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PST003 - XactMath: AN INNOVATIVE TEACHING TOOL TO SUPPORT FORMULA AND TOPIC SELECTION IN BUSINESS MATHEMATICS

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ABSTRACT

This study investigates the use of the XactMath application as a digital learning tool to support students in mastering the topics of Simple Interest and Promissory Notes in Business Mathematics. The application guides students through three steps: identifying keywords, matching them to formulas and selecting the appropriate formula for problem-solving. A descriptive analysis was conducted to measure student acceptance and interest in the app after usage. Findings from a sample of 50 students, consisting of 36 females (72%) and 14 males (28%) revealed a high level of acceptance (M = 4.46, SD = 0.54) and strong interest (M = 4.44, SD = 0.52) in using the app for learning. Students agreed that the app improved their understanding, memorization and application of concepts, even without lecturer guidance. These results suggest that XactMath is a promising instrument for improving mathematical learning engagement and self-directed learning in business-related topics.

Keywords – engagement, technology, self-directed learning, mathematical learning

INTRODUCTION

In the digital era, technology-enhanced learning has become an essential strategy in higher education. The rapid pace of technological advancement presents ongoing challenges, requiring continuous adaptation of teaching methods and learning resources. In response, universities are increasingly embracing digital transformation as a sustainable approach, integrating information and communication technologies, computing and connectivity tools into the learning environment (Mondragon-Estrada et al., 2023). Thus, the integration of digital tools in teaching and learning has become a key strategy to enhance flexibility, engagement and educational access. In addition, understanding how students make connections across mathematical situations, particularly in problem-solving contexts like calculation is crucial to enhancing their learning experience.

Lockwood (2011) emphasizes the importance of analysing student-generated connections through the lens of actor-oriented transfer, which provides valuable insights into how students perceive similarities and differences among problems. Many students struggle not only with understanding mathematical concepts but also with applying the correct formulas when solving calculus problems. Alias et al. (2023) found that students often commit conceptual, procedural and technical errors, particularly when differentiating or integrating functions such as misapplying the quotient or product rule. This suggests that formula selection and application remain critical barriers to mastering foundational calculus. Many students struggle not only with understanding formulas but also with identifying the correct formula to apply. Recognizing this issue, the XactMath application was developed to provide a structured and interactive approach.

The effectiveness of the XactMath application was evaluated by having students use the tool and complete a survey measuring their acceptance and interest. The results in Table 1 show a high level of acceptance, with an average mean score of 4.46 and a standard deviation of 0.54. Table 2 indicates a similarly high level of interest, with an average mean score of 4.44 and a standard deviation of 0.52. These findings suggest that students were highly engaged, motivated and able to learn independently. Overall, the results support the integration of XactMath into business mathematics instruction to improve learning outcomes and boost student confidence.

Table 1: Descriptive statistics for students' acceptance of XactMath application

A: Students' Acceptance on XactMath apps	**Mean Score**	**SD**	**Interpretation**
XactMath apps help me to memorize the formula of Simple Interest & Promissory Notes.	4.50	0.514	High
XactMath apps is suitable to be used in learning Simple Interest & Promissory Notes.	4.44	0.511	High
XactMath apps help me to differentiate the concept of Simple Interest & Promissory Notes.	4.44	0.616	High
I can master the topic of Simple Interest & Promissory Notes using the XactMath apps.	4.39	0.502	High
I can remember the rules Simple Interest & Promissory Notes easily by learning using XactMath apps.	4.50	0.514	High
I can apply the rules of Simple Interest & Promissory Notes using XactMath apps.	4.44	0.511	High
I know how to play the apps without lecturer's guidance.	4.50	0.618	High
Total	**4.46**	**0.54**	**High**

Table 2: Descriptive statistics for students' interest in using XactMath application

B: Students' Interest on the Application of XactMath	Mean Score	SD	Interpretation
I have fun in learning Simple Interest & Promissory Notes via XactMath apps	4.61	0.502	High
I am interested to learn about Simple Interest & Promissory Notes	4.44	0.511	High
I am excited because I understand the concepts of Simple Interest & Promissory Notes	4.44	0.511	High
I am more motivated to learn this topic	4.50	0.514	High
I am thrilled when XactMath apps is used in learning Simple Interest & Promissory Notes	4.28	0.575	High
I am not easily bored when XactMath apps are used in learning.	4.39	0.502	High
I like to learn about Simple Interest & Promissory Notes because this topic can enhance my thinking skills.	4.44	0.511	High
Total	**4.44**	**0.52**	**High**

OBJECTIVE

The objectives of this study and the development of the XactMath application are:

i. To assist students in identifying keywords related to Business Mathematics problems, specifically on Simple Interest and Promissory Notes.
ii. To support students in selecting and applying the correct formulas through a guided, interactive process.
iii. To evaluate students' acceptance and interest levels after using the application in a learning environment.

DESCRIPTION OF THE PROJECT

XactMath is a mobile-based educational application developed to support students in mastering Business Mathematics formulas. It employs a three-step framework: **(1)** identifying keywords in problem statements, **(2)** matching keywords to relevant formulas and **(3)** selecting and applying the appropriate formula. The application features a user-friendly interface and an organized formula database by topic, keyword and symbol to enhance independent and accurate problem-solving.

NOVELTY

The novelty of XactMath application lies in its keyword-driven formula-matching system. Unlike traditional formula sheets or static learning platforms, XactMath application allows students to interactively discover the correct formula based on problem keywords. This

mimics real examination conditions where students must interpret questions independently.

Furthermore:

i. It bridges the gap between textbook theory and practical application.
ii. Encourages self-directed learning without heavy reliance on instructors.
iii. Offers customized learning pathways depending on the topic and keyword selected.

This pedagogical design not only supports memorization but also strengthens conceptual understanding, making it particularly significant in topics students often find abstract or confusing.

CONCLUSION

The findings from the descriptive analysis indicate that XactMath is highly accepted and well-received by students, with high average scores for both acceptance (M = 4.46) and interest (M = 4.44). Students reported improvements in memory retention, understanding of mathematical rules and confidence in solving Business Math problems independently. The application's structured three-step method enhances both engagement and effectiveness in learning. XactMath demonstrates strong potential as an innovative digital solution to support teaching and learning in Business Mathematics, particularly in improving formula recognition, problem-solving accuracy, and motivation among learners.

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