Journal of Elementary and Secondary School Vol. 4 No. 2 (2026) https://doi.org/10.31098/jess.v4i2.4366

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Research Paper

Students' Experience With M-Learning Applications and Their Academic Performance in General Mathematics: Evidence from Grade 11 HUMSS Students

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Received : April 24, 2026	Revised : June 10, 2026	Accepted : June 16, 2026	Online : September 23, 2026

Abstract

This study investigated Grade 11-HUMSS students' experiences with the M-Learning application at North Central Mindanao College during the second semester of S.Y. 2024–2025 and its relationship to academic performance. Fifty-two students participated, and a quantitative descriptive correlational design was used, employing percentages, weighted means, and Pearson's correlation coefficient. Findings revealed that students' experiences with the M-Learning application were moderate (M = 3.05), with most appreciating its diverse approaches to solving math problems, while some reported minor distractions. Academic performance analysis showed that 50% of students earned an Average grade (75–79), 21.15% received Very Satisfactory (85–89), 17.31% achieved Excellent (90–100), and 11.54% obtained Satisfactory (80–84). Statistical results indicated a significant relationship between students' experiences with the M-Learning application and their academic performance (p = 0.001). This study enhances the existing literature on mobile learning by presenting evidence about the correlation between students' experiences with M-Learning applications and their academic achievement in General Mathematics among Grade 11 HUMSS students. The results may aid educators in developing technology-enhanced learning environments that foster engagement and academic achievement. The results suggest that schools and teachers may benefit from integrating well-designed mobile learning applications into mathematics instruction while providing appropriate guidance to minimize distractions.

Keywords: *M-Learning Application, Student Experience, Academic Performance, Mathematics Learning, Grade 11 HUMSS Students, Descriptive-Correlational Design, Mobile Learning, Learning Engagement, Statistical Analysis, Pearson Correlation, Educational Technology*

INTRODUCTION

Technology-enabled learning is increasingly used to support students in their studies, providing flexible learning tools. However, many students still don't understand the simplest topics, which can lead to poor academic performance. Furthermore, several factors influence students' academic performance. Among these is a lack of motivation or interest in the subject matter, which leads to reduced effort and engagement in studies. Beyond study habits, poor time management is another important factor, as students may struggle to balance their academic responsibilities. Moreover, unassisted learning may explain the underachievement of some students. Other factors, such as ineffective teaching methods and limited access to necessary facilities, can also result in many academic problems and an unsupportive academic environment. As a consequence, students may have difficulties in learning and may show poor academic performance (Rosales et al., 2024; Medel et al., 2024).

Poor academic performance among students is often due to the use of ineffective learning strategies. Sometimes students rely on a single way of learning a subject, which can lead to failure. Additionally, students who are not doing well in their studies often face many difficulties in their

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lives, which can hinder their progress and further undermine their academic performance. Ongoing problems can also cause low self-esteem, high stress, and anxiety. However, the mobile learning (M-Learning) app is designed to tailor the student's pace and style of learning, which can be helpful so that students may be taught in a way that is easy for them to understand (Bano et al., 2018). If proper guidance is provided to address this problem, it will make learning more engaging and accessible to learners. This will lead to improved student performance and create an enriching learning experience.

Zhampeissova et al. (2020) show in their study the effect of cognitive load on learners' success in attaining educational goals through mobile learning. This result highlights the significance of pedagogical tools for measuring student learning and suggests a mobile learning strategy to enhance students' academic achievement. Demir et al. (2018) highlight that promoting mobile learning is important for students' better academic performance. According to this study, mobile learning plays an important role in increasing students' motivation and interest in education, creating a more creative, engaging, accessible, and motivating learning environment.

The studies by Saeid et al. (2022) emphasize the importance of mobile learning availability as an effective way to help students with complex educational topics. The current study focuses on students who use mobile learning as a supplemental tool, where they can find important educational papers that can help improve their learning and academic performance. In addition, they note that the flexibility of this type of education allows learners to learn in accordance with their circumstances and mental readiness, which can prevent distractions and reduce factors that affect concentration. Understanding this idea may lead to more flexible learning in education for students and may promote the use of user-friendly tools for a better learning experience. Mobile learning also had a significant influence on students' academic interest and learning attitude, and the influence of learning attitude and interests on students' academic performance. Their research highlights the effect of M-Learning on students' academic performance through their learning attitude, considering factors such as mobile self-efficacy, optimism, self-directed learning, learning attitude, and academic performance (Nagaraju et al., 2024).

The study by Hattie, Linda (2023) highlights an analysis of a few academic publications, research papers, and educational journals that have been carried out, and it identified some common patterns in the use of mobile learning applications by college students. The present study also investigated changes in study habits, such as reading methods, note-taking, and interaction with course materials. However, this study identified several factors influencing the uptake of and the effectiveness of mobile learning apps, including technological expertise, app design, and pedagogical strategies. Furthermore, the study suggests an approach to the benefits of mobile learning while at the same time considering the possible threats. Research studies also indicate that adopting M-Learning applications can lead to changes in study habits and academic performance, enabling students to achieve higher grades and higher assessment scores. According to Hattie et al. (2023), this can help students progress and have a better chance of achieving better academic results than relying on traditional methods.

While prior research has demonstrated favorable correlations between mobile learning and academic success, the majority of studies have focused on higher education contexts, technology use, or overall learning outcomes. Few studies have examined the experiences of Grade 11 HUMSS students with M-Learning applications in General Mathematics and the relationship between these experiences and their academic achievement. Furthermore, there is a dearth of localized evidence from Senior High School students within the Philippine educational context.

This study aims to provide a concrete analysis of the relationship between experiences with a mobile learning application and students' academic performance, particularly the important role of mobile learning apps in students' academic achievements and their different effects on students'

educational experiences. It is intended to assess students' grades and how the strategies affect their academic performance. The study also aims to provide clear, specific, and realistic suggestions for future researchers who will conduct a similar study, and to propose practical recommendations regarding the adverse effects of the mobile learning application on students' academic performance.

This study seeks to address this gap by examining the experiences of Grade 11 HUMSS students with M-Learning applications and determining their relationship with academic performance in General Mathematics. Unlike previous studies that primarily evaluated the effectiveness of mobile learning technologies, the present study focuses on learners' experiences and perceptions while using these applications. The findings are expected to contribute context-specific evidence that may guide educators in integrating mobile learning strategies more effectively within mathematics instruction. This will be conducted in the second semester of the academic year 2024-2025. The research is designed to ensure effectiveness and productivity, as all necessary information will be collected within the stipulated time frame. The researchers are Mathematics students pursuing a Bachelor of Secondary Education major in Mathematics at North Central Mindanao College, and the respondents are Grade 11 HUMSS students in Senior High School at North Central Mindanao College. The researchers aim to investigate how students' experiences with M-Learning applications are associated with their academic performance in General Mathematics and to generate evidence that may support the development of more effective technology-enhanced learning strategies for Senior High School students. The researchers applied rigorous methods during the data-gathering process to ensure the study's credibility. The researchers did not rely on hunches or intuitions and based all findings solely on factual data directly from the respondents. The researchers also verified that no relevant data was excluded and no irrelevant data was included in the study. The research subjects are qualified to be studied by the researchers according to the standards and policies of the school.

Theoretical Framework

The study will anchor in the following theories: Cognitive Load Theory by Sweller, as cited in Banerjee et al. (2024); Attribution Theory by Bernard Weiner, as cited in Maymon et al. (2018); and Experiential Learning Theory by John Dewey.

The Cognitive Load Theory, developed by Sweller, states that learning is more effective when learners can manage the mental effort required to acquire new knowledge. This theory is one of the best ways to teach by understanding how our brains work. In addition, it proposes ways of presenting information that make learning easier and less tiring, enabling students to comprehend and remember things more effectively. However, mobile learning and educational applications are well designed to lessen mental effort by organizing information. This method of teaching allows learners to see the material more clearly and recall it better, leading to improved academic performance. Additionally, mobile learning can make it easier to understand even complicated topics by lowering the mental burden. In this way, the learning outcomes can be better and more understandable for learners.

The relevance of this theory for mobile learning and academic performance lies in the accessibility of small screens and the common practice of multitasking in these environments. To support learners, mobile learning should be designed to avoid unnecessary information, so students can focus on the most important content without becoming overwhelmed. When this theory is applied well, it can improve learning, memory, and academic performance by making better use of limited mental resources.

Bernard Weiner's Cognitive Attribution Theory states that people interpret their success and failure by subjectively attributing them to the causes they perceive. When they fail, they often

conduct more in-depth causal analyses, and these attributions affect emotions and behaviors. On the other hand, if the cause of failure is something they could have done, they may feel guilty or ashamed. Whereas if they feel that the cause is external or uncontrollable, they might get upset. This theory explains the experience of positive emotions such as pride and hopefulness, mainly as the result of perceiving control and the belief that the situation will be improved.

Attribution Theory explains how students interpret their successes and failures, shaping their emotions, motivation, and future behavior. When students attribute failure to internal, controllable factors, they may feel guilt or shame but are more likely to work harder to improve. Conversely, if they see failure as due to external or uncontrollable factors, they may experience frustration or helplessness, leading to disengagement. Positive attributions, such as viewing success as a result of effort or ability, foster emotions like pride and hope, motivating continued academic effort and resilience.

John Dewey's Experiential Learning Theory emphasizes the importance of "learning by doing". It encourages active participation of students in the learning process, rather than passive absorption of information. The theory is based on the assumption that people learn and develop through their interaction with the world and that all real-world experiences are educational. Dewey's principles encompass experiential learning, social learning, collaborative learning, critical reflection, curriculum integration, and the importance of questions and emotional responses to learning.

These ideas collectively offer a thorough elucidation of the potential impact of M-Learning applications on academic performance. Cognitive Load Theory explains how effectively designed mobile learning materials diminish extraneous mental effort and enhance learning. Attribution Theory explains how students' views of success and failure in using mobile learning resources influence motivation and academic behavior. Experiential Learning Theory underscores the dynamic and interactive characteristics of learning experiences facilitated by mobile devices. Collectively, these theories substantiate the premise that favorable interactions with M-Learning applications may enhance academic performance.

Mobile learning is relevant to this theory because it promotes active, experiential learning through mobile devices. M-Learning fosters interaction, collaboration, and reflection, and aligns with Dewey's principles of social learning, critical thinking, and curriculum integration. Learners can learn in real-world contexts and gain more knowledge. It increases engagement.

Conceptual Framework

The aim of this study is to examine the extent to which experiences with M-Learning applications influence academic performance. Continuous monitoring of academic progress is important. This can be achieved through M-Learning apps that make learning more engaging and flexible to meet students' needs, especially in the field of mathematics. This approach helps students build confidence and pay more attention to improving their math skills. As a result, their learning experience will be both effective and meaningful.

These relationships among the identified variables are shown in Figure 1 of the study's paradigm, Experiences of the independent variable in the M-Learning application. The dependent variable is the Academic Performance in Mathematics of the Grade 11 HUMMS students. Seminar Workshop

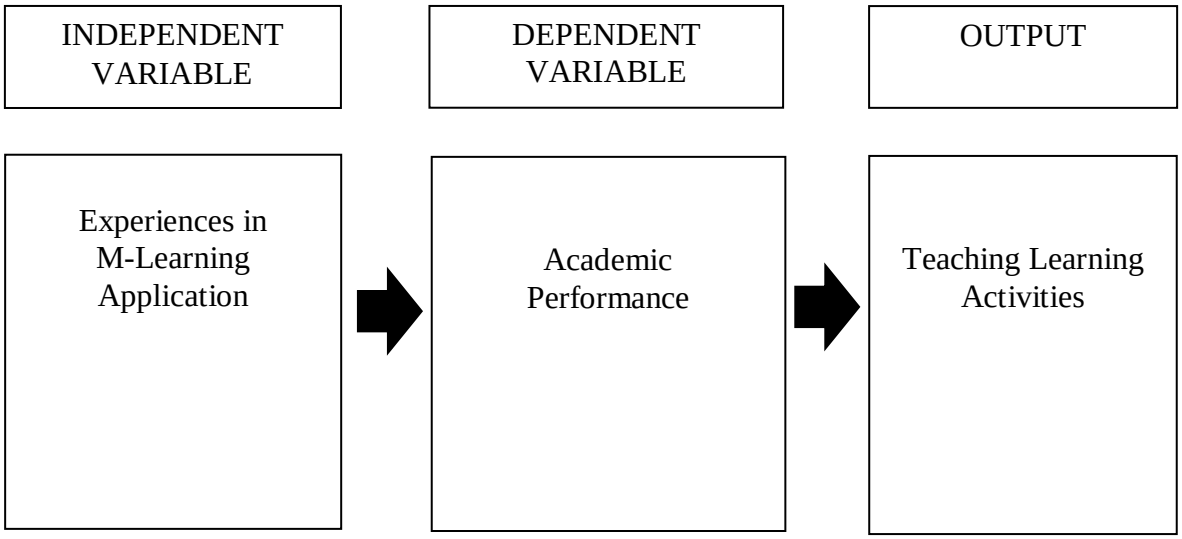

Figure 1. The Schematic Diagram

Statement of the problem

The study seeks to determine the relationship between the M-Learning application and the Academic Performance in Mathematics of Grade 11 HUMMS students at the Senior High of North Central Mindanao College. This study will answer the following questions that emerged and serve as integral components of the study:

1. What are the respondents' experiences in the M-Learning application?
2. What is the respondent's academic performance?
3. Is there any significant relationship between the respondents' academic performance and their experiences in the M-Learning application?
4. What output can be designed based on the results of the study?

Null Hypothesis

To achieve the purpose of the study, this hypothesis will be tested at the 0.05 level of significance.

H_{01}: There is no significant relationship between respondent's academic performance and their experiences in the M-Learning application.

LITERATURE REVIEW

In the present study, Varol et al. (2024) investigated M-Learning and found it had a positive influence on student collaboration, skill development, and self-assessment. For M-Learning apps to be effective, teachers and students must use mobile devices as learning tools. The success of M-Learning depends on people's attitudes toward technology and on the combination of technical and instructional support in the learning process. The study offers valuable insights into the potential of M-Learning to revolutionize learning and teaching in higher education. The authors call on educators, policymakers, and researchers to design and conduct more studies on integrating mobile technology into learning. They especially urge research into the impact of M-Learning on students' success over time and its effectiveness in different learning situations.

Al-Emran et al. (2018) discussed the development of M-Learning applications based on the knowledge management process. From an M-Learning perspective, integrating Knowledge Management (KM) processes into M-Learning apps is required to enhance learners' skills when using mobile devices. These include Knowledge Acquisition, Knowledge Sharing, Knowledge Application, and Knowledge Protection. Research indicates that many studies have focused on

developing M-Learning apps. However, there is limited literature on the impact of KM processes on the acceptance of M-Learning in theory and practice.

According to Criollo et al. (2021), the use of mobile technologies places the student's stay at the center of the teaching-learning process, and, for that reason, the teacher is seen as an intermediary between content and knowledge. M-Learning technology allows us to integrate different learning models in ways that sustain student engagement in the construction of learning. Yet we see growing concern about integrating M-Learning into the education model, despite the limitations of mobile technology.

The application of technology in the learning process and formal teaching practices critically hinges on teachers' capacity to embed digital technologies in the classroom without compromising the quality of instruction and the attention students need to follow the argumentation and ensure high-quality inquiry (Pedro et al., 2018). According to them, the addictive qualities of digital devices and social media, the prevalence of studies indicating the benefits of technologies in our media-rich world, and the "learn anytime and anywhere" mantra attached to mobile learning are all putting classroom dynamics in peril.

Wainaina et al. (2019) discussed the prevalent features of mobile learning, the pedagogical considerations, organizational issues, and the regulatory environment affecting access to higher education. This chapter reveals that HEIs should improve their technological infrastructure, address the incompatibility of mobile devices with learning management systems, ensure the availability of modern mobile devices, strengthen instructors' pedagogical skills related to M-Learning, and address instructors' and students' concerns and motivational incentives for M-Learning.

As Qureshi et al. (2020) note, mobile learning is closely tied to the educational process, and many fields are working to advance it. There are several key areas and important benefits of mobile learning in improving students' learning capabilities. Mobile applications are a significant step forward in skill acquisition across all areas, and social media networks also contribute to this. These apps not only deliver text and videos but also include tutorials that demonstrate real-world processes. Research has shown that literature has guided the quality of work in various fields from 2009 to 2018, but little has been said about social media and mobile application learning. According to these findings, researchers should recognize the importance and value of mobile applications in mobile learning, which will be useful for both students and teachers. The literature can offer teachers much in their learning and development, but it often does not give prominence to the important link between teacher training and teaching skills in the mobile learning environment. In recent years, there have been very few studies related to mobile learning and science and visual arts subjects. These subjects are important to include in mobile learning in order to teach efficiently, which makes researchers aware of their importance.

Ali et al. (2024) emphasized that mobile learning has become an effective instructional approach by enabling students to access learning materials anytime and anywhere through portable digital devices. The integration of mobile learning into education enhances accessibility and flexibility, promotes active learner engagement, and contributes to improved academic performance. By incorporating mobile learning into classroom instruction, educators can create more interactive and learner-centered environments that support continuous learning beyond the traditional classroom. These advantages also help prepare learners for the demands of an increasingly technology-driven educational landscape.

Saeid et al. (2022) emphasize the importance of accessible mobile learning, which is an effective way to support students with complex educational topics. This suggests that students are using mobile learning as a supplementary tool, finding useful educational papers to improve their learning and academic performance. In addition, they note that the flexibility of this type of

education allows learners to learn in accordance with their circumstances and mental readiness, which helps prevent distractions and reduce factors that affect concentration. Understanding this concept can enable more flexible learning in education and promote easy-to-use tools for a better learning experience. In addition, mobile learning had a significant effect on students' academic interests and learning attitudes, and these attitudes and interests, in turn, affected students' academic performance.

Demir et al. (2018) highlight the importance of promoting mobile learning to improve students' academic performance. This shows that mobile learning is an important factor in increasing students' motivation and interest in education. The study highlights the connection between mobile learning and academic performance by making learning more engaging and accessible and by increasing students' motivation to learn, thereby fostering a more creative and motivating learning environment.

Another study was conducted by Saroia et al. (2019) to understand the adoption of mobile learning, with a particular focus on m-LMS. The present study extends the use of the technology acceptance model in the field of mobile learning by demonstrating how well the proposed TAM framework predicts users' intentions to use an m-LMS in higher education. As in other research, PU and PEOU, which were found to be critical for users' intention to use an m-LMS app, were identified as important elements influencing users' attitudes toward the app. Further, in the context of m-LMS usage, augmented reality (AR) and user management systems (UMS) are additional components that significantly improve PU and PEOU.

Academic Performance

According to Togaibayeva et al. (2022), academic performance is influenced by how well students' needs are met by the content offered through mobile learning, as well as by their motivation and sense of self-efficacy, and by how beneficial and satisfying mobile learning is. These results corroborate earlier research showing that learners perform better when they are satisfied with mobile learning and believe that the right technologies are useful in the particular learning environment.

Klimova (2019) shows that well-designed learning resources and tools, such as mobile learning, which can be continuously supported by teachers and adapted to the needs of their students, can improve student achievement and lead to successful learning outcomes. Furthermore, the results reaffirm the appropriateness of mobile learning, with its frequent exposure to the target language, as an adjunct to other modalities of course delivery. However, students were also motivated to use the mobile app because of its rich content and fast feedback.

The importance of mobile technology, as discussed in the classroom by Miller et al. (2017), was examined. However, the study did not show a statistically significant effect of mobile learning on academic achievement. The study, however, provided useful information on students' motivation to learn using mobile devices. Students' motivation to learn has changed as they use mobile devices. Mobile devices have brought about more change in students' understanding of learning. Students felt they had a bigger change in their mobile device learning than in their paper-based learning. Students felt more confident in their knowledge. Moreover, students who used mobile devices showed more changes in their motivation and interest in learning than paper learners.

Xue et al. (2018) examined how mobile learning affects students' academic performance and learning attitudes. The results showed that students' attitudes toward different aspects of mobile learning were inconsistent, and that mobile learning could yield learning outcomes comparable to those of conventional classroom instruction. The study's findings contribute to the scholarship on mobile learning and can inform the design of mobile-based educational interventions.

Hattie (2023) reviewed the impact of mobile applications on academic achievement indicators such as grades, test scores, and retention. The study found that mobile learning applications had varying effects on students' learning experiences. It highlighted benefits such as greater access to educational materials, deeper engagement, and personalized learning paths. On the other hand, it also noted potential problems, including digital distractions, fewer in-person interactions, and concerns about the accuracy of information. The study identified factors such as technological literacy, app design, and pedagogical approaches that affected the adoption and effectiveness of mobile learning apps.

Zagirniak et al., (2021) reports on changes in the academic results of students who switched to a distance learning format during the COVID-19 pandemic, providing an opportunity to consider the advantages of this format and to identify its issues. Students were surveyed to understand how they felt about online education and which platforms and resources were most used. The characteristics of Generation Z in terms of academic performance in e-learning are analyzed, and recommendations are developed based on the results of the survey and monitoring. The research gave credence to the notion that Gen Z students do better academically in online classes than in traditional ones.

This study examined the relationship between academic achievement, measured by final grades in an online environment, and mobile learning (m-learning), which uses mobile technology, based on research conducted by Daniel Grenier (2018). The findings suggest that there is no significant relationship between m-learning and academic achievement. This implies that further research is required to fully understand the impact of m-learning on academic achievement in an online environment, considering variables such as institutional support for mobility and the context of location.

Polyudova et al. (2022) studied the effect of M-learning resources on the Information Science achievements of non-technical learners and provided recommendations for teachers to improve M-learning. The proposed technology had a positive impact on students' academic performance. The results of pupils' active use of mobile Web 2.0 technology are statistically significantly better than those of learners who learn in a conventional way [46]. The findings can be used to develop a better program to rationalize the educational process for learners and enhance their academic performance.

Mergany et al. (2021) examined the effect of integrating mobile learning into traditional classroom lectures on students' academic performance and their attitudes toward using mobile applications as teaching tools in dental education. The results showed that educational smartphone applications were useful learning tools for knowledge expansion and acquisition. Results indicated that dental students were receptive to mobile learning and had positive attitudes toward it.

Su et al. (2015) studied the impact of a context-aware mobile learning environment and a gamified learning approach on science learning, achievement, and motivation. Consider the implications for motivation and student learning. This paper presents the design and implementation of gamified learning activities based on the MGLS (Mobile Gamification Learning System) in an elementary school science curriculum to improve student motivation and encourage more active participation in the learning process. The chapter highlights students' belief that using a smartphone and its features created more opportunities for outdoor learning. The pre- and post-test results showed that gamification and mobile technologies embedded in a botanical learning process could result in higher levels of motivation and better learning outcomes than traditional instruction or non-gamified mobile learning.

Despite the growing body of research on mobile learning, few studies have specifically examined the experiences of Grade 11 HUMSS students in General Mathematics. Moreover, there is a lack of localized evidence on how students' interactions with M-Learning applications affect

academic achievement in Philippine Senior High Schools. This gap justifies the current investigation.

Insights Learned from Related Literature

The research examined consistently indicates that mobile learning applications can improve student engagement, motivation, access to learning materials, and academic performance. Nonetheless, the evidence regarding their efficacy remains inconclusive. Although numerous studies indicate beneficial effects on academic performance (Demir et al., 2018; Polyudova et al., 2022; Mergany et al., 2021), some report minimal or negligible effects (Miller et al., 2017; Grenier, 2018). The observed inconsistencies suggest that the efficacy of M-Learning may depend on learners' experiences, educational environments, and instructional implementation. Therefore, additional research is required to determine the relationship between students' experiences with M-Learning applications and their academic achievement, especially among Senior High School students in Mathematics.

In conclusion, the literature reveals the potential of mobile learning experiences to provide flexibility, mobility in accessing educational resources, and interactive content that can improve academic achievement. It is also designed to be inclusive of different learning styles, encourage collaboration, and provide immediate feedback, thus helping students achieve a better understanding and recall of the material.

The literature above also highlights the significant role of M-Learning and academic performance in education. M-Learning positively influences student learning, improving students' learning capabilities and enhancing their skills through mobile devices. In terms of academic performance, mobile learning allows instruction to be tailored to students' needs, which can improve their performance and lead to successful learning outcomes.

RESEARCH METHOD

Research Design

The study uses a descriptive-correlational research design. It aims to determine the level of experience with the M-Learning application and its impact on the academic performance in mathematics among Grade 11 students.

Research Environment

This study will be conducted at the North Central Mindanao College, a private school located in Purok Lemon Tree, Barangay Maranding, Lala, Lanao del Norte. The school is organized into sections by grade level. Grade 7 has the Sampaguita, Rose, and Daisy sections. Grade 8 has the Diamond and Emerald sections. Grade 9 has the Gold, Silver, and Bronze sections. Grade 10 has the Alpha, Bravo, Charlie, and Delta sections. In Senior High, students can choose from strands such as Humanities and Social Sciences (HUMSS), Science, Technology, Engineering and Mathematics (STEM), Accountancy, Business and Management (ABM), Technical-Vocational-Livelihood (TVL), and General Academic Strand (GAS). The student population is a mix of tribes, especially Bisaya and Muslim groups. This study focuses on the experiences of HUMSS students with the M-Learning application and its effect on their academic performance in General Mathematics.

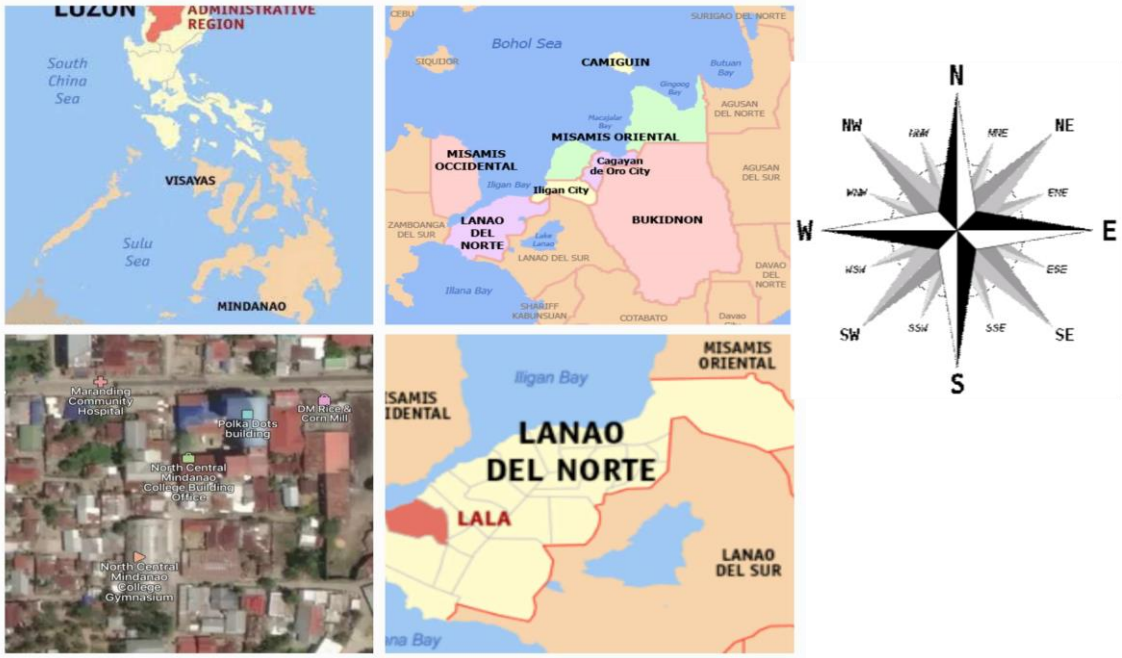

Figure 2. The Locale of the study

Research Respondents

The participants of the study are officially enrolled Grade 11 students of North Central Mindanao College at Barangay Maranding, Lala, Lanao Del Norte for school year 2024-2025. To complete this study, the researchers need fifty (52) students from the senior high school Grade 11 (HUMMS) who are willing to participate in the study; these students are needed to produce meaningful results and to determine which experiences with the M-Learning application impact their academic performance in mathematics. The study seeks to determine the most effective and advantageous approach to classroom instruction in mathematics for these Grade 11 HUMMS students. The outcomes of the study, conducted at a single institution and involving only Grade 11 HUMMS students, should be contextualized accordingly. Generalizations to different student groups, grade levels, or educational contexts should be approached with caution.

Research Instrument Used

To measure the impact of M-Learning applications on students, a "User Experience Questionnaire" (UEQ) developed by Santoso, H.B et al. (2016) was adapted and modified. The selected students or respondents were asked to provide their true responses to each statement and question for the success of the study. All completed questionnaires were retrieved. A Likert scale was used, with ratings of 4-Strongly Agree, 3-Agree, 2-Disagree, and 1–Strongly Disagree. The rating scale and its interpretation are shown below. The interpretation is used to describe the equivalent of the description to the experiences in M-Learning applications of students.

Scoring Indicators

Table 1. Interpretation of the Likert Scale for the respondent's experiences in M-Learning application.

Rate	Description	Interpretation
4	Strongly Agree	Highly Experienced
3	Agree	Very Experienced

2	Disagree	Slightly Experienced
1	Strongly Disagree	Not Experienced at all

Table 2. Table Descriptors, Grading Scale and Remarks

Grading scale	Description	Remarks
90-100	Outstanding	Passed
85-89	Very Satisfactory	Passed
80-84	Satisfactory	Passed
75-79	Fairly Satisfactory	Passed
Below 75	Did not Meet Expectations	Failed

DepEd K to 12 Grading System Steps for Computing Grades
From: DepEd ORDER No. 8, s. 2015 "POLICY GUIDELINES ON CLASSROOM ASSESSMENT FOR THE K TO 12 BASIC EDUCATION PROGRAM" (https://www.deped.gov.ph/wp-content/uploads/2015/04/DO_s2015_08.pdf)

A pilot test was administered to students not participating in the actual study to assess the reliability of the modified questionnaire. The instrument's internal consistency was evaluated using Cronbach's alpha. A reliability coefficient of at least 0.70 was considered satisfactory, indicating that the questionnaire items consistently assessed students' experiences with M-Learning applications. The questionnaire underwent content validation by specialists in Mathematics Educational Research. Their feedback was integrated to enhance the clarity, relevance, and suitability of the instrument items before administration.

Data Gathering Procedures

The researcher employs a specific procedure for the distribution and retrieval of the data. First, the researcher prepared a questionnaire and requested approval from the Dean of the Education Department. Furthermore, the researcher is seeking permission from the Principal of North Central Mindanao College High School, the coordinators, and the respondents involved. When the required approvals and permissions were obtained, the questionnaires on Experiences in M-Learning Application: Respondents will be provided the impact on Academic performance. The researcher will collect the completed questionnaires and then tabulate, analyze, and interpret the data.

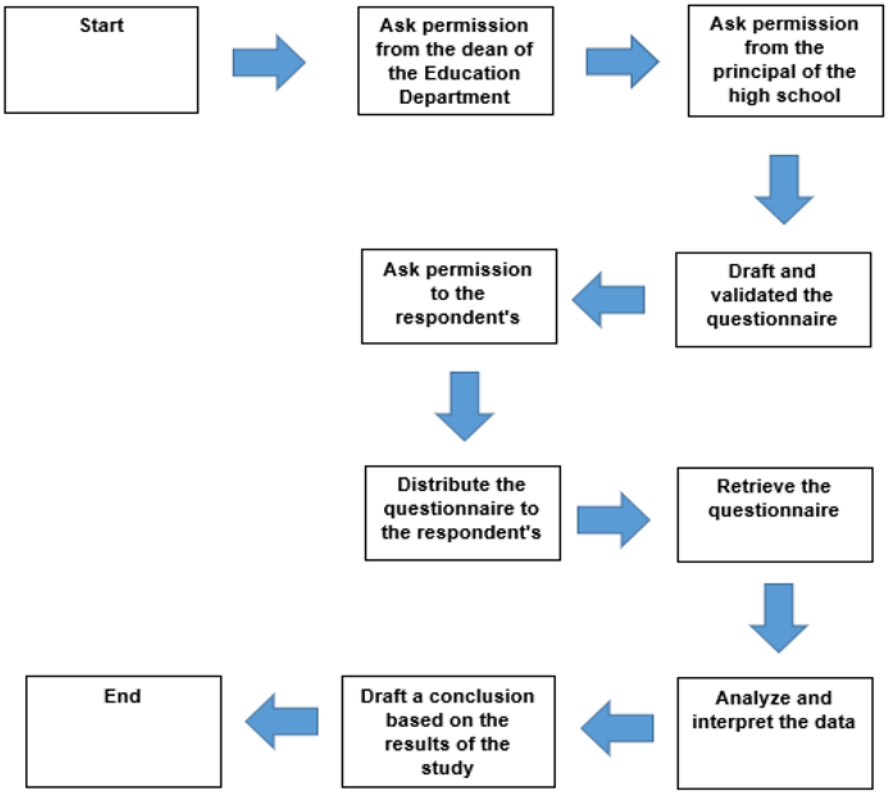

Figure 3. Flow chart of data gathering

Statistical Treatment

The following statistical tools are used to analyze and interpret the study's results.

1. **Frequency and/or percentage**. This is used to distribute the respondents' responses and helps answer statement of problem 2.
   Percentage Formula:

$$\textbf{Percentage} = \left(\frac{\textit{Frequency}}{n}\right) \times 100$$

   Where:
   n = total number of respondents

2. **Pearson Correlation**. This is used to determine the significant relationship between SRL strategies and students' academic performance in Mathematics. It is applied to answer problem 3.
   Formula:

$$r = \left[\frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}\right]$$

   Where:
   n = the number of data points, i.e., (x,y) pairs, in the data set.
   $\sum xy$ = the sum of the product of the x-value and y-value for each point in the data set.
   $\sum x =$ the sum of the x-values in the data set.
   $\sum y$ = the sum of the y-values in the data set.
   $\sum x^2$ = the sum of the squares of the x-values in the data set.

$\sum y^2$ = the sum of the squares of the y-values in the data set.

Ethical Consideration

Ethical considerations were upheld throughout the study. Authorization to conduct the research was obtained from the school administration. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection. Participants were informed of the study's objective and their right to withdraw at any time without repercussions. Confidentiality and anonymity were maintained by ensuring that no identifiable information was disclosed in the presentation of results. All collected data were used solely for scholarly purposes.

FINDINGS AND DISCUSSION

The Respondent's Experiences with the M-Learning Application

Table 3. Mean Distribution of Experiences in M-learning Application

Indicators	Mean	Response	Interpretation
I found accessing the math learning materials simpler with M-Learning apps.	3.02	*Agree*	*Moderately Experienced*
I found M-Learning apps helpful in understanding the discussions effectively.	3.13	*Agree*	*Moderately Experienced*
I found that through M-Learning apps, I can finish my math activities and assignments quickly and hassle-free.	3.11	*Agree*	*Moderately Experienced*
I find it easy to share academic information, particularly in math lessons.	3.02	*Agree*	*Moderately Experienced*
I found out that M-Learning apps provide different ways to solve the same math problem.	3.29	*Strongly Agree*	*Highly Experienced*
I experienced M-Learning apps that allowed me to review lessons during my free time.	3.08	*Agree*	*Moderately Experienced*
I discovered that M-Learning apps encourage my participation during math face-to-face classes.	2.94	*Agree*	*Moderately Experienced*
I experienced in tracking previously solved problems for future reference.	2.98	*Agree*	*Moderately Experienced*
I found out that M-Learning apps make math activities more enjoyable due to their convenience.	2.88	*Agree*	*Moderately Experienced*

I viewed it as a comprehensive platform for all my math learning activities.	2.96	*Agree*	*Moderately Experienced*
I found out that using M-Learning apps helps me to scan instantly a handwritten or printed math problems.	3.15	*Agree*	*Moderately Experienced*
I found M-Learning apps help me to recover from my mistakes quickly and easily in solving mathematics.	3.10	*Agree*	*Moderately Experienced*
I realized that my efforts and time using M-Learning apps improved my understanding in math subject.	3.17	*Agree*	*Moderately Experienced*
I found M-Learning apps to be helpful supplement in reviewing simple and difficult math concepts.	3.13	*Agree*	*Moderately Experienced*
I experienced fewer distractions while studying on M-Learning apps	2.83	*Agree*	*Moderately Experienced*
Weighted Mean	3.05	*Agree*	*Moderately Experienced*

Noted: 1.00-1.75 Not Experienced at All (Strongly Disagree); 2.51-3.25 Moderately Experienced (Agree); 1.76-2.50 Slightly Experienced (Disagree); 3.26-4.00 Highly Experienced (Strongly Agree)

The data illustrate students' experiences with M-Learning applications. The highest weighted mean, 3.29, was found in item 5 (I found out that M-Learning apps provide different ways to solve the same math problem), with a response of Strongly Agree. On the other hand, the lowest weighted mean, 2.83, was found in item 15 (I experienced fewer distractions while studying on M-Learning apps), with a response of Agree. Overall, the results indicate students' experiences with M-Learning applications, with a weighted mean of 3.05 (Agree).

The study reveals that the respondent's experience with the M-Learning application is moderate. This suggests that the M-Learning application is commonly used today, as a supplemental tool that supports math learning for everyone. The respondent's responses emphasize its usability in the learning process, particularly through its accessibility and convenience. Overall, the study highlights that the M-Learning application has the potential to overcome barriers to learning mathematical literacy, offering an effective way to enhance and enrich individuals' problem-solving abilities.

Daguinotan et al. (2024) conducted a comprehensive study demonstrating that PhotoMath can significantly enhance students' mathematical problem-solving skills. The research shows that this innovative tool not only helps students understand mathematical concepts but also strengthens their ability to tackle complex problems independently. By providing step-by-step solutions and explanations, PhotoMath serves as a valuable pedagogical resource that fosters active learning and deep comprehension. The findings underscore the effectiveness of integrating technology into education, highlighting PhotoMath's role in creating a more engaging and supportive learning environment for students navigating challenging mathematical subjects.

The Respondent's Academic Performance

Table 4. Frequency and Mean Distribution of the Respondents' Academic Performance

Scores	Interpretation	Frequency	Percent	Mean/Overall Interpretation
90 – 100	*Excellent*	9	17.31%	*82 Satisfactory*
85-89	*Very Satisfactory*	11	21.15%	
80-84	*Satisfactory*	6	11.54%	
75-79	*Average*	26	50%	
60-74	*Needs Improvement*	0	0%	
Total		**52**	**100%**	

The data reveal the respondents' final grades. As shown in the table above, the majority of students received an Average grade (75 to 79), with 26 students, representing 50% of the total. Additionally, 11 students achieved a Very Satisfactory grade (85 to 89), making up 21.15% of the total. 9 students earned an Excellent grade (90 to 100), accounting for 17.31%, while 6 students received a Satisfactory grade (80 to 84), corresponding to 11.54%.

The findings reveal that the respondents' grades reach a satisfactory level. The study indicates that most respondents obtained average grades, confirming an average level of cognitive abilities and the ability to meet the necessary requirements of different courses, which increases the likelihood of achieving above-average academic performance. As a result, respondents receive additional support to foster mathematical abilities for greater success and to ensure math literacy.

The present study by Mahinay et al. (2025) indicates that 13 out of 56 schools, representing 23.20%, received a Very Satisfactory rating, showcasing strong academic performance among their students. Students at these schools consistently achieve above-average grades and meet the coursework expectations set by the institutions. This impressive outcome reflects the overall academic success in Cagayan de Oro City, where students not only excel but also maintain grades significantly above minimum standards. Notably, no schools fell below the Very Satisfactory rating, further emphasizing the high level of academic achievement among students in the area.

The Significant Relationship Between the Respondent's Experiences in M-Learning Application and the Respondent's Academic Performance

Table 5. Correlation between the Respondent's Experiences in M-Learning Application and the Respondent's Academic Performance

Variable	Student Academic Performance			
Experiences in M-Learning Application	r-value	p-value	Result	Decision on Null Hypothesis
1. Experiences in M-Learning Application	0.938***	0.001	*Highly Significant*	*Rejected*

Noted: *p<0.05(Significant); **p<0.01(highly significant)

The findings indicated that students' experiences with the M-Learning application yielded an R-value of 0.938** and a p-value of 0.001, indicating a statistically significant and robust positive correlation between the variables. This research indicates that students who reported more favorable experiences with the M-Learning program generally achieved higher academic

performance in Mathematics. The findings demonstrate a substantial positive correlation between students' engagement with M-Learning applications and their academic performance. Nevertheless, because a descriptive-correlational research approach was used, the data do not confirm a causal association between the two variables.

The research demonstrated a statistically significant correlation between students' interactions with M-Learning applications and their academic success. The results indicate that favorable interactions with M-Learning applications may enhance student engagement in Mathematics by providing accessible resources, flexible learning options, and structured problem-solving support. These attributes may create a more interactive and accessible educational experience. However, the findings should not be construed as evidence that M-Learning applications directly enhance students' comprehension of Mathematics or ensure superior academic outcomes. The data suggest that favorable encounters with M-Learning applications correlate with improved academic performance.

The significant correlation coefficient observed in this study indicates a strong association between the variables. Nevertheless, the results must be interpreted with caution. Multiple validity concerns may affect the robustness of the observed correlation. Because the study relied on self-reported assessments of students' experiences, the potential for common method bias and response bias cannot be entirely ruled out. Furthermore, despite meticulous attention throughout data encoding and analysis, significant coding errors and instrument-related limitations may still influence the results. Additional characteristics excluded from the study, including student motivation, prior academic achievement, study habits, access to technology, parental support, and instructor assistance, may also influence academic performance. Thus, the robust correlation identified in this study should be interpreted as indicative of a substantial association rather than definitive confirmation of a direct causal relationship. Future research may use larger samples, validated instruments, and more stringent research designs to better investigate the correlation between students' experiences with M-Learning applications and academic success.

Findings

The study's findings indicated that Grade 11 HUMSS students predominantly reported moderate experiences with the M-Learning application. A statistically significant positive correlation was identified between students' experiences with the M-Learning application and their academic performance in General Mathematics. The results indicate that students who reported more favorable encounters with the application exhibited higher levels of academic performance. Nevertheless, because the study used a descriptive-correlational research approach, the results do not confirm a causal association between the variables. The data suggests a correlation that warrants further inquiry. The study was conducted at the senior high department of North Central Mindanao College. The respondents were Grade 11 students in the Humanities and Social Sciences strand. The research design was quantitative, descriptive, and correlational. Statistical analyses included percentages and weighted means. Pearson’s product-moment correlation coefficient was used.

The following outlines the findings from the study based on data collected by the researchers:

1. The respondents' experience in M-Learning application is 3.05 which is interpreted as moderately experienced.
2. The overall weighted mean of the student’s final grade in General Mathematics is 82 which is interpreted as Satisfactory.
3. There is a significant relationship between the experiences in the M-Learning application and the respondent’s academic performance.

CONCLUSIONS

The study's findings indicated a statistically significant correlation between students' experiences with the M-Learning application and their academic success in Mathematics. The findings indicate that students who reported more favorable encounters with the application exhibited higher levels of academic success. Nonetheless, due to the use of a descriptive-correlational research approach, the results do not demonstrate a causal relationship between students' interactions with the M-Learning application and their academic performance.

The results can be analyzed using Thorstein Veblen's Theory of Technological Determinism, which posits that technological advancements can affect educational methodologies and learning experiences. In this study, students who reported more favorable experiences with the M-Learning application also exhibited superior academic performance. Nonetheless, this relationship should be viewed as an association rather than proof that the technology itself directly enhances learning outcomes. Additional factors, such as motivation, prior academic success, study habits, teacher assistance, and the availability of learning tools, may also influence students' academic performance.

The findings indicate that mobile learning applications might be regarded as supplemental aids in mathematics instruction, as they offer learners flexible access to educational resources and interactive learning experiences. Students could consider employing M-Learning applications as supplementary educational tools to enhance their study of Mathematics and facilitate autonomous learning. Similarly, educators may investigate the effective incorporation of mobile learning tools into mathematics instruction to offer students enhanced opportunities for participation and practice outside the classroom. School administrators might also consider endorsing the judicious use of educational technologies and mobile learning materials as components of comprehensive programs that enhance student learning and academic involvement. Furthermore, parents may promote and guide their children in the judicious use of educational applications as ancillary learning tools, while ensuring that technology use remains balanced and intentional.

Nonetheless, these conclusions must be read with caution and should not be taken as direct evidence of the efficacy of M-Learning applications. Educational decisions must be guided by a synthesis of research findings, instructional goals, learner needs, and contextual factors. Moreover, more robust evidence from experimental, quasi-experimental, and longitudinal investigations is required before definitive judgments about the efficacy of M-Learning applications can be made.

LIMITATION & FURTHER RESEARCH

Several constraints must be acknowledged when interpreting the results of this study. The study included only fifty-two (52) Grade 11 HUMSS students from a single educational institution, limiting the generalizability of the findings to other student demographics and educational contexts. Second, the research relied on self-reported assessments of students' interactions with the M-Learning application, which may be influenced by response bias and social desirability bias. Third, despite adapting the instrument from a pre-existing questionnaire, measurement constraints may persist due to modifications made to suit the study's setting. The descriptive-correlational research approach does not allow conclusions about causal relationships between students' experiences with M-Learning applications and their academic performance.

Subsequent research could replicate this study using larger, more diverse samples from various schools and educational settings to enhance the generalizability of the results. Researchers are urged to employ validated tools and account for additional variables, such as learning motivation, self-efficacy, study habits, technological access, teacher support, and prior academic performance. Moreover, experimental, quasi-experimental, and longitudinal study designs are advocated to yield more robust evidence on the association between M-Learning experiences and

academic performance. Comparative analyses across diverse academic disciplines, grade levels, and topic areas may yield significant insights into the role of mobile learning in various educational contexts.

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