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Project Math Q-Bank: An Interactive Learning Platform for Competency-Based Assessment in Grade 7 Mathematics

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Abstract: *This study examined the effectiveness of an interactive online platform in enhancing the mathematical proficiency of Grade 7 students. A total of 385 students participated, with performance measured across four assessment periods. Results revealed a marked improvement in mean scores from the pre-assessment (33.71) to the second assessment (44.64), representing a 32.34% increase, before a slight decline in the third assessment (40.25). Despite this dip, the overall gains confirmed the platform's positive impact on student learning. Survey findings further supported these results, showing strong student agreement that the platform's lessons were aligned with classroom learning competencies (composite mean = 4.58), promoted self-directed learning (4.57), and increased engagement through interactive features (4.78). Additionally, competency-based online tests with immediate feedback were found highly effective in preparing students for formal assessments (4.73). Collectively, the data highlight that the platform not only improved mathematical proficiency but also fostered autonomy, sustained practice, and motivation among learners. To sustain long-term benefits, strategies should focus on maintaining engagement, reinforcing concepts, and encouraging reflective learning.*

Keywords—mathematical proficiency; online learning platform; competency-based assessment; immediate feedback

Introduction The transition toward technology-enhanced education has underscored the need for sustainable digital learning platforms that address persistent instructional gaps. Project Math Q-Bank was conceptualized as a Google Site-based intervention to respond to the challenges encountered by Grade 7 learners in Mathematics. The unprecedented shift to modular learning during the COVID-19 pandemic, along with subsequent disruptions caused by Typhoon Kristine in 2020 and the recurring eruptions of Taal Volcano from 2020 to 2022, created significant interruptions in the academic routine. These circumstances contributed to widening learning gaps, reduced access to teachers, and weakened study habits among learners.

Project Math Q-Bank provides an alternative mode of learning that is competency-aligned, self-paced, and accessible beyond the confines of the classroom. By offering immediate feedback and ensuring 24/7 availability, it minimizes the effects of school closures and guarantees continuity of instruction even in times of crisis. This platform not only facilitates recovery of lost learning opportunities but also strengthens resilience in the education system by preparing learners and teachers to sustain progress despite future disruptions. In a related study, Aquino (2024) reported that the implementation of *Project Kit at Home* significantly enhanced learners' numeracy skills, particularly in Grades 1, 2, 4, and 6, by reducing the number of moderately skilled learners and increasing those who were highly numerate. The success of this intervention was attributed to the strong collaboration between parents and teachers, though continued efforts were recommended for Grade 5 learners who showed relatively limited progress. Such findings affirm the importance of collaborative and innovative learning strategies, reinforcing the rationale behind the development of Project Math Q-Bank as a sustainable digital intervention.

Research Questions

1. How does the use of an interactive online platform affect the mathematical proficiency of Grade 7 students?
2. To what extent do interactive lessons and assessments aligned with specific learning competencies improve students' mastery in Mathematics?
3. How does the online platform promote self-directed learning and continuous practice among Grade 7 students?
4. What is the effect of immediate feedback and interactive features on students' engagement and interest in learning Mathematics?
5. How effective are competency-based online tests in preparing students for formal Mathematics assessments?

Proposed Innovation, Intervention, and Strategy

Project Math Q-Bank is an innovative digital tool designed to align lessons and Project Math Q-Bank is an innovative digital platform developed to strengthen Grade 7 students' proficiency in Mathematics by integrating lessons and assessments that are aligned with the prescribed learning competencies. The platform provides students with the opportunity to study specific topics at their own pace, engage in competency-based tests, and instantly receive feedback on their performance.

This intervention combines the advantages of digital learning with formative assessment strategies to create a flexible, learner-centered, and engaging environment. Through immediate feedback and tailored exercises, students are guided toward mastery of mathematical concepts while also becoming familiar with formats similar to formal classroom assessments.

Furthermore, the platform generates varied test data that simulate real-world testing scenarios, allowing learners to practice and prepare effectively. By ensuring accessibility, adaptability, and continuous assessment, Project Math Q-Bank serves as both a remediation and enrichment tool designed to close learning gaps and promote sustained academic growth in Mathematics.

Research Methodology

a. Sampling

A total of **385 Grade 7 students** from Wenceslao Trinidad Memorial National High School participated in the implementation of Project Math Q-Bank. The participants were selected through **purposive sampling**, as they represented the intended beneficiaries of the program—students who were identified to have learning gaps in Mathematics.

The sample included learners from different Grade 7 sections to ensure diversity in academic performance levels. Both male and female students were represented, providing a balanced distribution across the group. Participation was voluntary and encouraged by their Mathematics teachers, with the aim of engaging a broad population of learners in order to evaluate the effectiveness of the platform in improving mathematical proficiency.

b. Data Collection

Data will be collected through a combination of quantitative. The primary data sources include:

Pre- and post-test scores from the competency-aligned assessments on Project Math Q-Bank.

Surveys or questionnaires assessing students' engagement, motivation, and perceived learning effectiveness.

Focus group discussions or interviews to gather feedback on students' experiences with the platform.\

Ethical Issues

Participation in the study will be voluntary, with informed consent obtained from both students and their parents/guardians. Students' data and responses will remain confidential, and results will be anonymized in the final report. The platform usage will be designed to prevent any form of academic pressure or penalization for non-participation. Any issues related to fairness, data privacy, and consent will be carefully addressed to uphold ethical research standards.

d. Plan for Data Analysis

Quantitative data from the pre- and post-tests will be analyzed using descriptive statistics, such as mean scores and standard deviations, to determine any significant improvements in mathematical proficiency. Comparative analysis (e.g., t-tests) will be used to evaluate the effectiveness of the intervention. Qualitative data from surveys and focus groups will be thematically analyzed to identify recurring themes related to student engagement, challenges faced, and the overall user experience with Project Math Q-Bank. This mixed-methods approach will provide a comprehensive understanding of the impact of the intervention on student learning.

Discussion of Results and Reflection

1. How does the use of an interactive online platform affect the mathematical proficiency of Grade 7 students?

The platform positively influenced students' mathematical proficiency, as reflected in the improvement of mean scores across four assessments.

Table 1. Assessment Results Over Time

Assessment Period	Date	Mean Score	No. of Students	Participation Rate
Pre-Assessment	Sept. 24, 2024	33.71	385	100%
First Assessment	Nov. 25, 2024	38.15	292	75.84%
Second Assessment	Feb. 20, 2025	44.64	284	73.96%
Third Assessment	Apr. 3, 2025	40.25	375	97.40%

This data shows a significant improvement in scores from pre-assessment to the second assessment, confirming the effectiveness of the platform. The slight dip in the final assessment suggests a need to reinforce sustained usage and motivation.

2. To what extent do interactive lessons and assessments aligned with specific learning competencies improve students' mastery in Mathematics?

Students reported that the lessons matched their classroom topics and helped them master key skills.

Table 2. Weighted Mean – Alignment with Learning Competencies

Indicator	Weighted Mean	Interpretation
The topics in the platform matched what we learned in class.	4.58	Strongly Agree
The lessons were aligned with our learning competencies.	4.60	Strongly Agree

Indicator	Weighted Mean	Interpretation
The activities focused on important skills I need to learn in Math.	4.56	Strongly Agree
Composite Mean	**4.58**	**Strongly Agree**

This strong agreement highlights the importance of aligning digital content with curriculum standards.

3. How does the online platform promote self-directed learning and continuous practice among Grade 7 students?

Students indicated that the platform supported self-paced study and regular practice.

Table 3. Weighted Mean – Self-Directed Learning and Practice

Indicator	Weighted Mean	Interpretation
The platform allows me to study at my own pace.	4.62	Strongly Agree
I regularly use the platform to review lessons and practice.	4.53	Strongly Agree
I can decide which topics to study and when to study them.	4.54	Strongly Agree
Using the platform helped me become a more independent learner.	4.60	Strongly Agree
Composite Mean	**4.57**	**Strongly Agree**

These results confirm that the platform encourages autonomy and consistent engagement.

4. What is the effect of immediate feedback and interactive features on students' engagement and interest in learning Mathematics?

The highest composite mean indicates students found the platform engaging and enjoyable.

Table 4. Weighted Mean – Engagement and Interest

Indicator	Weighted Mean	Interpretation
I enjoy learning Math through the platform.	4.80	Strongly Agree
The interactive features (videos, animations, games, etc.) keep me interested.	4.79	Strongly Agree
The platform made Math more fun and engaging.	4.75	Strongly Agree
I prefer learning Math with the platform than without it.	4.78	Strongly Agree
Composite Mean	**4.78**	**Strongly Agree**

The data supports that students were highly engaged and motivated by interactive features and multimedia.

5. How effective are competency-based online tests in preparing students for formal Mathematics assessments?

Students perceived the platform's quizzes and feedback as valuable for test preparation.

Table 5. Weighted Mean – Immediate Feedback and Exam Preparation

Indicator	Weighted Mean	Interpretation
The platform gives me feedback right after I answer a question.	4.71	Strongly Agree
The feedback helps me understand what I did wrong.	4.75	Strongly Agree
The quizzes on the platform helped me prepare for our quizzes/exams.	4.70	Strongly Agree
I feel more prepared for real tests because of the online tests.	4.75	Strongly Agree
Composite Mean	**4.73**	**Strongly Agree**

The platform's testing features were found to be highly effective in helping students review and prepare for formal assessments

5. How does the use of an interactive online platform affect the mathematical proficiency of Grade 7 students?

The data in Table 1 demonstrates a clear upward trend in students' mathematical proficiency. The **mean score improved from 33.71 (pre-assessment)** to **38.15** in the first assessment, and peaked at **44.64** in the second. This consistent rise suggests that the platform was effective in helping students gain a better understanding of mathematical concepts over time.

However, there was a **slight decline to 40.25** in the third assessment, despite a higher participation rate (97.4%). This dip may indicate a potential decline in individual student engagement or possible inconsistencies in platform usage as the school year progressed. It also suggests the need for **continued motivation and reinforcement strategies** to sustain high performance.

Interpretation:

1. The platform is effective in improving proficiency when consistently used. The performance gains from the pre-

assessment to the second assessment are strong indicators of learning, but maintaining student engagement is essential to prevent regression.

2. To what extent do interactive lessons and assessments aligned with specific learning competencies improve students' mastery in Mathematics?

As shown in Table 2, students **strongly agreed** that the lessons and activities were aligned with classroom instruction and the expected learning competencies, with a **composite mean of 4.58**. This alignment is crucial, as it ensures that what students practice online directly reinforces what they are learning in class.

Interpretation:

When digital content is aligned with the curriculum, students are more likely to find it meaningful and relevant, which enhances their mastery of the subject. The data confirms that the platform effectively supports curriculum-based instruction.

3. How does the online platform promote self-directed learning and continuous practice among Grade 7 students?

Table 3 indicates that students **strongly agreed (composite mean of 4.57)** that the platform encouraged autonomy. The highest-rated statement (4.62) was about the ability to study at their own pace—an essential element of self-directed learning.

Interpretation:

By giving students the flexibility to choose what and when to study, the platform empowers them to take ownership of their learning. This consistent practice fosters confidence, builds routine, and supports long-term academic improvement.

4. What is the effect of immediate feedback and interactive features on students' engagement and interest in learning Mathematics?

Table 4 received the **highest composite mean of 4.78**, showing that students found the platform highly enjoyable and engaging. Features like games, videos, and animations contributed significantly to their interest and motivation.

Interpretation:

The high engagement levels are a direct result of the platform's design. When students enjoy the learning process, they are more likely to persist, explore, and retain concepts. Immediate feedback, combined with gamified elements, creates a dynamic and student-friendly learning environment.

5. How effective are competency-based online tests in preparing students for formal Mathematics assessments?

Table 5 shows that students strongly agreed (composite mean of 4.73) that **online tests with immediate feedback** helped them prepare for real quizzes and exams. The high ratings for statements about feedback and preparation (4.70–4.75) reflect the platform's effectiveness as a study tool.

Interpretation:

The inclusion of practice assessments that mirror real test formats helps students build familiarity and confidence. The immediate feedback allows for correction and deeper understanding, which translates into better performance in formal assessments.

Across all five research questions, the data suggests that the interactive online platform was **highly effective** in improving mathematical proficiency, increasing student engagement, and promoting self-directed learning. The assessments showed **clear gains in performance**, while the survey responses revealed **strong positive attitudes** toward the platform's features and structure.

To sustain this success, future implementations should focus on:

Maintaining consistent student engagement
Monitoring individual usage
Reinforcing concepts during peak assessment periods
Encouraging reflection and self-evaluation

Conclusion

1.that the platform significantly enhanced students' understanding and performance when used consistently
that students strongly agreed (composite mean = 4.58) that the platform's lessons were aligned with classroom learning competencies. This strong alignment ensured that the digital activities were meaningful, relevant, and effective in reinforcing classroom instruction, thereby strengthening mastery of mathematical concepts.

2.That The platform effectively promoted self-directed learning, as indicated by a composite mean of 4.57. The flexibility to learn at their own pace and select topics empowered students to take ownership of their learning, resulting in consistent practice, increased confidence, and sustained academic growth.

3. that the platform achieved the highest engagement rating (composite mean = 4.78). The interactive features such as videos, games, and animations made Mathematics more enjoyable and motivating, while immediate feedback encouraged persistence and deeper learning.

4.That students strongly agreed (composite mean = 4.73) that the platform's online tests and instant feedback effectively prepared them for formal assessments. The immediate feedback allowed students to understand and correct their mistakes, boosting their readiness and confidence in taking exams.

Recommendations

1. May the school continue using the platform to enhance students' understanding and performance in Mathematics.

2. May teachers align digital lessons with curriculum standards to reinforce classroom learning.

3. May educators encourage students to use the platform independently for continuous learning and growth.

4. May teachers and developers improve interactive features to sustain student engagement and motivation.

5. May teachers utilize immediate feedback and online tests to strengthen exam readiness and address learning gaps.

Reflection

This project highlighted the importance of digital learning tools in promoting continuity and resilience in education. It empowered both teachers and students to adapt to new learning modalities while maintaining quality instruction in Mathematics

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