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Research Article

A Self-Learning Module for Grade 7 Students: A Sustainable Enhancement Material for the Least Mastered Competencies in Basic Mathematical Concepts

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ABSTRACT

Mathematics is considered one of the most important subjects in the Philippine educational curriculum. However, the majority of students, especially those in junior high school, still struggle with its basic concepts. To address this problem, the researchers developed a self-learning module (SLM) to enhance Grade 7 students' least mastered competencies in basic mathematical concepts, using the ADDIE (Analyze, Design, Develop, Implement, Evaluate) model and a descriptive-developmental research approach. The least mastered competencies of students were analyzed during the needs assessment of researcher-extensionists at a state university in Zambales. The researchers designed and implemented the SLM to help students study independently and understand mathematics better, with features such as various types of activities, practical examples, self-assessment tasks, and bilingual (English and Filipino) explanations, serving as an innovative means of indirect interaction. Results indicated that the SLM effectively addressed learning gaps, as evidenced by improved student performance and favorable evaluation ratings of the module's design and instructional features. This study implied that the SLM is expected to contribute to the development of effective and accessible learning materials that can sustainably enhance the mathematical proficiency of Grade 7 students, particularly in contexts where language and resource limitations persist.

Keywords: *ADDIE Model, Basic Mathematical Concepts, Bilingual Language, Least Mastered Competencies, Self-Learning Module*

Introduction

Mathematics is a complex yet systematic subject as it incorporates different symbols and interesting equations in terms of manipulation

and simplification, and its application in reality or real-life situations. Mathematics has since been viewed as a "difficult" subject for today's generation, and stereotypes characterizing this

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label abound. Such stereotypes eventually lead to fear that develops into mathematics phobia among students (Waswa & Al-kassab, 2023). Most students often avoid mathematics due to its complexity and the approaches to solving different mathematics-related problems. The various branches of mathematics present different and sometimes unique challenges to students (Waswa & Al-kassab, 2023).

As Reid (2009) and Linga (2024) cited, mathematics makes high conceptual demands on students. This negative view impacts their self-efficacy and approach to learning, resulting in significant struggles and challenges in understanding the material, solving equations, and recalling formulas and problem-solving methods (Gafoor & Kurukkan, 2015). Several factors were detrimental due to low performance, under-recognition of students' needs, and interest in their pre-existing knowledge and skills toward mathematical concepts (Acharya, 2017). In Malaysia, students struggle to convert mathematical sentences, comprehend mathematics and basic concepts, and do not like to read long questions (Martin et al., 2019). In Indonesia, narratives of mathematics difficulties were also reported regarding students' solving numeracy problems, placing unit number values, and distinguishing the symbols of counting operations (Aisah et al., 2024).

In the Philippines, students struggle to retrieve mathematical facts, learn mathematical language, and solve real-world problems. It presented challenges in comprehending the problem, selecting a strategy, and careless solving skills (Unson, 2021). Research indicates a significant gap in mathematics proficiency among students, with many failing to meet minimum proficiency levels (OECD, 2019). This gap further increases the challenges faced by mathematics teachers, including inadequate subject knowledge, limited resources, and insufficient support (Jailani et al., 2025). In the PISA 2018 global report, Filipino students' average score in mathematics literacy was 353 points, significantly lower than the average of 489 points, indicating a low level of proficiency (OECD, 2019). Furthermore, the results of the Program for International Student Assessment (PISA) in 2022 found that the majority of Filipino students lack the fundamental mathematical skills

required for everyday problem-solving, with only 16% obtained the basic level of mathematical comprehension. These findings only prove that Filipino students struggle to learn basic mathematical concepts even at later ages.

To address the issue, the researchers developed a Self-Learning Module (SLM) aligned to the needs of the Grade 7 students. The researchers specifically chose Grade 7 students based on the needs assessments conducted by the researcher-extensionists in a state university in Zambales, which showed that Grade 7 students struggled to master basic mathematical concepts, particularly operations across different math competencies. According to Castroverde and Acala (2021), cited by Lutching (2024), modular learning was a form of distance learning that used self-learning modules (SLM) based on the essential learning competencies (MELCS) provided by DepEd. These modules included sections on motivation and assessment that served as a comprehensive guide to the desired competencies of both teachers and students. Students can be utilized in any setting that is helpful to them and can be completed at their own pace (Benito et al., 2022).

Learning gaps can be a big problem for students; however, utilizing Self-Learning Modules, or SLMs, can really help. They make it easier for students to understand specific topics, like basic math concepts, at their own level. For some students, learning in two languages - like English and their native language, Filipino - works really well. Adding explanations in the English-Filipino language as a note for every topic to the SLMs made learning more fun and accessible. Research has shown that students who learn math in both English and their native language are more confident and understand the material better (Norén & CaLigari, 2021; Perez & Alieto; 2018). This suggests that by using SLMs that include native language explanations, students can get a better grasp of math concepts. This is essential as it can help students catch up and understand the material more thoroughly. When students are taught in a way that makes sense to them, they are more likely to understand the concepts. Thus, using the native language in math education can be a

really effective way to improve student outcomes.

Thus, the present study developed a self-learning module as a sustainable instructional material aimed at helping students master the least-learned basic mathematical concepts. It aims to bridge existing learning gaps, enhance comprehension, and serve as a valuable resource for fostering independent and meaningful learning among Grade 7 students.

Conceptual Framework

The researchers employed the ADDIE (Analyze, Design, Develop, Implement, Evaluate) model as a conceptual framework for developing a self-learning module (SLM) to address the least mastered competencies in basic mathematical concepts among Grade 7 students.

The ADDIE model, originally developed by the Center for Educational Technology at

Florida State University in 1975, is a learning development model used as an iterative approach to determine training needs, design instructional programs and materials, implement these programs, and evaluate their effectiveness. The ADDIE instructional design is commonly used to develop courses and streamline the production of training material (Bouchrika, 2024; Rapada and Servañez, 2024).

Based on these concepts, the researchers employed the ADDIE model, which involved identifying Grade 7 students' least mastered competencies in basic mathematical concepts, designing and developing sustainable learning materials to address the problem, and evaluating the developed materials. Figure 1 below illustrates the conceptual model of the development of the SLM.

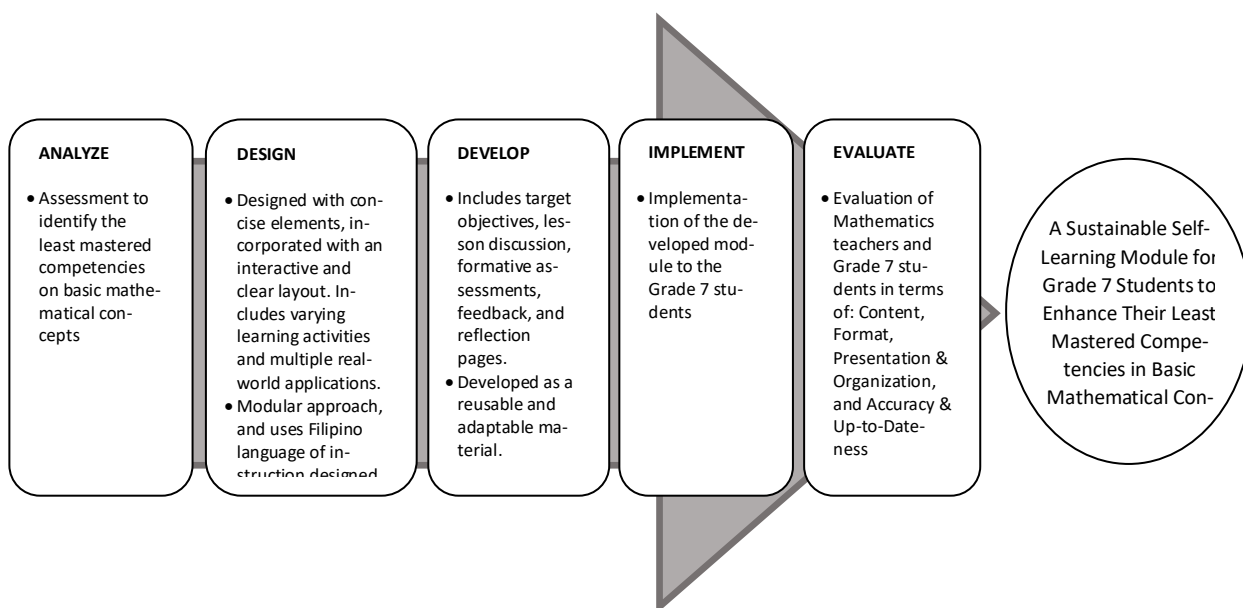


Figure 1. The Conceptual Model of the Development of the Self-Learning Module

In the “Analyze” phase, the researchers identified the least mastered competencies of Grade 7 students in basic math concepts by conducting a needs assessment through a diagnostic test, which was conducted by the College of Teacher Education Extension Office of President Ramon Magsaysay State University. The researchers made sure the assessment tool used aligned with the mathematics curriculum of the Department of Education.

In the “Design” phase, the researchers designed the SLM with concise elements and incorporated an interactive, clear layout, along with diverse learning activities and multiple real-world applications. The SLM employed a modular approach, breaking the main concept into smaller units, enabling students to manage lesson discussions more effectively. Additionally, the researchers used Filipino-English instructions, presented as notes, to offer an

innovative instructional method for each lesson discussion.

In the “Develop” phase, researchers created the SLM, which included targeted objectives for each topic, lesson discussions, formative assessments to check progress, feedback from users, and reflection pages to track how well students were doing. The SLM was designed to give each student the help they needed and to guide them through each objective. Since every student learns differently, the researchers made sure the SLM could be used more than once. The researchers also wanted to make sure the SLM would be used for a long time, so they incorporated it into many classroom discussions. This way, the SLM became a regular part of the learning process.

In the “Implement” phase, the researchers conducted the implementation of the developed module as part of the extension project of the university, which consists of 6 sessions, 2 hours each, every Friday, depending on the availability of the students and the school during the school year 2024-2025.

The “Evaluate” phase involved assessing the developed SLM, which was evaluated by Mathematics teachers and selected Grade 7 students from Amungan National High School. In evaluating the developed material, the researchers utilized an adapted instrument, originally developed by Rapada and Servañez (2024), which complies with the guidelines of the Department of Education. The following criteria were used in evaluating the SLM: Content, Format, Presentation & Organization, and Accuracy & Up-to-Dateness. In order to analyze the data collected, the researchers employed appropriate statistical tools to check the effectiveness of the developed SLM.

Research Objectives

This study aimed to develop a self-learning module for Grade 7 students as a sustainable enhancement learning material to address their least mastered competencies in basic mathematical concepts. Specifically, it sought to:

1. Assess the performance of Grade 7 students before and after the implementation of the

extension project in terms of Operations on Whole Numbers, Operations on Integers, and Operations on Fractions.

2. Develop an innovative intervention material (self-learning module) to enhance the least mastered competencies in basic mathematical concepts using bilingual language (English and Filipino).
3. Evaluate the developed self-learning module based on expert assessments in terms of Content, Format, Presentation & Organization, and Accuracy & Up-To-Dateness of Information.
4. Analyze the significant difference between the pre-test and post-test performance of Grade 7 students in basic mathematical concepts.

Methodology

Research Design

The researchers employed a descriptive-developmental approach in conducting the study, composed of two phases. The first phase primarily focused on developing the self-learning module, which included creating lessons for students' least mastered competencies, providing activities, pre-tests, and post-tests for each lesson, and reflections at the end of each discussion. The second phase of the study solely focused on evaluating the developed module. Additionally, this design incorporated a quantitative research method to provide a comprehensive understanding of the research findings. Specifically, it followed an interpretation and conclusions framework, in which quantitative data were collected and analyzed.

The descriptive-developmental approach, as cited by Mallillin et al. (2024) and Roman (2013), discusses methods for gathering information about a current situation. Furthermore, it primarily worked on describing, comparing, analyzing, and interpreting existing data. Additionally, the developmental design translated the data into a material solution for the study. Based on these results, the researchers developed a self-learning module. The self-learning module was used as an innovative enhancement material for learning basic mathematical concepts.

Respondents and Research Locale

This study was conducted at Amungan National High School, a partner school of the President Ramon Magsaysay State University, College of Teacher Education, during the school year 2024-2025, as part of the university's mandate function. This is a public secondary school located in the Iba District of the Zambales Division. This partner school, starting in 2023-2024, worked together with the researcher-extensionists to determine the least mastered competencies of the Grade 7 students in basic mathematical concepts. This collaboration aimed to improve Grade 7 students' numeracy skills, providing a foundation for continued success in mathematics education in the school. To evaluate the self-learning module, the researchers distributed the evaluation tool to mathematics teachers and 136 Grade 7 students of Amungan National High School.

Research Instruments

This study employed an evaluation tool adopted from Rapada and Servañez (2024), which followed the guidelines issued by the Department of Education (DepEd). Under DepEd Order No. 001 s. 2021, the assessment of SLMs adopted a pass-fail method. The material underwent evaluation in four areas: content, format, presentation and organization, and accuracy and up-to-dateness.

The evaluation tool consisted of a checklist for each factor in the evaluation of the SLM. With a rating scale ranging from 4 to 1, where "4" represented "Very Satisfactory" and "1" represented "Poor," the SLM needed to meet a target score out of the maximum score for each criterion to "Pass." For every rating below "3," the evaluator provided comments or justification for giving the said rating. For every evaluation criterion considered as "Not Applicable" (NA), the material was rated "3" for the said criterion. Failure to meet the intended minimum score for each criterion resulted in a "Fail" for the said criterion.

Data Collection

The researchers utilized evaluation questionnaires including the following criteria: Content, Format, Presentation & Organization, and Accuracy & Up-to-dateness. The evaluation

questionnaires were reproduced into exact copies and distributed to Mathematics teachers and Grade 7 students of Amungan National High School (ANHS) for evaluation. The researchers collected the data using the said instruments. The evaluation results were further analyzed using various statistical tools.

The researchers provided a request letter to the school superintendent for permission to conduct this study. Furthermore, the researchers also sought permission from the school principal, mathematics teachers, and students to participate in the study. Correspondingly, the researchers requested assistance from the teachers responsible for the Grade 7 students in distributing the instruments. At the same time, the researchers handed over the instruments to the mathematics teachers during their free time or when they were provided. The researchers administered the instruments during face-to-face interactions or classes permitted by the school principal or the subject teacher currently handling the Grade 7 students, or during the students' free time.

The researchers maintained the highest respect for the dignity and privacy of research respondents throughout the study. The researchers carefully scrutinized every phase of the research process to ensure strict adherence to ethical standards. All necessary permissions were obtained from the relevant authorities before conducting the study. Strict measures were implemented to safeguard the anonymity of respondents in accordance with the Data Privacy Act of 2012 (Republic Act 10173, 2012). Confidentiality of the data collected and personal data of the respondents was strictly maintained, with all information used exclusively for research purposes. The researchers ensured that all respondents voluntarily participated in the study by sending them an informed consent form with a discussion of the study's objectives and procedures. Transparent and honest communication characterized all interactions regarding the study, and due credit was accorded to the authors of the works referenced in this research.

Data Analysis

The researchers collected the data and analyzed it using appropriate statistical methods,

including mean and paired t-test, to get a complete understanding of the results. The collected raw scores were transformed into ratings in accordance with the transmutation guidelines of DepEd Order No. 8, series of 2015, to assess the performance of the Grade 7 students in the conducted assessment using both pre- and post-tests.

Frequency was used to determine the number of observable data points. A percentage was applied to compute the proportion or distribution of responses, particularly in relation to the number of participants and their assessment scores. The mean was utilized to calculate the average scores, especially in evaluating responses from the self-learning module (SLM)

evaluation instruments. Additionally, the paired t-test was employed to identify the significant mean difference between the pre-test and post-test scores, which measured the effectiveness of the intervention material.

Results and Discussion

Grade 7 Students' Performance in Basic Mathematical Concepts Before and After the Implementation of the Developed SLM

Table 1 presents a comparative analysis of the performance of the 136 Grade 7 students before and after the implementation of the developed SLM during the conduct of the extension project of the university at ANHS.

Table 1. Mean Rating and Descriptive Equivalent of the Grade 7 Students' Performance on the Pre-and Post-Tests in the Basic Mathematical Concepts

Least Mastered Competencies on Basic Mathematical Concepts	Pre-Test Mean Rating	Descriptive Equivalent	Post-Test Mean Rating	Descriptive Equivalent
Operations on Whole Numbers	74.85	Fairly Satisfactory	89.17	Very Satisfactory
Operations on Integers	71.41	Did Not Meet Expectations	84.88	Very Satisfactory
Operations on Fractions	69.15	Did Not Meet Expectations	81.21	Satisfactory

Note: N = 136 Grade 7 Students

Based on the results of the analysis, the students performed poorly before implementing the developed SLM in the pre-test assessment on the three identified least mastered competencies. On the Operations on Whole Numbers, the mean rating was 74.85, which is interpreted as Fairly Satisfactory. Likewise, Grade 7 students' performance was an even more undesirable result in Operations on Integers (Mean Rating = 71.41) and Operations on Fractions (Mean Rating = 69.15), both of which are interpreted as Did Not Meet Expectations. These results could mean that students struggled fully with fundamental mathematical operations, specifically with integer and fraction operations. This finding aligns with the study of Velez et al. (2023), where they found Filipino students often encounter difficulties with these kinds of math problems due to a lack of practice and not fully understanding the concepts.

The implementation of the SLM had a positive impact on the students' performance of the three key competencies, all of which showed significant improvement. Looking at the mean ratings for the three topics, it is clearly revealed that the post-test results were increased: Operations on Whole Numbers and Integers achieved mean ratings of 89.17 and 84.88, respectively, which were interpreted as Very Satisfactory. Meanwhile, Operations on Fractions attained a mean rating of 81.21, interpreted as Satisfactory. This suggests that the developed module was highly effective in enhancing the students' understanding and skills in basic mathematical operations. The finding is consistent with the study conducted by Culpable et al. (2024), which found that the targeted remediation programs substantially improve academic performance when aligned to address specific learning gaps. By focusing on the areas where students needed the most support, the

SLM was able to make a meaningful difference in their mathematical abilities.

In addition, a study by Hattie (2008) suggests that giving students feedback, teaching them directly, and using targeted interventions can have a big impact on how well they do in school. Another study by Radha et al. (2015) found that special projects or catch-up programs that are aligned to each student's needs can really help them do better in school, especially in math. These programs not only help students catch up on their schoolwork, but they also make students feel more confident and engaged in their learning. By giving students the

extra help they need, these programs can make a big difference in how well they do in school and how much they enjoy learning.

The Developed Self-Learning Module: Enhancement in Basic Mathematical Concepts for Grade 7 Students

Figure 2 presents the front page of the developed SLM, serving as a sustainable enhancement instructional material to address the least mastered competencies of Grade 7 students in basic mathematical concepts, titled "Enhancement in Basic Mathematical Concepts for Grade 7 Students."

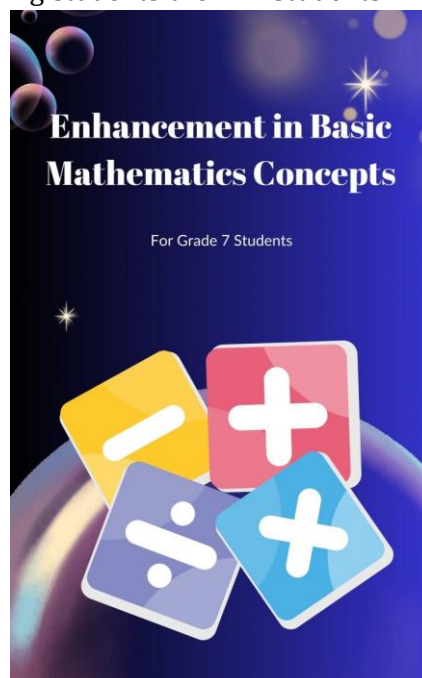


Figure 2. Front Page of the Developed Self-Learning Module, titled: Enhancement in Basic Mathematics Concepts for Grade 7 Students

This learning module consists of three chapters that help students build a strong foundation in math. It starts with operations on whole numbers, followed by operations on integers, and finally the operations on fractions. Chapter 1: Operations on Whole Numbers introduces students to the set of whole numbers and teaches them how to add, subtract, multiply, and divide these numbers through simple explanations. Chapter 2: Operations on Integers builds a foundation for both positive and negative numbers and shows students how to follow the rules when working with integers. Chapter 3: Operations on Fractions teaches

students how to add, subtract, multiply, and divide fractions, as well as simplify them, find common denominators, and convert between improper fractions and mixed numbers. This module is designed to help students learn and understand these important math concepts in a step-by-step way.

This learning module begins with a pre-test to assess the prior knowledge of the user and ends with a post-test, followed by a short reflection to share what they think they have learned from it, as a way of promoting independent learning and self-assessment. What makes SLM unique from other learning

modules is its bilingual notes, with lessons explained in both English and Filipino, which makes it easier for more people to understand. The lessons are explained in a way that is easy to follow, with step-by-step guides and examples that help students visualize the problems. The module also uses real-life examples that help them think critically.

This learning module has mixed review sections that put together ideas from whole numbers, integers, and fractions to show their interconnectedness. These reviews help learners use what they know to solve complex problems that are like real-life situations. By doing these exercises, students learn to think critically and solve problems in ways that are useful in the

real world. Students not just learn individual math operations, but also how to apply them practically.

Evaluation of the Developed Self-Learning Module Features

Table 2 presents the mean, descriptive equivalent, and total score of the evaluation features of the developed self-learning module, including content, format, presentation & organization, and accuracy & up-to-dateness of information. The findings indicate that the SLM met acceptable standards, with most areas receiving a “Satisfactory” descriptive equivalent and some achieving a “Very Satisfactory” rating.

Table 2. Mean, Descriptive Equivalent, and Total Score of the Evaluation Features of the Developed Self-Learning Module

Features	Statement	Mean	Descriptive Equivalent
Content	1. Content is suitable to the students’ level of development.	3.50	Very Satisfactory
	2. Material contributes to the achievement of specific objectives of the subject area and grade/year level for which it is intended.	3.25	Satisfactory
	3. Material provides for the development of higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem-solving, etc.	3.25	Satisfactory
	4. Material is free of ideological, cultural, religious, racial, and gender biases and prejudices.	3.25	Satisfactory
	5. Material enhances the development of desirable values and traits	3.25	Satisfactory
	6. Material has the potential to arouse the interest of the target reader.	2.25	Fairly Satisfactory
	7. Adequate warning/symbols are provided in topics and activities where safety and health are concerned.	3.00	Satisfactory
	Weighted Mean	3.11	Satisfactory
	Total Score	21.75	Passed
Format	A. Text		
	1. The size of the letters is appropriate for the intended user.	3.00	Satisfactory
	2. Spaces between letters and words facilitate reading.	3.00	Satisfactory
	3. The font is easy to read.	3.00	Satisfactory
	4. Printing is of good quality.	3.00	Satisfactory
	B. Illustrations		

Features	Statement	Mean	Descriptive Equivalent
	1. Simple and easily recognizable	2.75	Satisfactory
	2. Clarify and supplement the text.	2.50	Fairly Satisfactory
	3. Properly labeled or captioned (if applicable)	3.00	Satisfactory
	4. Realistic/appropriate colors	3.00	Satisfactory
	5. Attractive and appealing	3.00	Satisfactory
	6. Culturally relevant	3.00	Satisfactory
	C. Design and Layout		
	1. Attractive and pleasing to look at	3.00	Satisfactory
	2. Simple (i.e., does not distract the attention of the reader)	3.75	Very Satisfactory
	3. Adequate illustration in relation to the text	3.00	Satisfactory
	4. The harmonious blending of elements (e.g., illustrations and text)	3.00	Satisfactory
	D. Paper and Binding		
	1. The paper used contributes to easy reading.	3.75	Very Satisfactory
	2. Durable binding to withstand frequent use	3.00	Satisfactory
	E. Size and Weight of Resources		
	1. Easy to handle	3.00	Satisfactory
	2. Relatively light	3.00	Satisfactory
	Weighted Mean	3.04	Satisfactory
	Total Score	54.75	Passed
Presentation and Organization	1. The presentation is engaging, interesting, and understandable.	3.00	Satisfactory
	2. There is a logical and smooth flow of ideas	3.00	Satisfactory
	3. Vocabulary level is adapted to the target reader's likely experience and level of understanding	3.00	Satisfactory
	4. The length of sentences is suited to the comprehension level of the target reader	3.00	Satisfactory
	5. Sentences and paragraph structures are varied and interesting to the target reader.	3.00	Satisfactory
	Weighted Mean	3.00	Satisfactory
	Total Score	15	Passed
Accuracy and Up-To-Datedness of Information	1. Conceptual errors	3.75	Very Satisfactory
	2. Factual errors	3.75	Very Satisfactory
	3. Grammatical errors	3.75	Very Satisfactory
	4. Computational errors	3.75	Very Satisfactory
	5. Obsolete information	3.75	Very Satisfactory
	6. Typographical and other minor errors (e.g., inappropriate or unclear illustrations, missing labels, wrong captions, etc.)	3.75	Very Satisfactory
	Weighted Mean	3.75	Very Satisfactory
	Total Score	22.5	Passed

Content Features

The developed self-learning module's (SLM) content features obtained a weighted

mean score of 3.11, which is interpreted as "Satisfactory", and a total score of 21.75 (Passed), meaning it met the standards set by

the evaluators when it comes to the features of the content. This evaluation shows that the material is suitable for the age group and is taught in a way that is relevant to the students. Based on the evaluation, the SLM matches the curriculum, which may help students develop their thinking skills, and does not show any cultural or ideological bias. However, one thing that needs to be improved under this feature is its ability to arouse the students' interest (Mean = 2.25, Satisfactory). Although the module provides a positive evaluation of the basics, it could be made more engaging to keep students engaged.

When it comes to creating effective learning materials, the content is the most important part. According to Carnine (2017), content needs to be clear and well-organized for learners to master the subject, especially when they are being directly taught. Other researchers, like Mallillin et al. (2024), found that for learners to be able to study on their own, the content must be accurate, relevant, and easy to understand. It is also crucial that the content is logically organized. When these conditions are met, learners can navigate through lessons independently, even without a teacher's supervision. This is particularly helpful in situations where teachers cannot always be there to guide them. By focusing on creating high-quality content, educators can help learners achieve their goals more effectively.

In addition to this, learners appreciate content that is clear, relevant, and includes real-life examples, all presented in a logical order (Natividad, 2021). This type of content helps learners understand and engage with the material more easily. Similarly, Rico and Mendoza (2022) reported that the quality assessment of self-learning modules for content features is the most important factor in determining module effectiveness, even more so than design and technical quality.

Format Features

The SLM's format features also received a weighted mean score of 3.04, interpreted as "Satisfactory", and a total score of 54.75 (Passed), indicating that the SLM met the evaluators' standards regarding format features. The evaluation revealed that elements such as

font size, text readability, illustrations, layout, and paper quality were all deemed acceptable. However, one indicator, "Illustrations clarify and supplement the text", received a slightly lower mean score of 2.50 (Fairly Satisfactory), suggesting a need for improved integration of visuals with the content.

Learning is easier when things are presented in a clear and simple way. Research has shown that visual designs, including the font, spacing, colors, and layout, really matter when it comes to learning (Sousa, 2017). When a module is well-formatted, learners are more likely to understand and remember the information. This is especially important when people are learning on their own, because they need to be able to explore the material easily and understand what they can see. If the format is confusing, it can be difficult to focus on the actual learning. However, when everything is laid out in a clear, logical way, learners can concentrate on what they are trying to learn, rather than getting bogged down in figuring out what is going on. This helps reduce the mental effort required to learn and makes the whole process more efficient.

Research by Rogayan Jr. and Dollete (2019) shows that when information is presented in a clear and organized way, with things like tables, diagrams, and important points highlighted, it is easier for students to read and understand. This makes learning more efficient. Similarly, a study by Buan et al. (2024) found that learners are more likely to engage with course materials that have a consistent layout, proper spacing, and information that is presented in a logical order. Thus, the satisfactory rating of the SLM in terms of format feature means that the design is functional, but there is still room for improvement, like ensuring that pictures and illustrations are used in a way that really supports the text.

Presentation and Organization Features

The SLM's presentation and organization features got a weighted mean score of 3.00, interpreted as "Satisfactory" and a total score of 15 (Passed). This means that the evaluators' expectations for the material in terms of presentation and organization features were met. This suggests that the content was presented in a

coherent sequence, used age-appropriate language, and maintained consistency in sentence and paragraph structures, making it accessible and understandable to students.

When content is systematically organized and divided into more manageable sections, students may more effectively understand and remember it. This helps form an engaging mental image and enhances their confidence as they progress through the session. According to Rogayan Jr. and Dollete (2019), presenting topics in a logical sequence, meticulously planning exercises, and utilizing easily comprehensible visual aids significantly enhance learning efficacy and interest. Likewise, Buan et al. (2024) found that proper use of headings, subheadings, and uniform design significantly helps students by enhancing content understanding and facilitating seamless transitions between subjects. This enables learners to concentrate on the material instead of being hindered by a confusing presentation. The objective is to render the learning process as clear and intuitive as feasible. The evaluation suggests that designing SLM in a more interesting way with different formats to move from one idea to the next, which could help students want to learn and understand more.

Accuracy and Up-To-Dateness of Information Features

The module received its highest weighted mean score in terms of accuracy and up-to-

dateness of information features of 3.75, rated as “Very Satisfactory,” and a total score of 22.5 (Passed), indicating that the evaluators’ standards were met in terms of accuracy and up-to-dateness features. This means that the module was accurate and had no mistakes in facts, concepts, grammar, or calculations. It also had up-to-date and reliable information. This kind of accuracy is important for helping students trust the material and learn in a meaningful way. When students can rely on the information being correct, they are more likely to engage with it and understand it better.

This SLM’s strength is also supported by the research of Uhuad (2024), which claims the importance of accuracy and using the latest information in self-learning modules. If a module contains mistakes or outdated content, it can lead to misunderstandings and make it difficult for students to learn. Thus, the evaluation of “Very Satisfactory” rating in this feature shows that the module is reliable, which in turn makes it a more effective tool for learning.

Test of Significant Difference Between the Grade 7 Students’ Performance Before and After Implementing the Developed SLM

Table 3 shows the result of the Paired *t*-Test to determine if there is a significant difference in the performance of Grade 7 students between the pre- and post-test assessments on the identified least mastered competencies in basic mathematical concepts.

Table 3. Paired t-Test to Test the Significant Difference Between the Grade 7 Students’ Performance in Their Pre-and Post-Tests on the Basic Mathematical Concepts

Paired Samples Test	Mean	N	SD	t	df	Sig. (2-tailed)
Pre-Test Performance	71.8033	136	2.50485	-	135	.000
Post-Test Performance	85.0867	136	3.70866	40.906		

The findings reveal that students’ performance improved from the pre-test (Mean = 71.81, SD = 2.50, N = 136) to the post-test (Mean = 85.04, SD = 3.71, N = 136) results. The paired *t*-test ($t(135) = -40.906, p < .05$) showed that there was a significant negative difference between the performance of the respondents before and after the implementation of the developed SLM. This result indicates that the observed improvement is not due to chance but is

attributable to the effectiveness of the intervention.

Based on the findings, the researchers implied that the extension project made a positive impact on how students improved their mathematics skills in basic math concepts. This claim could be justified based on the significant improvements in the three most struggling mathematics competencies. The results are also consistent with the findings of several researchers

from local and international studies. For instance, local studies done by Francisco et al. (2022) and Mandagdag et al. (2024) show that programs designed to help students with specific problems and learning materials that are relevant to their needs can really improve their understanding of math. Internationally, Abbas et al. (2025) and Ysseldyke and Tardrew (2007) suggest that using a structured approach to teaching and identifying areas where students need help can make a big difference in how well they do in school. Thus, the present study shows that when teachers design interventions to help students learn and master specific skills and ensure those programs are based on what the students need to know, they can really help them get a better grasp of the basics of math.

Conclusion

The study found that before the implementation of the developed Self-Learning Module, Grade 7 students generally performed poorly across the targeted least mastered competencies. However, following the implementation of the extension project of the university where SLM was introduced and implemented, there was significant improvement in their mathematics performance, indicating the effectiveness of the material. The SLM was evaluated by mathematics experts and users as generally satisfactory in terms of its content quality, format, presentation & organization, as well as accuracy & up-to-dateness, claiming its potential as a reliable supplementary learning material. In general, the study provides compelling evidence that the Extension Project and the developed SLM significantly enhanced the mathematical competencies of Grade 7 students.

Recommendations

To further improve students' mathematics competencies, several recommendations are proposed to take action. First, it is recommended that targeted intervention programs be sustainably implemented to continuously address the mathematical competencies in which students demonstrated performance below the expected mastery level. This will help them catch up and build a strong foundation for future math classes. Second, the study suggests

intensifying the implementation of the successful utilization of the SLM through an extension project to other relevant groups or grade levels, as the intervention has proven effective in improving student performance. This will help understand its strengths and weaknesses and make necessary adjustments. Lastly, make improvements on the content and format features of the SLM that received a fairly satisfactory rating, specifically on how to arouse the interest of the readers and to supplement the content using accurate illustrations.

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