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FROM CONCEPTS TO REALITIES: DEVELOPMENT AND VALIDATION OF CONTEXTUALIZED LEARNING MODULES FOR MATHEMATICS 9

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ABSTRACT

This study developed and validated contextualized learning modules for Mathematics 9 to address students' difficulties in mastering selected least learned competencies. The study aimed to provide instructional materials that are meaningful, relevant, and grounded in real-life and localized contexts to improve students' understanding and engagement in Mathematics. A descriptive-developmental research design was employed using the ADDIE model, specifically the Analysis, Design, Development, and Evaluation phases. The modules were evaluated based on objectives, presentation, assessment, and contextualization and localization, while validation focused on learning outcomes, content mapping, readability, usability, and format. Respondents included Grade 9 Mathematics teachers and subject-matter experts such as Master Teachers, Head Teachers, and Education Program Supervisors from the Division of the City of Balanga. Data were collected using a researcher-made evaluation instrument. Weighted mean and standard deviation were used to determine the level of acceptability of the modules, while the Mann–Whitney U test determined significant differences between the evaluations of teachers and experts. Results showed that the contextualized learning modules received high mean ratings across all design and validation criteria, indicating that the materials were clear, well-organized, and instructionally sound. Furthermore, the Mann–Whitney U test revealed no significant difference between the assessments of teachers and experts, showing consistency in their evaluations. The findings confirmed that the developed modules are highly valid and suitable for teaching Mathematics 9, particularly in addressing least learned competencies.

Keywords: *Contextualization, Least learned competencies, Localization, Module*

INTRODUCTION

Mathematics is a fundamental discipline that develops critical thinking, logical reasoning, problem-solving, and decision-making skills necessary for learners to function effectively in everyday life and future careers. Despite its importance, Mathematics is often perceived as one of the most difficult subjects because of its abstract nature and the complexity of its concepts. This challenge has become more evident with the emergence of international large-scale assessments such as the Programme for International Student Assessment (PISA), which measures learners' mathematical literacy and their ability to apply mathematical knowledge in real-life situations. Since the Philippines participated in PISA in 2018, Filipino learners have consistently ranked among the lowest-performing countries in mathematics, science, and reading, revealing persistent gaps in the country's educational system (Organisation for Economic Co-operation and Development [OECD], 2023).

The PISA 2022 results further emphasized the urgency of addressing the declining performance of Filipino learners in Mathematics. Only 16% of Filipino students achieved at least Level 2 proficiency in Mathematics, far below the OECD average of 69% (OECD, 2023). This indicates that the majority of learners struggle with basic mathematical processes such as interpreting simple mathematical representations and solving routine problems situated in real-life contexts. Moreover, only a very small percentage of Filipino students reached advanced proficiency levels that require higher-order thinking, reasoning, and problem-solving skills. These findings suggest that learners are not sufficiently equipped with the competencies necessary to meet global standards in mathematical literacy.

Several studies attribute this low performance to the limited emphasis on higher-order thinking skills, reasoning, and contextualized instruction in Mathematics education. Golla and Reyes (2020) found that the current K to 12 Mathematics curriculum lacks adequate integration of advanced reasoning processes and authentic real-life applications. Consequently, students often fail to connect abstract mathematical concepts with practical experiences, resulting in low engagement, weak conceptual understanding, and poor problem-solving abilities. Similarly, Javillonar (2024) revealed that Grade 9 learners experienced significant difficulties in solving quadratic equations due to conceptual misunderstandings and insufficient instructional support. Dumigsi and Cabrella (2019) further emphasized that instructional materials developed from least learned competencies can effectively address students' learning gaps by simplifying difficult concepts and providing focused remediation activities.

In response to these educational concerns, the Department of Education strongly promotes contextualization and localization in curriculum implementation. Republic Act No. 10533, also known as the Enhanced Basic Education Act of 2013, mandates that the curriculum should be flexible enough to allow schools to localize and contextualize instruction according to learners' educational and social realities. Supporting this mandate, DepEd Order No. 32, s. 2015 defines contextualization as the process of relating curriculum content to specific settings, situations, and applications to make

learning more meaningful and relevant to learners. Localization, as part of contextualization, emphasizes the integration of local culture, community resources, and learners' experiences into instruction.

Contextualized learning has been recognized as an effective approach in improving learners' engagement, comprehension, and academic performance in Mathematics. Aguinaldo Jr. et al. (2021) found that contextualized learning modules incorporating local activities and familiar situations significantly improved students' understanding and achievement in Mathematics. Likewise, Tupaz (2021) reported that contextualized modular worktexts enhanced learners' comprehension of trigonometric concepts by connecting lessons to real-life experiences. Research by Jalotjot and Fidelino (2023) also highlighted the significant role of contextualized and localized instructional materials in promoting student engagement and meaningful learning outcomes.

The effectiveness of contextualized learning materials is also influenced by essential components such as objectives, presentation, assessment, readability, usability, content mapping, and format. Clear learning objectives guide instruction and align learning activities with intended competencies (Rodriguez et al., 2022). Effective presentation and learner-friendly organization enhance engagement and comprehension (Locsin, 2022; Elen, 2024). Appropriate assessments encourage critical thinking and authentic application of knowledge (Orozco et al., 2021), while readability and usability ensure that instructional materials are accessible and understandable to learners (Schmitt et al., 2022; Biason, 2022). Moreover, well-structured formatting and coherent content mapping contribute to the effectiveness and instructional value of learning modules (Madrazo & Dio, 2023).

Despite the growing body of literature supporting contextualized instruction, there remains a limited number of validated contextualized learning modules specifically designed for Grade 9 Mathematics competencies, particularly those based on identified least learned competencies. Existing studies have primarily focused on instructional strategies and intervention materials, with limited attention given to the systematic development and validation of contextualized modules that integrate real-life applications, localization, and learner-centered design. This research gap highlights the need for innovative instructional resources that directly address students' learning difficulties while aligning with curriculum standards and the demands of global assessments such as PISA.

At Bataan National High School–Junior High School, students continue to demonstrate difficulties in mastering selected Grade 9 Mathematics competencies, particularly those requiring higher-order thinking and problem-solving skills. Classroom observations, assessment results, and performance records indicate that many learners struggle to understand abstract concepts and apply mathematical principles in practical situations. These challenges underscore the necessity of developing contextualized learning modules that simplify difficult concepts, integrate meaningful real-life experiences, and provide engaging learning opportunities for students.

Hence, this study entitled “From Concepts to Realities: Development and Validation of Contextualized Learning Modules for Mathematics 9” was conducted to develop and validate contextualized learning modules anchored on the least learned competencies in Grade 9 Mathematics. Specifically, the study aimed to produce instructional materials that are relevant, learner-centered, localized, and aligned with the needs and experiences of learners. The proposed modules sought to enhance students’ mathematical reasoning, conceptual understanding, engagement, and problem-solving skills through contextualized and authentic learning experiences. Furthermore, the study contributes to the improvement of Mathematics education by providing validated instructional materials that support meaningful learning and help prepare Filipino learners for national and international academic standards.

Research Questions

This study aimed to determine the process of developing and validating contextualized modules in Mathematics 9 for the School Year 2025–2026.

Specifically, this study sought to answer the following questions:

1. What are the least-learned competencies in Mathematics 9?
2. How may the contextualized modules be designed in terms of:
   2.1. objective;
   2.2. presentation;
   2.3. assessment; and
   2.4. contextualization and localization?
3. What are the results of the assessment of the modules as perceived by teachers and experts in terms of;
   3.1. learning outcomes;
   3.2. mapping of content;
   3.3. readability;
   3.4. usability; and
   3.5. format?
4. Is there a significant difference between teachers' and experts' assessments of the contextualized module?
5. What are the implications of the findings of the study for mathematics education?

METHODOLOGY

The study was conducted within the Schools Division of Balanga. The respondents were selected from public junior high school institutions offering Grade 9 Mathematics. The locale was chosen because it represents a setting where learners experience varying levels of proficiency in Mathematics, particularly in the least learned competencies such as quadratic equations, quadratic inequalities, and rational algebraic expressions. This setting provided relevant bases for the development and validation of contextualized learning modules aligned with actual classroom needs and learner performance.

The research employed a descriptive-developmental research design utilizing the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The descriptive component was used to determine the level of validity and acceptability of the developed contextualized learning modules as evaluated by teachers and experts. The developmental component focused on the systematic design, construction, and refinement of instructional materials intended to improve learners' understanding of Grade 9 Mathematics competencies.

The investigation utilized purposive sampling, a non-probability sampling technique in which respondents were selected based on their expertise, experience, and relevance to the study objectives (Alchemer, 2021). This ensured that only qualified individuals capable of evaluating instructional materials were included. The respondents consisted of 25 participants, composed of 17 Grade 9 Mathematics teachers and 8 experts, including Mathematics Master Teachers, a Head Teacher in Mathematics, and an Education Program Supervisor (EPS) in Mathematics. These respondents were selected due to their direct involvement in Mathematics instruction and curriculum evaluation.

The primary instrument used in the investigation was a structured questionnaire adapted from Carlos (2018) and Macalalad (2017). The instrument was modified to align with the objectives of developing and validating contextualized learning modules in Mathematics 9. It consisted of two parts: the evaluation of modules in terms of objectives, presentation, assessment, contextualization, and localization; and the assessment of modules based on learning outcomes, content mapping, readability, usability, and format. The questionnaire used a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Content validation was conducted by Mathematics experts, including Master Teachers, a Head Teacher, and an Education Program Supervisor, and their suggestions were incorporated to improve the instrument. No pilot testing was conducted due to the expert-based validation approach of the study.

Data gathering began with the securing of necessary permissions from the appropriate educational authorities. After approval, coordination was made with school representatives and identified respondents. The questionnaires were then distributed to Grade 9 Mathematics teachers and expert validators. The purpose of the investigation and instructions for accomplishing the instrument were clearly explained. Respondents were given sufficient time to evaluate the contextualized modules before the retrieval of accomplished questionnaires. All responses were collected, checked, encoded, and organized for statistical analysis.

The data gathered were analyzed using appropriate statistical tools. Frequency and percentage were used to describe the profile of respondents. Weighted mean was used to determine the level of validity and acceptability of the modules in terms of the specified criteria. Standard deviation was used to measure the consistency of responses among evaluators. The Mann–Whitney U test was used to determine whether there were significant differences between the evaluations of Grade 9 Mathematics teachers and

expert validators. All statistical computations were processed using Microsoft Excel and SPSS software.

The investigation focused on the development and validation of contextualized learning modules in Mathematics 9 covering quadratic equations, quadratic inequalities, and rational algebraic expressions. The evaluation was limited to Grade 9 Mathematics teachers and selected experts within the Division of Balanga. The study assessed the modules in terms of objectives, presentation, assessment, contextualization, localization, learning outcomes, content mapping, readability, usability, and format. However, it did not include experimental implementation or measurement of the modules' effect on students' academic performance, as it was limited to validation and acceptability analysis only.

RESULTS

Part I. Identification of the least learned competencies

Table 1: Results of Quarterly Exam Mean Percentage Score (MPS) of Grade 9 from 2022–2023 to 2024–2025

Quarter	2022 – 2023	2023 – 2024	2024 – 2025
1ST Quarter	50.06	48.84	56.19
2nd Quarter	54.94	51.29	59.13
3rd Quarter	50.73	62.80	63.35
4th Quarter	60.27	58.15	60.76

Table 2: Least - Learned Competencies in Quarter 1 Mathematics 9

Rank	Item No.	Least Learned Competencies	PERCENTAGE of Correct Responses
1	27	"Solves equations transformable to quadratic equations (including rational algebraic equations)."	37.41%
2	32	"Solves quadratic equations by: (a) extracting square roots; (b) factoring; (c) completing the square; and (d) using the quadratic formula."	40.19%
3	41	"Solves equations transformable to quadratic equations (including rational algebraic equations)."	40.56%
4	40	"Solves equations transformable to quadratic equations (including rational algebraic equations)."	40.93%

5	50	“Solves problems involving quadratic equations and rational algebraic equations.”	41.94%
6	34	"Solves quadratic equations by: (a) extracting square roots; (b) factoring; (c) completing the square; and (d) using the quadratic formula."	42.22%
7	35	“Describes the relationship between the coefficients and the roots of a quadratic equation.”	42.41%
8	28	“Solves equations transformable to quadratic equations (including rational algebraic equations).”	42.87%
9	49	“Solves problems involving quadratic equations and rational algebraic equations.”	44.07%
10	44	“Solves equations transformable to quadratic equations (including rational algebraic equations).”	44.26%

Part II. Evaluation of the Design of Contextualized Learning Module in Mathematics 9 in Terms of Objectives, Presentation, Assessment, and Contextualization and Localization

Table 3: Evaluation of Design in Terms of Objectives

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
“Objectives of the localized and contextualized activities were based on the Most Essential Learning Competencies issued by the Department of Education.”	4.93	5.00	4.96	0.21	Strongly Agree
“Objectives of the localized and contextualized modules were clearly stated.”	4.93	5.00	4.96	0.21	Strongly Agree
“Objectives of the localized and contextualized modules were simple yet attainable and measurable.”	4.93	5.00	4.96	0.21	Strongly Agree
OBJECTIVE	**4.93**	**5.00**	**4.96**	**0.21**	**Excellent**

Table 4: Evaluation of Design in Terms of Presentation

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Motivation of the learners to engage in the class discussion and actively participate in the learning modules was enhanced in the activities indicated."	4.80	4.88	4.83	0.39	Strongly Agree
"Provision of the localized and contextualized modules was clearly stated in the module."	4.93	5.00	4.96	0.21	Strongly Agree
"Students' attention was caught by the localized and contextualized modules indicated in the module."	4.87	5.00	4.91	0.29	Strongly Agree
"The procedures in the presentation of the lesson are clearly specified as they are stated and enumerated."	4.93	5.00	4.96	0.21	Strongly Agree
"A presentation that was clear and sequential was provided through the localized and contextualized module in Mathematics."	5.00	4.88	4.96	0.21	Strongly Agree
"Presentation of the lesson with relevant learning tasks was undertaken through the localized and contextualized module in Mathematics."	5.00	5.00	5.00	0.00	Strongly Agree
"Varied and related tasks and activities were stated in the module."	4.87	4.88	4.87	0.34	Strongly Agree
"Activities to generalize the lesson were provided in the module."	4.93	5.00	4.96	0.21	Strongly Agree
PRESENTATION	**4.92**	**4.95**	**4.93**	**0.12**	**Excellent**

Table 5: Evaluation of Design in Terms of Assessment

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"The assessment activities provided will clearly determine whether the objective is met and learning takes place."	4.80	4.88	4.83	0.39	Strongly Agree
"Encouragement of the students to interact and respond to the lesson was executed through a localized and contextualized module in Mathematics."	4.73	4.88	4.78	0.42	Strongly Agree
"The assessment activities for the learners indicated in the module are engaging, which help the students to understand the lesson."	4.73	5.00	4.83	0.39	Strongly Agree
"Encouragement of the learners to be inspired to value and set high-performance targets for themselves was fostered."	4.60	4.88	4.70	0.47	Strongly Agree
"The assessment activities for the learners are engaging, which help the students to understand the lesson."	4.80	4.88	4.83	0.39	Strongly Agree
"Provision of the assessment activities and homework to retain skills and knowledge was evident."	4.87	4.88	4.87	0.34	Strongly Agree
"Thought-provoking questions were used as a formative assessment of the lesson."	4.73	4.75	4.74	0.54	Strongly Agree
"Assessment activities were stated to provide a reflection of the students about the lesson."	4.80	5.00	4.87	0.34	Strongly Agree
"Assessment activities were congruent with the objectives of the lesson."	5.00	5.00	5.00	0.00	Strongly Agree
ASSESSMENT	**4.81**	**4.91**	**4.84**	**0.22**	**Excellent**

Table 6: Contextualization and Localization

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Formative and summative assessments were given."	5.00	5.00	5.00	0.00	Strongly Agree
"Contextualized and Localized activities in the learning materials are set in the local conditions in terms of geography, cultural diversity, and individuality."	4.87	5.00	4.91	0.29	Strongly Agree
"Activities have meanings that are easy to comprehend, appreciate, and relevant in their lives."	4.80	4.88	4.83	0.39	Strongly Agree
"Strategies used are situational and will change based on the environment and circumstances."	4.73	4.75	4.74	0.45	Strongly Agree
"Learning standards and competencies are always preceded by contextualization and localization."	4.93	4.88	4.91	0.29	Strongly Agree
"Learning materials conform, reflect, and are flexible to the needs of the learners, especially the 21st-century learners who need to be holistically and skillfully developed."	4.80	5.00	4.87	0.34	Strongly Agree
"Lessons are flexible, fit, creative, relevant, and meaningful, and adaptable to students' level of understanding and instructional needs."	4.93	4.88	4.91	0.29	Strongly Agree
"Instructional materials used in the learning process are adaptable to the local needs and preferences of students to	4.67	4.75	4.70	0.47	Strongly Agree

make learning more accessible and open to all."					
"Students are put in a natural learning environment, letting them manipulate, relate, and adapt various learning resources within the locality/community, where profound learning will be assured and realized."	4.80	4.88	4.83	0.39	Strongly Agree
"The use of available resources within the community and real-life experiences to connect concepts to issues that are relevant in the needed skills and competencies is evident."	4.80	4.88	4.83	0.39	Strongly Agree
"Shows positive effects on the performance of the students and is effective as a strategy for imparting the lifelong learning outcomes."	4.73	4.75	4.74	0.45	Strongly Agree
CONTEXTUALIZATION AND LOCALIZATION	**4.81**	**4.86**	**4.83**	**0.27**	**Excellent**

Table 7: Summary Result for the Design of the Developed Contextualized Learning Modules

Indicators	Mean	SD	Adjectival Rating
Objective	4.96	0.21	Excellent
Presentation	4.93	0.12	Excellent
Assessment	4.84	0.22	Excellent
Contextualization and Localization	4.83	0.27	Excellent
Overall	**4.89**	**0.17**	**Excellent**

Legend: 4.20-5.00 Strongly Agree/Excellent; 3.35-4.19 Agree/Very Satisfactory; 2.60-3.34 Moderately Agree/ Satisfactory;1.80-2.59 Disagree/Fair; 1.00-1.79 Strongly Disagree/Poor

Part III. Validation of Contextualized Learning Module in Mathematics 9 in Terms of Learning Outcome, Mapping of Content, Readability, Usability, and Format

Table 8: Learning Outcomes

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Clearly defines what is to be learned."	5.00	5.00	5.00	0.00	Strongly Agree
"Supports the realization of the course's general objectives."	4.87	4.88	4.87	0.34	Strongly Agree
"Achieves learning goals within the available time, knowledge, and resources."	4.93	4.88	4.91	0.29	Strongly Agree
"Presents a logical and coherent structure."	4.93	4.75	4.87	0.34	Strongly Agree
"Communicates expected learning outcomes from the start."	4.87	5.00	4.91	0.29	Strongly Agree
Nature	**4.92**	**4.90**	**4.91**	**0.18**	**Excellent**
"Describes the intended result of the instruction."	4.87	4.88	4.87	0.34	Strongly Agree
"Shows commitment to the goal of the college."	4.67	4.75	4.70	0.47	Strongly Agree
"Satisfies the curriculum requirement."	4.73	4.88	4.78	0.42	Strongly Agree
"Requires a high level of cognition."	4.67	4.88	4.74	0.45	Strongly Agree
"Provides a clear goal for learning."	4.80	5.00	4.87	0.34	Strongly Agree
Purpose	**4.75**	**4.88**	**4.79**	**0.35**	**Excellent**
"States what the students will be able to do upon successful completion of the subject."	4.93	4.88	4.91	0.29	Strongly Agree
"Facilitates the students to develop study attitudes and skills."	4.87	4.88	4.87	0.34	Strongly Agree

"Considers the goal of the learning process."	4.87	5.00	4.91	0.29	Strongly Agree
"Addresses skills or technical procedures needed in the subject."	4.80	4.88	4.83	0.39	Strongly Agree
"Shows the expected amount of work to be done."	4.93	4.88	4.91	0.29	Strongly Agree
Procedure	**4.88**	**4.90**	**4.89**	**0.28**	**Excellent**
Learning Outcomes	**4.85**	**4.89**	**4.86**	**0.24**	**Excellent**

Table 9: Mapping of Content

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Delivers lessons that are accurate, organized, clear, and up to date."	4.93	4.88	4.91	0.29	Strongly Agree
"Gives clear and easy-to-follow instructions."	4.93	5.00	4.96	0.21	Strongly Agree
"Covers the topics necessary in understanding the subject."	4.93	5.00	4.96	0.21	Strongly Agree
"Includes references at the end of the lesson."	4.93	5.00	4.96	0.21	Strongly Agree
"Uses smooth, integrated, comprehensive, relevant, and concrete evidence from sources."	4.87	4.88	4.87	0.34	Strongly Agree
Logical Presentation	**4.92**	**4.95**	**4.93**	**0.16**	**Excellent**
"Aligns lessons to the curriculum."	4.80	5.00	4.87	0.34	Strongly Agree
"Maintains focus on topic/subject throughout the response."	4.80	4.88	4.83	0.39	Strongly Agree
"Shows what is important in the topic."	4.87	4.88	4.87	0.34	Strongly Agree
"Provides relationship of previous and present ideas."	4.80	5.00	4.87	0.34	Strongly Agree
"Contains clear lesson introductions and summaries."	4.87	5.00	4.91	0.29	Strongly Agree
Consistency	**4.83**	**4.95**	**4.87**	**0.27**	**Excellent**
"Sharpens analytic skills."	4.87	4.88	4.87	0.34	Strongly Agree

"Provides real-life application of the lesson."	4.87	4.88	4.87	0.34	Strongly Agree
"Presents appropriate activities to the students."	4.93	4.88	4.91	0.29	Strongly Agree
"Applies activities to a diversity of student abilities, interests, and learning styles."	4.73	4.88	4.78	0.42	Strongly Agree
"Develops the ability to work individually."	4.87	4.88	4.87	0.34	Strongly Agree
Quality	**4.85**	**4.88**	**4.86**	**0.26**	**Excellent**
Mapping and Content	**4.87**	**4.93**	**4.89**	**0.18**	**Excellent**

Table 10: Language

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Uses correct grammar throughout the modules."	5.00	4.75	4.91	0.29	Strongly Agree
"Provides instructions/directions that are clear and easy to follow."	5.00	4.88	4.96	0.21	Strongly Agree
"Develops a language structure that avoids misinterpretation."	4.93	4.88	4.91	0.29	Strongly Agree
"Presents the topics and subtopics clearly."	4.93	5.00	4.96	0.21	Strongly Agree
"Fits audience and purposes in terms of its sentence style."	4.93	4.75	4.87	0.34	Strongly Agree
Communicative Function	**4.96**	**4.85**	**4.92**	**0.17**	**Strongly Agree**
"Uses English as the medium of instruction."	5.00	5.00	5.00	0.00	Strongly Agree
"Makes use of a language that is simple and easy to understand."	4.93	4.88	4.91	0.29	Strongly Agree
"Chooses words for their precise meaning and uses an appropriate level of specificity."	4.87	4.75	4.83	0.39	Strongly Agree
"Demonstrates superior knowledge of the language of mathematics and basic mathematical concepts and operations."	5.00	4.88	4.96	0.21	Strongly Agree
"Applies various sentences, yet clearly structured and carefully focused."	4.87	4.88	4.87	0.34	Strongly Agree
Language Function	**4.93**	**4.88**	**4.91**	**0.22**	**Strongly Agree**

Language	**4.95**	**4.86**	**4.92**	**0.18**	**Strongly Agree**

Table 11: Usability

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Shows usefulness in understanding the different concepts of the subject."	4.87	5.00	4.91	0.29	Strongly Agree
"Helps in responding to the students' need to understand the subject."	4.87	4.88	4.87	0.34	Strongly Agree
"Serves as a useful and effective instructional material."	4.87	4.88	4.87	0.34	Strongly Agree
"Adapts to students' interests and abilities.	4.93	4.88	4.91	0.29	Strongly Agree
Communicates knowledge and ideas effectively."	4.93	4.88	4.91	0.29	Strongly Agree
Effectiveness	**4.89**	**4.90**	**4.90**	**0.25**	**Excellent**
"Uses a design that supports ease of learning."	4.80	4.88	4.83	0.39	Strongly Agree
"Strengthens the learning interests of the students."	4.87	4.88	4.87	0.34	Strongly Agree
"Encourages the student to work at his own pace."	4.87	4.88	4.87	0.34	Strongly Agree
"Reinforces the transfer of learning."	4.87	4.88	4.87	0.34	Strongly Agree
"Encourages students in completing the given task."	4.87	5.00	4.91	0.29	Strongly Agree
Efficiency	**4.85**	**4.90**	**4.87**	**0.22**	**Excellent**
"Offers meaningful experiences to the learners in learning the lessons."	5.00	4.88	4.96	0.21	Strongly Agree
"Provides useful information, graphics, and illustrations to understand better the topics presented."	5.00	4.88	4.96	0.21	Strongly Agree
"Develops new knowledge and skills	5.00	4.88	4.96	0.21	Strongly Agree
Stimulates enthusiasm for further learning."	4.87	4.88	4.87	0.34	Strongly Agree
"Presents intellectually stimulating learning activities."	4.93	4.88	4.91	0.29	Strongly Agree

Satisfactory in the Content of Use	**4.96**	**4.88**	**4.93**	**0.22**	**Excellent**
Usability	**4.90**	**4.89**	**4.90**	**0.20**	**Excellent**

Table 12: Format

Indicators	Teachers	Experts	Overall		Interpretation
	Mean	Mean	Mean	SD	
"Organizes topics logically."	4.93	4.88	4.91	0.29	Strongly Agree
"Shows attractive and readable design, and quality suitable for students' use."	4.87	5.00	4.91	0.29	Strongly Agree
"Contains adequate margins and readable typeface."	5.00	5.00	5.00	0.00	Strongly Agree
"Exhibits a visually appealing and stimulating format."	4.80	5.00	4.87	0.34	Strongly Agree
"Demonstrates accurate and well-integrated graphics and illustrations into the text."	4.93	5.00	4.96	0.21	Strongly Agree
Structure	**4.91**	**4.98**	**4.93**	**0.13**	**Excellent**
"Shows a visible font style and size on paper."	4.87	4.88	4.87	0.34	Strongly Agree
"Prevents visibility of extra marks or smudges on the paper."	4.93	4.88	4.91	0.29	Strongly Agree
"Locates letters and graphics correctly in relationship to the lines."	4.80	4.88	4.83	0.39	Strongly Agree
"Displays appropriate spacing between letters and learning illustrations."	4.87	4.88	4.87	0.34	Strongly Agree
"Exhibits a visually appealing presentation, hence sustains learning."	4.93	4.88	4.91	0.29	Strongly Agree
Layout	**4.88**	**4.88**	**4.88**	**0.20**	**Excellent**
"Illustrates carefully planned instructional designs."	4.93	5.00	4.96	0.21	Strongly Agree
"Combines attractiveness with effectiveness on page layouts."	4.80	4.88	4.83	0.39	Strongly Agree
"Illustrates appropriate styles and structures."	4.93	4.75	4.87	0.34	Strongly Agree
"Consists of illustrations related to the lesson."	5.00	5.00	5.00	0.00	Strongly Agree

"Shows consistency of illustrations and text in the materials."	5.00	4.88	4.96	0.21	Strongly Agree
Quality	**4.93**	**4.90**	**4.92**	**0.18**	**Excellent**
Format	**4.91**	**4.92**	**4.91**	**0.11**	**Excellent**

Table 13: Summary of Validation Results of the Developed Module

Indicators	Mean	SD	Adjectival Rating
Learning Outcome	4.86	0.24	Excellent
Mapping of Content	4.89	0.18	Excellent
Language	4.92	0.18	Excellent
Usability	4.90	0.20	Excellent
Format	4.91	0.11	Excellent
Overall	**4.89**	**0.16**	**Excellent**

Legend: 4.20-5.00 Strongly Agree; 3.35-4.19 Agree; 2.60-3.34 Moderately Agree;1.80-2.59 Disagree; 1.00-1.79 Strongly Disagree

Part IV. Comparison of Validation

Part IV presents the differences in validation result between teachers and experts for the contextualized module.

Table 14: Validation vis-à-vis Group

Variables	Group	Mean	Mean	U	Sig.	Decision	Interpretation
Learning Outcome	Teachers	4.85	11.30	49.50	0.51	Failed to Reject	Not Significant
	Experts	4.89	13.31				
Mapping of Content	Teachers	4.87	11.40	51.00	0.59	Failed to Reject	Not Significant
	Experts	4.93	13.13				
Language	Teachers	4.95	12.80	48.00	0.47	Failed to Reject	Not Significant
	Experts	4.86	10.50				
Usability	Teachers	4.90	11.23	48.50	0.47	Failed to Reject	Not Significant
	Experts	4.89	13.44				
Format	Teachers	4.91	12.00	60.00	1.00	Failed to Reject	Not Significant
	Experts	4.92	12.00				
Overall	**Teachers**	**4.89**	**11.60**	**54.00**	**0.73**	**Failed to Reject**	**Not Significant**
	Experts	**4.90**	**12.75**				

at the 0.05 level of significance.

DISCUSSION

Table 1 presents the mean percentage scores (MPS) for the quarterly examinations across three consecutive school years, from 2022–2023 to 2024–2025.A notable pattern in the data is the consistently low student performance during the 1st quarter across the three consecutive school years, with MPS values of 50.06, 48.84, and 56.19, respectively. These scores are among the lowest recorded in each school year compared to the other quarters.

The persistently low MPS in the 1st quarter indicates that the topics covered during this period represent some of the least-learned competencies in Mathematics 9. This suggests that students experience significant difficulty in mastering foundational concepts introduced at the beginning of the school year. Poor performance in the first quarter may negatively affect students' understanding and performance in succeeding quarters.

The results further suggest that traditional instructional approaches may not be sufficient to address learners' needs during the 1st quarter. This recurring challenge across multiple school years provided a strong rationale for designing and development of contextualized learning modules focused specifically on the 1st-quarter Mathematics 9 topics. By contextualizing lessons to students' real-life experiences and local settings, the modules aim to improve comprehension, engagement, and retention of concepts that are otherwise perceived as complex or abstract.

Therefore, the consistently low 1st-quarter MPS results provide empirical evidence of the need for targeted instructional intervention. This study addresses this gap by developing and validating contextualized learning modules to improve students' mastery and enhance their learning outcomes in subsequent lessons. In the study of Javillonar (2024), it also found that Grade 9 learners experienced difficulties and errors when solving quadratic equations. The researcher used the identified least-learned competencies and developed a strategic intervention material that proved to be highly effective in addressing learners' difficulties.

Table 2 presents the least learned competencies in Quarter 1 Mathematics 9, ranked according to the percentage of correct responses. The results indicate that all identified competencies obtained correct response rates below 45%, signifying low mastery among Grade 9 students. The competency “Solves equations transformable to quadratic equations (including rational algebraic equations)” ranked 1st, with only 37.41% correct responses, making it the most difficult competency for learners. This same competency repeatedly appeared in the rankings (3rd, 4th, 8th, and 10th), highlighting a persistent difficulty in transforming and solving quadratic and rational algebraic equations.

This suggests that students struggle to apply various methods for solving quadratic equations, indicating gaps in both procedural fluency and conceptual understanding. Meanwhile, "Solves problems involving quadratic equations and rational algebraic equations" ranked 5th and 9th, with correct response rates of 41.94% and 44.07%, respectively.

These results reflect learners' difficulty with problem-solving and applying quadratic concepts to contextual situations. The competency “Describes the relationship between the coefficients and the roots of a quadratic equation” ranked 7th, with a correct response rate of 42.41%, further highlighting limited understanding of key concepts related to quadratic relationships.

Overall, the concentration of these least-learned competencies in Quarter 1 topics aligns with the consistently low performance observed in first-quarter Mathematics 9 assessments. The predominance of quadratic equation–related competencies among the lowest-ranked items underscores the need for focused instructional intervention at the beginning of the school year. The dominance of quadratic equation–related competencies among the lowest-ranked items underscores the need for focused instructional intervention at the beginning of the school year. These findings provided a strong basis for the design and development of contextualized learning modules targeting Quarter 1 Mathematics 9 competencies. Such modules aim to address persistent learning gaps, enhance conceptual understanding, and improve students’ overall performance in Mathematics.

Table 3 presents the evaluation results for the design of the developed contextualized learning module in Mathematics 9, based on the objective. The data show that the respondents give excellent evaluations of the module objectives (Mean = 4.96, SD = 0.21). The data reveal that the respondents award equal marks across the three indicators, suggesting an excellent evaluation of the statements. This high mean score reflects the respondents’ strong approval of how the objectives are formulated and presented in the modules.

Specifically, the respondents expressed an excellent evaluation of the alignment of the localized and contextualized activities with the Most Essential Learning Competencies (MELCs) issued by the Department of Education. They also strongly agree that the objectives are clearly stated and are simple, attainable, and measurable, indicating that they are easy to understand and appropriate to the given learning context. The low standard deviation further reflects a high level of agreement among the respondents regarding the quality and clarity of the module objectives. In connection with Bloom's Revised Taxonomy (2001), well-defined learning objectives play a crucial role in the effective presentation of the module, as they serve as the foundation for instructional planning and assessment. Clearly stated objectives guide the organization of lesson content and activities, ensuring that all parts of the topic are aligned and congruent with the intended learning outcomes across different cognitive levels. When learning objectives are properly established, they provide clear direction for both teachers and learners, making it easier to measure students' performance and determine the extent to which the intended learning outcomes are achieved.

Table 4 presents the evaluation results for the design of the developed contextualized learning module in Mathematics 9, based on the presentation. The data indicate that the respondents give excellent evaluations of the contextualized modules, with a mean score of 4.93 and a standard deviation of 0.12. The data reveal that, among

the indicators, Indicator 6 receives the highest mean score (Mean = 5.00, SD = 0.00), indicating that the respondents strongly agree that the lesson is presented with relevant learning tasks through the localized and contextualized module in Mathematics. It can also be observed that the lowest mean score is for Indicator 1 (Mean = 4.83, SD = 0.39), which still reflects strong agreement with the statement that “the learners’ motivation to participate in class discussions and actively engage with the learning modules is enhanced through the indicated activities.

These results imply that the modules are presented in a clear, organized, and systematic manner, allowing learners to easily follow the lesson flow, and supporting active engagement through well-structured and relevant learning tasks. The slightly lower rating on motivation, although still strongly agreed upon, suggests that there is room to further strengthen motivational elements in the activities.

These findings are supported by related literature emphasizing the importance of effective presentation in instructional materials. Ensuring a clear, organized, and learner-friendly structure that includes essential components such as objectives, activities, assessments, and reflection is fundamental in the development of contextualized modules in Mathematics. When visually appealing elements, logical content flow, and contextual relevance are incorporated, learners are more likely to engage meaningfully and understand mathematical concepts more easily. The effective presentation highlighted in Locsin (2022) is highly relevant to the present study, as it demonstrates how clarity, organization, and alignment of visuals and text enhance learners' comprehension of complex concepts. Modules that are presented with a logical flow, age-appropriate language, and supportive visuals become more engaging and accessible, particularly for learners with diverse backgrounds and learning needs.

Table 5 presents the evaluation results for the design of the developed contextualized learning module in Mathematics 9, based on the assessment. The data show that the respondents give excellent evaluations in the assessment of the contextualized modules (Mean = 4.84, SD = 0.22). The data reveal that, among the indicators, Indicator 9 receives the highest mean score (Mean = 5.00, SD = 0.00), indicating that the respondents strongly agree that “assessment activities are congruent with the objectives of the lesson.” This unanimous rating suggests that the assessors clearly recognize a strong alignment between the learning objectives and the assessment tasks, indicating that the assessments are purposefully designed to directly measure the intended learning outcomes. Such alignment is essential in ensuring that assessments accurately reflect students' mastery of the targeted competencies and support meaningful evaluation of learning.

Consequently, the lowest mean is recorded for Indicator 4 (Mean = 4.70, SD = 0.47), which pertains to “encouragement of learners to be inspired to value and set high-performance targets for themselves.” Although this indicator still falls under the Strongly Agree category, the relatively lower mean and higher standard deviation suggest varying perceptions among respondents regarding the motivational impact of the assessment activities on learners' goal-setting and self-motivation. This indicates that while the

assessments are effective in measuring learning and promoting understanding, there is potential to further enhance components that explicitly encourage self-reflection, goal-setting, and intrinsic motivation.

As explained by Orozco et al. (2021), well-designed, contextually relevant assessments play a crucial role in developing learners' higher-order thinking skills by engaging them in meaningful, real-life tasks that require analysis, evaluation, and reflection. When assessment activities are closely aligned with learning objectives, learners are better able to understand expectations and monitor their progress. However, Orozco et al. also emphasize the importance of incorporating reflective and learner-centered elements in assessments to strengthen students' motivation and self-directed learning. This supports the present findings, which show strong alignment between objectives and assessments, while the motivational aspect presents an area for further enhancement in the contextualized modules.

Table 6 presents the evaluation results for the design of the developed contextualized learning module in Mathematics 9, based on contextualization and localization. The data show that the respondents give excellent evaluations of the contextualized modules' contextualization and localization (Mean = 4.83, SD = 0.27). The data reveal that Indicator 1 receives the highest mean score (Mean = 5.00, SD = 0.00), indicating that the respondents strongly agree that formative and summative assessments are given. This unanimous rating suggests that the evaluators clearly recognize the presence of both formative and summative assessments embedded in the modules, reflecting a balanced and comprehensive approach to monitoring learners' progress, and evaluating learning outcomes. The inclusion of varied assessment types supports continuous feedback and ensures that learning is assessed throughout and at the end of instruction.

It can also be observed that the lowest mean is for Indicator 8 (Mean = 4.70, SD = 0.47), indicating strong agreement with the statement: "Instructional materials used in the learning process are adaptable to the local needs and preferences of students to make learning more accessible and open to all". Although this indicator still falls under Strongly Agree, the relatively lower mean and higher standard deviation suggest that respondents perceive varying degrees of adaptability of the materials to diverse learner preferences and local contexts. This implies that while the materials are generally contextualized and localized, there remains potential to further enhance flexibility and customization to better address learners' varied needs.

Overall, the consistently high ratings across all indicators affirm that the developed modules effectively integrate contextualization and localization principles. The findings indicate that the learning materials are aligned with local conditions, relevant to learners' real-life experiences, and responsive to instructional needs, thereby supporting meaningful learning and the development of lifelong learning skills in Mathematics 9.

These findings are supported by Aguinaldo Jr. et al. (2021), who highlight the significant role of contextualization and localization in enhancing the effectiveness of

Mathematics learning materials. Their study shows that incorporating local activities related to livelihood, leisure, and family practices, and using native materials, helps make contextualized learning modules more relatable and meaningful for students. The contextualized learning modules are found to be valid and effective in terms of objectives, content, organization, and resources, resulting in improved post-test performance among learners. This reinforces the relevance of the present study, affirming that contextualization and localization not only align instruction with learners' real-life experiences but also enhance comprehension and retention. Thus, these approaches serve as essential elements in developing effective, meaningful, and accessible Mathematics modules that are responsive to learners' needs and environments.

Table 7 presents the summary results for the design of the developed contextualized learning module in Mathematics 9. In summary, the overall evaluation of the contextualized module (Mean = 4.89, SD = 0.17) indicates that respondents rate it highly, meeting quality standards and achieving its intended goals. The data also reveal that the highest mean score is for objectives (Mean = 4.96, SD = 0.21), followed by presentation (Mean = 4.93, SD = 0.12), assessment (Mean = 4.84, SD = 0.22), and contextualization and localization (Mean = 4.83, SD = 0.27). The consistently high ratings across all components reflect a strong consensus among the validators regarding the effectiveness and sound design of the developed contextualized learning module in Mathematics 9.

The high rating for objectives supports the assertion of Pelemeniano and Siega (2023) that the development of contextualized modules should begin with well-defined objectives grounded in curriculum standards and learners' actual competencies. The strong agreement among respondents suggests that the module's objectives are clear, measurable, and aligned with the Most Essential Learning Competencies (MELCs), providing clear direction for instruction, learning activities, and assessment. Well-articulated objectives ensure coherence in module design and guide both teachers and learners toward the intended learning outcomes.

In terms of presentation, the findings are consistent with Cejas (2022), who highlighted the importance of effective presentation in the development of contextualized learning modules. The strong evaluation indicates that the module is organized, clear, and learner-friendly, with the use of localized examples and real-life situations that enhance understanding and motivation. Effective presentations help learners connect abstract mathematical concepts to familiar experiences, thereby improving comprehension and academic performance.

The assessment rating aligns with the study by Madrazo et al. (2020), which emphasizes that assessment strategies in contextualized learning modules must closely align with learners' real-life contexts and target competency gaps. The assessments in the module are designed not merely to test content recall but to measure learners' ability to apply mathematical concepts in meaningful and localized situations. This alignment ensures that assessment results accurately reflect students' understanding and skills development.

Lastly, the strong agreement on contextualization and localization is supported by Cejas (2022), who demonstrates that contextualized self-instructional modules using locally available materials significantly improve learner engagement and academic performance. Integrating community-based experiences and real-life contexts makes learning more relevant and meaningful to students. Overall, the related studies reinforce the present findings, affirming that the developed contextualized module is well-designed, appropriate, and effective in enhancing Mathematics 9 instruction.

Table 8 presents the results of validating the developed contextualized learning module in Mathematics 9 regarding Learning Outcomes. The data show that respondents strongly agree with the learning outcomes of the contextualized modules (Mean = 4.86, SD = 0.24). The data reveal that the respondents award the highest mean score to nature (Mean = 4.91, SD = 0.18), followed by procedure (Mean = 4.89, SD = 0.28) and purpose (Mean = 4.79, SD = 0.35). The high rating for the nature of the learning outcomes indicates that the module clearly defines what is to be learned and communicates expectations at the beginning of the lesson. This suggests that the learning outcomes are coherent, logically structured, and aligned with curriculum standards. From the teacher-researcher's perspective, this clarity helps guide both instruction and the learner's focus throughout the lesson.

The strong rating for Procedure indicates that the learning outcomes were clearly defined and effectively communicated what students are expected to achieve upon completing the lessons. This clarity allows learners to understand the required tasks, develop relevant skills, and demonstrate mastery through appropriate outputs. The slightly lower, yet still strong, rating for Purpose indicates that the outcomes align with the broader goals of the learning process and support meaningful learning.

These findings are supported by Tindog (2021), who emphasized the importance of clearly defined learning outcomes in the design of contextualized modules. The study revealed that learners exposed to a contextualized module with mobile applications in Geometry demonstrated significantly better performance and engagement. This underscores the crucial role of well-articulated learning outcomes in guiding instruction, enhancing learners' understanding, and improving overall learning effectiveness in Mathematics.

Table 9 presents the results of validating the developed contextualized learning module in mathematics 9 regarding the Mapping of Content. The data show that respondents gave excellent evaluations of the content mapping in the contextualized module (Mean = 4.89, SD = 0.18). Respondents awarded the highest mark for Logical Presentation (Mean = 4.93, SD = 0.16), followed by Consistency (Mean = 4.87, SD = 0.27) and Quality (Mean = 4.86, SD = 0.26), all interpreted as Strongly Agree.

The highest rating in Logical Presentation indicates that the lessons are accurate, well-organized, and clearly structured, with easy-to-follow instructions and sufficient coverage of topics. This suggests that the sequencing of concepts, inclusion of references, and use of supporting evidence effectively guide learners in understanding

the Grade 9 Mathematics lessons. Such clarity in presentation helps minimize confusion and supports learners in mastering complex concepts.

Meanwhile, the excellent ratings for Consistency and Quality reflect that the module remains aligned with the curriculum, highlights essential ideas, and establishes connections between previous and current lessons. The quality of the module is further demonstrated through the inclusion of real-life applications, varied activities, and tasks that cater to diverse learning styles and abilities.

As explained by Castro and Oliveira (2022), content mapping establishes a structured link between the curriculum, intended competencies, and classroom content. Although their work focused on software design, the principle is equally valuable in Mathematics education. Content mapping ensures that the lessons, activities, and assessments within the module are not only aligned with national standards but also address learners' specific needs. This approach supports the creation of coherent, targeted modules that are responsive to both educational goals and students' learning contexts.

As Shown in Table 10, the respondents gave excellent evaluations of the language used in the contextualized modules (Mean = 4.92, SD = 0.18). Data reveal that the respondents achieved the highest mark in Communicative Functions (Mean = 4.92, SD = 0.17), followed by Language Functions (Mean = 4.91, SD = 0.22). The high mean in Communicative Function indicates that the language used in the module is grammatically correct, clear, and appropriate for the target learners.

Respondents strongly agreed that the instructions are easy to follow, topics and subtopics are clearly presented, and sentence structures minimize misinterpretation. These findings suggest that the module effectively communicates mathematical ideas, supporting comprehension and reducing cognitive load for learners. Similarly, the strong rating in language reflects that the module uses simple, precise, and well-structured language while demonstrating accuracy in mathematical terminology and concepts. The use of English as the medium of instruction, combined with clear, focused sentence structure, helps learners better understand mathematical processes and operations.

Overall, these findings indicate that the language used in the contextualized module is clear, learner-appropriate, and supportive of effective teaching and learning in Mathematics 9. When developing a learning module, designers should use a language that aligns with students' level of understanding. The readability test supports this through the Flesch Reading Ease test in the Grammarly Pro application, used in a developed, contextualized learning module on mathematics 9. Similarly, in compliance with Executive Order (EO) No. 210, s. In 2003, former President Gloria Macapagal Arroyo issued a directive that English should be taught as a second language at all levels of the educational system and used as the medium of instruction for English, Math, and Science in all learning institutions, especially at the secondary level. Learning in mathematics becomes effective when there is a one-to-one interaction that increases the student's

critical thinking and logical reasoning, along with feedback on teaching practices and responses to a particular module, as determinants of the module's effectiveness.

Table 11 presents the results of validating the developed contextualized learning module in mathematics 9 regarding the Usability. As shown in Table 11, respondents gave an excellent rating in the contextualized modules' usability (Mean=4.90, SD=0.20). The data further indicate that respondents awarded the highest satisfaction ratings for content of use (Mean = 4.93, SD = 0.22), followed by effectiveness (Mean = 4.90, SD = 0.25) and efficiency (Mean=4.87, SD=0.22).

The excellent rating in Content of Use indicates that the module provides meaningful learning experiences, useful graphics, illustrations, and activities that help students understand mathematical concepts more clearly. This suggests that learners find the module engaging and relevant, supporting both comprehension and application of lessons.

Similarly, the excellent ratings in Effectiveness and Efficiency indicate that the module adapts to students' abilities and interests, communicates ideas clearly, reinforces learning transfer, and allows learners to work at their own pace. These features suggest that the contextualized module in Mathematics 9 is a practical and functional resource that supports meaningful learning, encourages active participation, and fosters the development of new skills and knowledge.

These findings align with Biason (2022), who highlighted those well-designed instructional materials in Mathematics, particularly those rated exemplary for usability, enhance learners' ability to navigate content, follow instructions, and apply concepts effectively. This indicates that a usable module is not only relevant and aligned with curriculum objectives but also accessible, organized, and clear factors that significantly contribute to improved learning outcomes in Mathematics 9.

In Table 12, the data show that the respondents gave excellent evaluations in the contextualized modules' format (Mean=4.91, SD=0.18). The data reveal that the respondents awarded the highest mark for structure (Mean=4.93, SD=0.13), followed by quality (Mean=4.92, SD=0.18), and layout (Mean=4.88, SD=0.20). The excellent rating in structure indicates that the module organizes topics in a logical sequence, presents information clearly, and integrates graphics and illustrations accurately, making the content easy to follow. Similarly, the excellent quality score reflects the module's visually appealing design, appropriate fonts and margins, and well-integrated illustrations that enhance readability and learning engagement. The layout rating shows that the module effectively combines attractiveness with instructional functionality, ensuring that pages are visually stimulating, consistent, and supportive of learning activities.

In line with this, Aguinaldo, and Domingo (2021) emphasized that adopting a clear, organized format for Contextualized Learning Materials (CLMs) in Mathematics—incorporating sections such as introduction, learning goals, pretest/post-test, module map, activities, and reflection—provides a structured learning experience. A systematic

and consistent format not only facilitates independent learning but also enhances usability, promotes critical thinking, and supports the development of problem-solving skills, making the module both engaging and pedagogically effective. This suggests that the carefully planned format of the contextualized learning module in Mathematics 9 not only draws learners' attention but also sustains their focus, making it both engaging and effective in supporting the understanding of complex mathematical concepts.

Table 13 presents the summary results for the validation of the developed contextualized learning module in Mathematics 9. In summary, respondents gave excellent evaluations of the overall development of the contextualized module (Mean = 4.89, SD = 0.16). Data also reveal that the highest mark is on the language (Mean = 4.92, SD = 0.18), followed by format (Mean = 4.92, SD = 0.18), usability (Mean = 4.90, SD = 0.20), mapping and content (Mean = 4.89, SD = 0.18), and learning outcomes (Mean = 4.86, SD = 0.24), all interpreted as Excellent.

The high language rating indicates that the module uses clear, precise, and student-friendly communication. The format and usability were also rated highly, reflecting logical organization, visually appealing design, and learner-friendly features that enhance comprehension and sustain engagement. Content mapping, and learning outcomes confirm that the module is coherent, aligned with curriculum standards, and focused on measurable competencies. Overall, these results suggest that the module was excellent, well-designed, accessible, and effective in supporting meaningful learning experiences in Mathematics 9. As evident, the validation procedure assessed the lesson objectives, format, content standards, organization, language, and usability of the module, with respondents expressing very high satisfaction, as reflected by the grand mean of 4.89.

Correspondingly, Naval (2024) emphasized the development and validation of modules based on selected least mastered competencies, ensuring appropriateness in objectives, content, design, learning activities, adaptability, clarity, and evaluation. Such modules, validated by experts, teachers, and students, were shown to enhance students' knowledge acquisition and performance. Following a systematic approach, such as the ADDIE model—covering preparation, development, validation, and try-out—supports the creation of modules that sustain learning and meet the needs of the contemporary educational system.

The results of table 14 or the analysis using the Mann–Whitney U test, a nonparametric test, indicate that there is insufficient evidence to conclude that a significant difference exists between teachers' and experts' validation of the contextualized module in terms of learning outcomes ($U = 49.50$, $p = 0.51$), content mapping ($U = 51.00$, $p = 0.59$), language ($U = 48.00$, $p = 0.47$), usability ($U = 48.50$, $p = 0.47$), and format ($U = 60.00$, $p = 1.00$) when respondents are grouped accordingly. This is further supported by the overall U-value of 54.00 with a significance level of 0.73, which is greater than the alpha level of 0.05; thus, the null hypothesis is not rejected.

Although differences in perceptions or evaluations among groups are often expected, the findings of this study confirm the module's effectiveness based on the

established criteria. The results indicate that the contextualized learning module in Mathematics 9 is an effective instructional tool, as validated by teachers and subject-matter experts. Hence, the module is highly recommended for use among Grade 9 junior high school students to support the teaching–learning process. Furthermore, its classroom utilization may serve as a basis for assessing its level of acceptability and effectiveness among the end users.

Conclusions

Considering the findings of the study, the following conclusions are drawn:

1. The study identified the least learned competencies as topics from the first quarter of Mathematics 9 that students consistently found challenging. These competencies served as the basis for developing the contextualized learning module to address gaps in understanding and enhance mastery of essential mathematical concepts.

2. The modules were designed to target the identified first-quarter least-learned competencies. Objectives were clearly defined, aligned with the K to 12 curriculum, and reflective of the competencies in the Curriculum Guide. Content was logically sequenced, presented in language suitable for Grade 9 learners, and enriched with visuals and examples. Assessment components, including pre-assessment, post-assessment, and practice exercises, were integrated to monitor learning progress and strengthen concept mastery. Activities and illustrations were contextualized and localized to students' real-life experiences, making mathematics relevant, meaningful, and accessible.

3. Teachers and experts validated the developed module, which received excellent ratings across all criteria. Respondents strongly agreed that learning outcomes were clear, achievable, and aligned with curriculum standards. The content was well-mapped and logically organized, the language was readable, and the module was user-friendly, visually appealing, and well-structured. Suggestions for improvement focused on adding more practice exercises and increasing the number of pre- and post-assessment items to provide comprehensive measures of learning progress. Overall, the evaluations confirm that the module is valid, effective, and suitable for instructional use.

4. The Mann–Whitney U test revealed no significant difference between teachers' and experts' evaluations, indicating a consistent and positive perception of the module's quality, design, and effectiveness. The result underscores the importance of incorporating feedback from both teachers and experts in refining instructional materials.

5. The study implies that future mathematics modules should be contextualized and localized. The high validation ratings demonstrate that contextualized modules improve student engagement, understanding, and performance while

making abstract concepts relevant and accessible. These modules provide teachers with effective resources to address least learned competencies, promote higher-order thinking, and support improved mathematics teaching and learning at the junior high school level.

Recommendations

In connection with the findings of the study, the following recommendations are hereby suggested:

1. Since the results revealed a very high level of validity across all criteria and no significant difference between teachers' and experts' evaluations, it is strongly recommended that the developed contextualized learning module in Mathematics 9 be used as a supplementary instructional material in actual classroom settings. Its use supports lesson delivery, reinforces learning, and enhances students' understanding of mathematical concepts through localized, context-based activities.

2. Although the module was rated very highly, minor improvements—such as providing additional exercises, more precise directions and instructions, and more items for pre-assessment and post-assessment are recommended. These enhancements align with the evaluators' feedback and aim to further strengthen the module's instructional value without altering its core design and structure.

3. As the findings confirmed that the lesson objectives, content, and assessments are aligned with curriculum standards, it is recommended that future revisions continue to ensure consistency with the K to 12 curriculum and targeted competencies in Mathematics 9. Emphasis on higher-order thinking skills and problem-solving tasks should be sustained to support mastery and application of mathematical concepts.

4. While the present study focused on expert and teacher validation, it is recommended that the module be piloted in the classroom with Grade 9 learners. This will allow the assessment of students' learning performance, engagement, and acceptability of the module as end-users, further validating its effectiveness as an instructional intervention.

5. Given the positive evaluation of the module's design, content, language, usability, and format, Mathematics teachers are encouraged to adopt and adapt the module according to their learners' needs. Sharing the module within learning action cells (LACs) or departmental meetings promotes collaborative improvement and contextualized teaching practices.

6. School administrators are encouraged to support the reproduction, dissemination, and use of contextualized learning modules in Mathematics

9. Institutional support may strengthen curriculum implementation, promote innovative teaching strategies, and improve student learning outcomes in mathematics.

7. Future researchers may conduct experimental or quasi-experimental studies to determine the impact of the contextualized learning module on students' academic performance, PISA-related skills, and problem-solving abilities. Further studies may also explore its applicability in other grade levels or subject areas.

Compliance with Ethical Standards

Ethical considerations were pivotal in the study, development, and validation of contextualized learning modules on quadratic equations, quadratic inequalities, and rational algebraic equations. The preparation of the data-gathering procedures was undertaken by the researcher, who obtained the necessary approvals for the courtesy call during the exit conference. Coordination was carried out among the researcher, the Graduate School, and the Schools Division Office of Balanga. These efforts were undertaken to ensure the privacy and well-being of the participants, with particular emphasis on obtaining informed consent from all individuals involved to safeguard their anonymity and confidentiality.

Additionally, the research process adhered to academic and professional integrity standards, avoiding plagiarism and other forms of misconduct. Special attention was given to securing the intellectual property rights of all contributors, particularly those of the researcher. Moreover, ensuring the accuracy of the data was imperative, and the data-gathering procedures were meticulously conducted from the initial phase up to the exit conference. By recognizing the contributions of all individuals involved, the study acknowledged their valuable input.

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