0.95*			
Verbal Interpretation	*Very High*			

The material's content was important to my personal and professional development in terms of self-regulation (M=4.61, SD=0.53), the ideas presented in the content helped me improve different parts of my life through self-regulation (M=4.69, SD=0.53), included practical ways for developing self-regulation abilities (M=4.03, SD=0.93), the learners was in control of their behaviors and actions (M=4.73, SD=0.49), and improved their capacity to control their thoughts and emotions

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(M=3.55, SD=1.31).
Overall, the level of Learners' Self-Efficacy in Using the Supplementary Material in terms of Self-Regulation is interpreted as *Very High* with the weighted mean of 4.32 and standard deviation of 0.95.
Table 11 presents the level of learners' self-efficacy in using the supplementary material in terms of self-monitoring.

Table 11 Level of Learners' Self-Efficacy in Using the Supplementary Material in terms of Self-Monitoring

STATEMENT	***MEAN***	***SD***	***REMARKS***	***VERBAL INTERPRETATION***
I feel that the material's improvement in self-monitoring will be long-lasting.	4.16	0.92	Agree	Very High
I feel that the strategies presented in the content can be used to improve numerous elements of my life via self-monitoring.	4.61	0.53	Strongly Agree	Very High
The content includes practical ways for developing self-monitoring abilities.	4.73	0.47	Strongly Agree	Very High
Because of engaging with the content, I am more aware of my progress and places for development.	4.44	0.65	Strongly Agree	Very High
The supplementary material has improved my capacity to monitor and evaluate my thoughts and behaviors.	3.74	1.15	Agree	High
Weighted Mean	*4.34*			
SD	*0.86*			
Verbal Interpretation	*Very High*			

The learners felt that the material's improvement in self-monitoring was long-lasting (M=4.16, SD=0.92), the strategies presented in the content was used to improve numerous elements of their life via self-monitoring (M=4.61, SD=0.53), included practical ways for developing self-monitoring abilities (M=4.73, SD=0.47), more aware of their progress and places for development (M=4.44, SD=0.65), and improved their capacity to monitor and evaluate my thoughts and behaviors (M=3.74, SD=1.15). Overall, the level of Learners' Self-Efficacy in Using the Supplementary Material in terms of Self-Monitoring is interpreted as *Very High* with the weighted mean of 4.34 and standard deviation of 0.86.

Level of Learners' Mathematical Skills
In this study the level of learners' mathematical skills in formative and summative assessment using the Supplementary Material in terms of comprehension, analytical thinking, critical thinking, and problem solving were shown.

The following table shows the statement, mean, standard deviation, frequency, percentage, remarks, and verbal interpretations of learners' mathematical skills in formative and summative assessment using the supplementary material in terms of comprehension, analytical thinking, critical thinking, and problem solving.

Table 12 shows the level of learners' mathematical skills in formative and summative assessment using the supplementary material in terms of comprehension.

The mean for the formative assessment is 4.38 interpreted as *Fairly Satisfactory* and the summative assessment is 7.52 interpreted as *Very Satisfactory*, The researcher may infer that an increase of mathematical skills in comprehension by a mean difference of 3.14.

Table 12 Level of Learners' Mathematical Skills in terms of Formative and Summative Assessment as to Comprehension

Raw Score	**Learners' Mathematical Skill Comprehension**					
	Formative			**Summative**		
	f	**%**	**Verbal Interpretation**	**f**	**%**	**Verbal Interpretation**
9-10	0	0	Outstanding	26	30	Outstanding
7-8	3	3	Very Satisfactory	35	40	Very Satisfactory
5-6	42	48	Satisfactory	26	30	Satisfactory
3-4	40	45	Fairly Satisfactory	1	1	Fairly Satisfactory
0-2	3	3	Did Not Meet Expectation	0	0	Did Not Meet Expectation
	Mean = 4.38 SD = 1.11		Fairly Satisfactory	Mean = 7.52 SD = 1.58		Very Satisfactory

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Table 13 Level of Learners' Mathematical Skills in Formative and Summative Assessment as to Analytical Thinking

Raw Score	Learners' Mathematical Skill Analytical Thinking					
	Formative			Summative		
	f	%	Verbal Interpretation	f	%	Verbal Interpretation
9-10	0	0	Outstanding	15	17	Outstanding
7-8	1	1	Very Satisfactory	33	38	Very Satisfactory
5-6	23	26	Satisfactory	34	39	Satisfactory
3-4	51	58	Fairly Satisfactory	6	7	Fairly Satisfactory
0-2	13	15	Did Not Meet Expectation	0	0	Did Not Meet Expectation
	Mean = 3.66 SD = 1.15		Fairly Satisfactory	Mean = 6.74 SD = 1.65		Very Satisfactory

Table 13 shows the level of learners' mathematical skills in formative and summative assessment using the supplementary material in terms of analytical thinking.

The mean for the formative assessment was 3.66 interpreted as *Fairly Satisfactory* and the summative assessment was 6.74 interpreted as *Very Satisfactory*, the researcher had seen that there is an increase of mathematical skills in analytical thinking by a mean difference of 3.08.

Table 14 shows the level of learners' mathematical skills in formative and summative assessment using the supplementary material in terms of critical thinking.

Table 14 Level of Learners' Mathematical Skills in Formative and Summative Assessment as to Critical Thinking

Raw Score	Learners' Mathematical Skill Critical Thinking					
	Formative			Summative		
	f	%	Verbal Interpretation	f	%	Verbal Interpretation
9-10	0	0	Outstanding	11	13	Outstanding
7-8	0	0	Very Satisfactory	32	36	Very Satisfactory
5-6	12	14	Satisfactory	32	36	Satisfactory
3-4	43	49	Fairly Satisfactory	11	13	Fairly Satisfactory
0-2	33	38	Did Not Meet Expectation	2	2	Did Not Meet Expectation
	Mean = 2.80 SD = 1.49		Fairly Satisfactory	Mean = 6.39 SD = 1.87		Satisfactory

The mean for the formative assessment was 2.80 interpreted as *Fairly Satisfactory* and the summative assessment is 6.39 interpreted as *Satisfactory*, we could see that we had an increase of mathematical skills in critical thinking by a mean difference of 3.59.

Table 15 shows the level of learners' mathematical skills in formative and summative assessment using the supplementary material in terms of problem solving.

Table 15 Level of Learners' Mathematical Skills in Formative and Summative Assessment as to Problem Solving

Raw Score	Learners' Mathematical Skill Problem Solving					
	Formative			Summative		
	f	%	Verbal Interpretation	f	%	Verbal Interpretation
9-10	0	0	Outstanding	11	13	Outstanding
7-8	0	0	Very Satisfactory	32	36	Very Satisfactory
5-6	12	14	Satisfactory	32	36	Satisfactory
3-4	43	49	Fairly Satisfactory	11	13	Fairly Satisfactory

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0-2	33	38	Did Not Meet Expectation	2	2	Did Not Meet Expectation
	Mean = 1.48 SD = 1.22		Did Not Meet Expectation	Mean = 5.51 SD = 2.11		Satisfactory

The mean for the formative assessment wis 1.48 interpreted as *Did not Meet Expectation* and the summative assessment was 5.51 interpreted as *Satisfactory*, the researcher had seen an increase of mathematical skills in problem solving by a mean difference of 4.03.

Teaching mathematics through problem-solving aligns with the true nature of mathematics and the work of mathematicians, making it a meaningful approach for children. Problem-solving has been proven effective for a diverse range of learners, helping them develop a deeper understanding of mathematics compared to memorization or practice of given strategies. Learning mathematics through problem-solving enhances children's confidence and fosters positive attitudes towards the subject.

Test of Significant Difference between the Learners' Mathematical Skills in Formative and Summative Assessment

In this study, the test of significant differences between the learners' mathematical skills in formative and summative assessment are determined.

To test the significant difference between the learners' mathematical skills in formative and summative assessment using the supplementary material, data were treated statistically using Minitab 14 using T-test.

Table 16 shows the mean, mean difference, number of respondents, computed t-value, p-value, and its analysis.
In terms of formative and summative assessment, p at 0.000 on all mathematical skills namely comprehension, analytical thinking, critical thinking, and problem-solving shows that there is a significant difference between the formative and summative assessment because they were less than p which is 0.05 and proves that their comprehension, analytical thinking, critical thinking, and problem-solving skills had improved.

Table 16 Significant Difference between the Learners' Mathematical Skills in Formative and Summative Assessment

Mathematical Skills	**Assessment**	**Mean**	**Difference**	**N**	***t-value***	***p***
Comprehension	Formative	4.375	3.148	88	23.19	0.000*
	Summative	7.523				
Analytical Thinking	Formative	3.659	3.080	88	20.76	0.000*
	Summative	6.739				
Critical Thinking Skills	Formative	2.795	3.590	88	22.04	0.000*
	Summative	6.386				
Problem Solving	Formative	1.477	4.034	88	21.14	0.000*
	Summative	5.511				

*Note: * p < .05. constant = 1.99*

Test of Significant Relationship of the Supplementary Material on Learners' Self-efficacy

In this study, the significant correlation of the supplementary material on learners' self-efficacy was determined.

To test the significant correlation of the supplementary material on learners' self-efficacy, data were treated statistically using Minitab 14 using Pearson Product-Moment Correlation Coefficients.

Table 17 shows the significant correlation of the supplementary materials components in terms of objectives, content, activities, assessment, and features in terms of clarity, appropriateness, adaptability, and ease of use to the learners' self-efficacy in terms of self-confidence, self-regulation, and self-monitoring.

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Table 17 Significant Correlation of the Supplementary Material on Learners' Self-Efficacy

Supplementary Material			Self-Efficacy		
			Self-Confidence	Self-Regulation	Self-Monitoring
Components	Objectives	r	0.17712	0.169231	0.130122
		p	0.0988	.115043	.226994
		N	88	88	88
	Content	r	0.212329	0.15867	0.143954
		p	0.0471*	.139975	.181035
		N	88	88	88
	Activities	r	0.227878	0.172185	0.117675
		p	0.0328*	.108858	.275183
		N	88	88	88
	Assessment	r	0.175393	0.141905	0.042853
		p	0.1023	.187239	.692149
		N	88	88	88
Features	Clarity	r	0.29756	0.177989	0.240714
		p	0.0049*	.097268	.023883*
		N	88	88	88
	Appropriateness	r	0.133247	0.188569	0.129544
		p	.216019	0.0786	.229162
		N	88	88	88
	Adaptability	r	0.346338	0.283562	0.25857
		p	0.001*	.007438*	0.015*
		N	88	88	88
	Ease of Use	r	0.29756	0.177989	0.240714
		p	.004879*	.097268	.023883*
		N	88	88	88

*Note: * p < .05.*

The values shown at table 17 with asterisk signified the relationship between the two variables. In terms of the supplementary material's component with regards to content and self-confidence, and activities and self-confidence have a p-value of 0.0471 and 0.0328, an r-value of 0.212329 and 0.227878 respectively that indicates that there is significant correlation and low relationship between the variables. In terms supplementary material's features with regards to clarity and self-confidence, clarity and self-monitoring, adaptability and self-confidence, adaptability and self-regulation, adaptability and self-monitoring, ease of use and self-confidence, and lastly ease of use and self-monitoring have a p-value of 0.0049, 0.023883, 0.001, 0.007438, 0.015, 0.00489, and 0.023883 and an r-value of 0.29756, 0.240714, 0.346338, 0.283562, 0.25857, 0.29756, and 0.240714 respectively that indicates that there is significant correlation and low relationship between the variables. The rest of the variables that are compared had a p value greater than 0.05 that tells us there is no significant correlation between them.

4. CONCLUSION AND RECOMMENDATIONS

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

1. There is a difference between the learners' mathematical skills in terms of formative and summative assessment leading to the rejection of the null hypothesis. This implies that creating supplementary materials that has valid objectives, content, activities, assessment and was clear, appropriate, adaptable, and easy to use would help learners improve their mathematical skills like comprehension, analytical thinking, critical thinking, and problem solving.
2. There is no correlation between the use of supplementary materials and learners' self-efficacy in terms of self-confidence, self-regulation, and self-monitoring leading to the acceptance of the null hypothesis. The data reveals that certain components and features of the supplementary materials, specifically content and self-confidence, activities and self-confidence, clarity and self-confidence, clarity and self-monitoring, adaptability and self-confidence, adaptability and self-regulation, adaptability and self-monitoring, ease of use and self-confidence, and lastly ease of use and self-monitoring have significant correlation and low relationship to each other. This implies that while not all elements of the supplementary materials impact learners' self-efficacy, some do indeed play a crucial role. Thus, the use of supplementary materials can be a beneficial tool in enhancing certain aspects of learners' self-efficacy.

In view of the findings and conclusions, the following recommendations may be made.

1. The school may launch a seminar on the creation of supplementary materials. The school may duplicate the validated supplementary material and distribute it to all the students to better improve the mathematical skills of the learners.

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2. Teachers may use supplementary material. Teachers may utilize the scores in assessment as a foundation for improvement activities. The supplementary material only comprises topics from 2nd quarter thus it is advised that the mathematics teachers provide additional content that includes topics from every quarter.
3. Learners can make full use of the validated supplementary material. Learners may keep the validated supplementary material. Learners may take part in comparable studies.

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