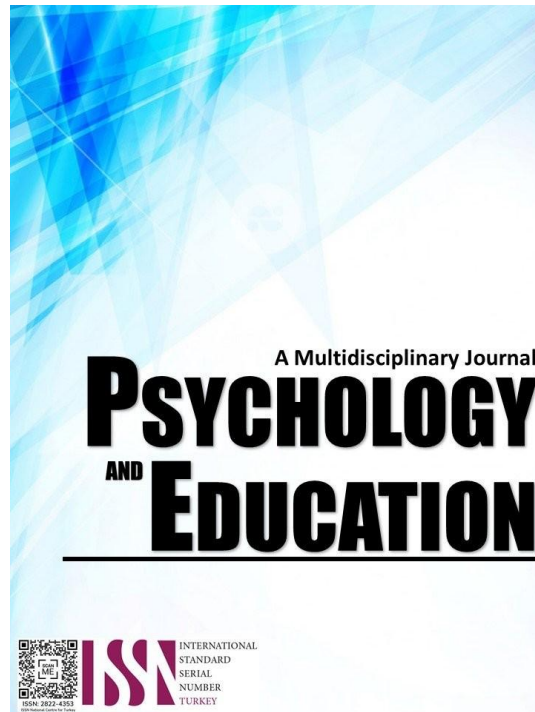


ASSESSING THE EFFECTIVENESS OF MOBILE LEARNING APPS IN ENHANCING STUDENT LEARNING AND ENGAGEMENT IN SELECTED SECONDARY PUBLIC SCHOOLS IN GENERAL TRIAS CITY



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Assessing the Effectiveness of Mobile Learning Apps in Enhancing Student Learning and Engagement in Selected Secondary Public Schools in General Trias City

Salvador Miguel M. Pedraza,* Orbel M. Canoy

For affiliations and correspondence, see the last page.

Abstract

The rapid evolution of educational technology has positioned mobile learning apps as transformative tools for enhancing student learning and engagement. This study assesses the effectiveness of mobile learning apps in selected secondary public schools in General Trias City, Philippines, focusing on their impact on academic performance and engagement. Using a quantitative descriptive-comparative design, the research examines the perceptions of 60 students across different grade levels, genders, socio-economic statuses, and mobile device usage frequencies. Findings indicate that mobile learning apps are strongly effective in enhancing student learning, particularly through interactive features, accessibility, and exam preparation support. Students also rated these apps as effective in boosting engagement, especially via gamification and diverse content. However, socio-economic disparities and frequency of use significantly influenced perceived effectiveness, with higher-income and frequent users reporting greater benefits. No significant differences were found based on grade level or gender. The study highlights the need for equitable access to mobile learning tools, improved digital literacy programs, and consistent integration into curricula. Recommendations include subsidized devices for low-income students, teacher and student training, and enhanced interactive features to maximize engagement. Future research should explore long-term impacts and strategies for bridging the digital divide in Philippine public schools.

Keywords: *Mobile learning apps, student engagement, academic performance, digital divide, secondary education, Philippines*

Introduction

The rapidly evolving educational landscape highlights technology as a transformative tool for enhancing learning experiences and fostering student engagement. A mobile learning app is a software application designed for use on mobile devices, such as smartphones and tablets, to facilitate educational activities, including accessing learning materials, completing assignments, and engaging in interactive content. COVID-19 marked a significant turning point for mobile learning applications in the Philippines. As schools closed to prevent the spread of the virus, the education system shifted to online and blended learning modalities. Mobile learning apps became indispensable tools for delivering lessons, completing assignments, and maintaining student engagement during this period. The pandemic highlighted the importance of mobile technology in ensuring the continuity of education amid disruptions (Adonis, 2021; Patel, 2023).

Mobile learning platforms, such as Google Classroom, Kahoot!, and Edmodo, have been found to provide more positive experiences, higher usage frequency, and greater satisfaction compared to those who do not use such platforms. Notably, the intervention group outperformed the control group in both course grades and standardized test scores, suggesting a positive correlation between mobile learning app usage and academic performance and engagement. The positive outcomes are influenced by factors such as user satisfaction, app usability, and the provision of adequate support and training (Anuyahong & Pucharoen, 2023; Lee, 2023; Purwanto, 2025).

Furthermore, mobile learning apps incorporate interactive and engaging content, such as videos, quizzes, and simulations, which foster active participation and enhance knowledge retention. They also play a significant role in supporting students with disabilities, as artificial intelligence integrated into these apps helps them overcome barriers and achieve academic success. By providing access to educational resources on affordable and widely available mobile devices, these apps help bridge the digital divide, ensuring equitable access to high-quality education for students from diverse socio-economic backgrounds. Overall, mobile learning apps are vital tools for creating accessible, personalized, and interactive educational experiences that enhance student learning and engagement (LearnWorlds, 2017; AP News, 2023; YouLearnT, 2023).

The integration of mobile learning in the Philippines is not without challenges. Factors such as digital literacy, access to reliable internet connectivity, and the readiness of educators and students to adapt to new technologies play crucial roles in the successful implementation of mobile learning initiatives. A systematic review of mobile learning adoption underscores the importance of understanding these factors to facilitate effective integration in educational contexts (Marcial, 2018; Kumar & Chand, 2019). While there have been initiatives to integrate mobile learning into the educational framework, its full potential remains underexplored, necessitating further utilization and research. In the Philippine Educational setting, it is essential to highlight the early stages of mobile learning integration and the need for more comprehensive adoption strategies. Its full potential remains underexplored. Addressing technical challenges, providing adequate training for educators, and ensuring equitable access to necessary resources are crucial steps toward comprehensive learning adoption (Muchnik et al., 2022).

There is limited research that examines the specific impact of mobile learning apps on secondary public school students in the Philippines, particularly in settings where access to technology and internet connectivity is constrained. Few studies investigate the measurable effectiveness of interventions in improving academic performance and fostering student engagement in real-world public school environments. Socio-economic disparities and resource limitations pose challenges to the integration of mobile learning technologies (Gomez, 2022).

Although extensive research has been carried out on mobile learning apps independently, few studies have examined them particularly in secondary public schools, such as those in General Trias City. This gap is significant because most literature focuses on higher education, leaving limited insights into students' engagement and learning experiences (Naveed et al., 2023). It is important to emphasize that the demographic profile of secondary students may result in distinct learning needs and engagement patterns compared to those of learners in higher education, particularly when using mobile learning apps.

Research Questions

This study aimed to assess the effectiveness of mobile learning apps in selected secondary public schools in General Trias City. However, specifically, it aimed to:

1. What is the demographic profile of the respondents in terms of:
 - 1.1. sex;
 - 1.2. grade level;
 - 1.3. socio-economic status of the students' parents; and
 - 1.4. frequency of mobile device usage for educational purposes?
2. What is the level of effectiveness of mobile learning apps in student learning?
3. What is the level of effectiveness of mobile learning apps in student engagement?
4. Is there significant difference in effectiveness of mobile learning apps when grouped according to demographic profile?

Literature Review

Defining Mobile Learning Apps and Its Emergence

Mobile learning app adoption was greatly accelerated by the COVID-19 pandemic, which is the use of software programs designed for mobile devices such as smartphones and tablets to facilitate the delivery of educational materials and activities. As schools and universities worldwide faced closures, educators and learners relied on these apps to ensure continuity in education. Mobile learning apps provide flexibility and convenience by enabling users to access educational resources, engage in interactive exercises, and connect with peers and teachers remotely. UNESCO reported that over 1.5 billion students were affected by school closures globally during the pandemic, underscoring the critical need for alternative learning methods like mobile apps (UNESCO, 2020; Raccoon Gang, 2020). These tools not only addressed immediate educational challenges but also showcased their potential to transform traditional learning environments.

Quipper, Google Classroom, Kahoot!, Edmodo, and Seesaw are widely used mobile learning apps that enhance education through interactive and engaging methods. Quipper provides personalized lessons and quizzes aligned with the Philippine curriculum, helping students improve in subjects like Math and Science (Camella, 2022). Google Classroom streamlines assignment distribution and communication between teachers and students, while Kahoot! facilitates interactive learning experiences. Makes learning fun and competitive with game-based quizzes (Bosstab, 2022). Edmodo fosters collaboration and continuous learning by enabling students to share content and track progress. Seesaw allows younger students to create digital portfolios, encouraging creativity and enabling teachers and parents to provide feedback and stay updated on progress (Bosstab, 2022).

These apps enable learners to access educational materials, participate in interactive exercises, and communicate with educators and peers, offering flexibility and convenience in the learning process. By leveraging the portability and connectivity of mobile devices, m-learning apps support learning anytime and anywhere, accommodating diverse learning styles and schedules. This approach not only enhances traditional educational experiences but also promotes continuous, self-directed learning (Rosenblum, 2019; Tremblay, 2024).

Access to educational materials outside of traditional classroom hours is important since it lets students interact with them whenever it's convenient for them and encourages lifelong learning (Atef, 2023). Furthermore, by empowering students to create and accomplish personal objectives, these applications promote individualized learning and boost motivation and engagement. Learning is made more effective and engaging by incorporating interactive elements like gamification and animation, which accommodate different learning styles. Additionally, collaborative learning is supported by mobile learning apps, which allow students to interact in real time with teachers and peers, improving communication and knowledge exchange (Demir & Akpinar, 2018; Mehta, 2023).

Mobile learning apps have become increasingly crucial as essential tools for modern education, offering flexibility and adaptability to meet the diverse needs of learners. In countries like the Philippines, where access to educational resources varies significantly between urban and rural areas, mobile learning apps provide a practical solution to bridge these gaps. These apps integrate digital tools with interactive and personalized learning features, ensuring that students can access quality education regardless of location or socio-

economic background. By promoting continuous learning and engagement, mobile learning apps have proven to be a resilient and scalable approach, especially during challenges such as those brought about by the pandemic.

Demographic Profile of Learners affecting effectiveness of Mobile learning apps

Demographic factors such as gender, age, and education significantly influence the adoption and effectiveness of mobile learning applications. Gender differences affect usage intentions and performance expectations, with varying preferences for app features. Age plays a role, as younger users tend to adopt and navigate mobile technologies more easily than older users. Similarly, higher education levels correlate with better utilization of mobile learning tools. These insights emphasize the importance of designing mobile learning applications that accommodate diverse user needs, ensuring inclusivity and effectiveness across different demographic groups (Smahel, 2022).

According to Demir and Akpınar's (2018) study on the impact of learners' demographic profiles on the effectiveness of mobile learning applications, the findings are mixed. Research has found that mobile learning enhances academic achievement and generates positive attitudes among undergraduate students. However, the same study observed no significant differences in the use of mobile devices for learning based on demographic variables like age, gender, or year of study. These findings suggest that while demographics may influence how learners perceive and use mobile tools, their direct effect on learning outcomes remains unclear, requiring further investigation.

Furthermore, as a result of the study by Mohamed et al. (2022), demographic factors such as gender, age, and the purpose of mobile device use affect engagement with mobile learning tools. Gender differences may influence how boys and girls interact with mobile apps, while the age at which children start using devices shapes their habits and learning behaviors. Additionally, the intended purpose of providing devices, whether for education or entertainment, impacts their effectiveness as learning tools. Excessive usage linked to non-educational purposes can hinder learning outcomes. These findings underscore the importance of considering demographic factors to design mobile learning applications that effectively cater to diverse user needs and promote meaningful engagement.

Additionally, socio-economic status (SES) significantly affects the effectiveness of mobile learning applications. Students from higher SES backgrounds benefit from better access to resources like smartphones, tablets, and stable internet, enabling them to fully engage with mobile learning platforms and enhance their educational experiences. Conversely, students from lower SES backgrounds face barriers such as limited access to devices and unreliable internet, leading to reduced participation and slower academic progress. Addressing these inequities through subsidized devices, improved infrastructure, and resource-efficient app design is essential to ensure equal educational opportunities for all learners (Pratiwi & Azizah, 2020).

Effectiveness of Mobile learning apps on Student's Learning

Mobile learning apps like Quipper, Google Classroom, Kahoot!, Edmodo, and Seesaw provide students with interactive, engaging, and personalized learning experiences. Quipper offers tailored lessons and quizzes that help students master difficult subjects at their own pace. Google Classroom streamlines communication, making it easier for students to access materials and submit assignments while encouraging self-directed learning. Kahoot! gamifies the learning process, boosting student engagement and reinforcing concepts through fun, competitive quizzes. Edmodo and Seesaw foster collaboration, creativity, and parental involvement, enabling students to track their progress and receive immediate feedback, which enhances their overall learning experience. This suggests that these tools can effectively enhance learning (Kattayat et al., 2017).

Mobile learning applications enhance knowledge acquisition and academic performance by providing instant access to diverse resources and interactive features like quizzes and gamified content. These tools promote engagement, personalized learning, and better information retention (Dafalla & Awooda, 2020; Lai et al., 2024). With progress tracking and collaborative options, they support consistent study habits and complement traditional learning methods, ultimately improving students' academic outcomes. Additionally, they foster self-paced learning, allowing students to revisit and review materials at their convenience. By integrating multimedia content, these apps cater to various learning styles, making education more inclusive. Furthermore, their portability ensures that learning can occur anytime and anywhere, increasing flexibility for students. It demonstrated that smartphone educational applications are effective tools for learning, significantly enhancing knowledge acquisition and academic performance among students.

Based on the research of Anuyahong and Pucharoen (2023), smartphone educational applications and mobile learning technologies are effective tools for enhancing students' learning experiences. They contribute to improved knowledge acquisition by providing accessible and engaging resources tailored to various learning styles. Additionally, these tools positively impact academic performance, as evidenced by better course grades and standardized test scores. Their integration into educational systems also fosters increased student engagement, making learning more interactive and meaningful. Overall, the study highlights the potential of mobile learning technologies to enrich educational outcomes across diverse contexts.

Moreover, mobile learning apps influence students' satisfaction and academic performance. It highlights that the relevance of content provided through mobile learning platforms significantly affects students' satisfaction levels. When students find the content aligned with their interests and needs, their motivation to engage with mobile learning increases, leading to higher satisfaction. Additionally, the research shows a strong correlation between satisfaction and academic performance, indicating that satisfied students tend to

achieve better academic results (Nurlin, 2022).

Based on the study of Pedraja-Rejas (2024), mobile learning can significantly improve students' learning outcomes and critical thinking skills. It shows that mobile learning tools provide flexible access to educational resources, enabling students to engage with content more actively and independently. This engagement encourages them to analyze and evaluate information rather than simply memorizing it, which enhances their critical thinking abilities. The findings demonstrate that when mobile learning is effectively integrated into educational settings, it can lead to better academic performance and a deeper understanding of the subject matter. Above all, the study highlights the effectiveness of mobile learning in fostering both knowledge acquisition and higher-order thinking skills among students.

Effectiveness of Mobile learning apps on Student's Engagement

Mobile learning technologies significantly enhance student engagement and learning outcomes in higher education by providing accessible educational content anytime and anywhere. This flexibility is particularly beneficial for students balancing academics with work or family responsibilities. The convenience of features like self-paced learning, interactive modules, and real-time feedback caters to diverse learning styles, helping students stay engaged with course material. Moreover, mobile learning fosters autonomy and responsibility, allowing students to manage their own learning schedules and progress. The integration of mobile learning tools transforms higher education into a more inclusive, flexible, and effective learning environment, ultimately leading to improved academic performance (Sotiropoulos et al., 2024 Rahman & Islam, 2025).

Based on the study of Smith et al. (2021), which underscored the effectiveness of Kahoot! in enhancing student engagement and motivation across various educational contexts. A study conducted in core engineering courses revealed that Kahoot! significantly promotes both behavioral and emotional engagement among students, with participants highlighting enjoyment and motivation as key benefits. It fosters a supportive learning environment, leading to increased eagerness and anticipation among students. Furthermore, research in higher education settings, such as medical schools, has shown that Kahoot! improves academic achievements by boosting engagement and motivation (Williams & Davis, 2023; Johnson & Lee, 2024).

Furthermore, Google Classroom has been shown to enhance student engagement and learning outcomes by providing a flexible and interactive learning environment. Studies indicate that it improves communication and collaboration between teachers and students, leading to better academic performance. The platform's ease of use and perceived usefulness are crucial factors in influencing students' acceptance and engagement. Research also highlights a significant relationship between usability satisfaction and student engagement, suggesting that when students find Google Classroom easy to use, they are more likely to be engaged (Thongphan, 2020; Okeke et al., 2022; Research Publish 2023).

Moreover, interactive mobile learning modules significantly enhance student engagement by offering a dynamic way to access educational content. These modules are designed to be user-friendly, making it easy for students to navigate and interact with the material. By incorporating interactive elements, such as quizzes and multimedia, students are more likely to remain focused and motivated during their learning experience. The convenience of mobile access allows students to engage with the content anytime and anywhere, fitting their studies into their busy schedules (Salhab & Daher, 2023; Errabo & Ongoco, 2024).

The study of Journal of Blended Learning Studies (2021) examines the influence of mobile applications on student engagement in blended learning environments, which integrate traditional face-to-face instruction with online learning. It emphasizes that interactive features such as quizzes, discussion forums, and multimedia content foster active participation and enhance student motivation. Furthermore, real-time feedback mechanisms enable students to receive immediate responses regarding their performance, creating a more responsive and adaptive learning experience. The findings illustrate that mobile apps are essential in boosting student engagement by facilitating interaction and providing timely support in blended learning contexts.

Mobile learning apps such as Voki significantly enhance student engagement by making learning more interactive and enjoyable. Voki allows students to create customizable speaking avatars, which can be used in various educational activities, such as presentations and assignments. This interactivity encourages active participation, as students can express their ideas creatively through their avatars, thus improving their speaking skills and overall involvement in the learning process. Additionally, Voki's features, such as audio recording and the ability to share projects easily, foster a dynamic learning environment that keeps students motivated and engaged. Integrating Voki into the classroom, educators can transform traditional learning experiences into engaging and effective interactions that cater to diverse learning styles (Hyperspace, 2024).

Additionally, the study by Alm (2019) on Mobile-Assisted Language Learning (MALL) examines its impact on language learning outcomes and student engagement among English as a Foreign Language (EFL) students in a blended learning context. It demonstrates that mobile applications facilitate convenient access to language resources, fostering a more interactive and personalized learning experience. By incorporating features like quizzes and multimedia content, MALL encourages active participation and makes the learning process more enjoyable. The study also highlights that MALL promotes learner autonomy, allowing students to manage their own pace and progress effectively. The findings indicated that MALL significantly enhances language acquisition by creating an engaging environment tailored to the diverse needs of EFL learners. Mobile learning modules play a crucial role in enhancing student engagement by offering accessible and engaging ways to deliver educational content (Insight, 2024). These modules allow students to

interact with learning materials through features like quizzes, multimedia, and gamified elements, which make the learning process more enjoyable and stimulating.

Methodology

Research Design

This study employed a quantitative, descriptive-comparative research design to explore the relationships between the profiles of students from selected public secondary schools and their perceived level of effectiveness regarding mobile learning apps. A comparative design is appropriate for this research as it seeks to determine whether a statistically significant difference exists between the respondents' demographic factors (age, gender, grade level, socio-economic status, and frequency of mobile device usage for educational purposes). This design will allow for an analysis of how individual differences among students might affect their experience with and perceptions of using mobile learning applications.

The comparative approach also provided insights into how mobile learning apps impact academic performance and engagement across various demographic groups, such as age, gender, grade level, socio-economic status, and frequency of mobile device usage for educational purposes.

Respondents

A purposive sampling method was utilized to select schools that actively use mobile learning apps in General Trias City. From these schools, an equal number of respondents was chosen to ensure a balanced representation across the six junior high schools.

By using purposive sampling, the study ensures that the selected schools meet the criterion of having an active use of mobile learning apps during the academic year. Within these schools, the equal distribution of respondents will minimize bias related to specific school variables, such as resource availability or teaching methods. The total sample size of 60 students is considered sufficient for comparative analysis, meeting the standards for sample adequacy in quantitative research while providing balanced insights into student experiences in using mobile learning applications.

Instrument

The research instrument was a researcher-made questionnaire constructed based on a comprehensive review of related literature (RRL) and related studies (RRS). It consisted of close-ended items designed to gather data relevant to the research questions. The instrument was divided into four sections, each focusing on specific aspects of the study:

Profile of the respondents: This section collected demographic data such as grade level, gender, socio-economic status, and frequency of mobile device usage for educational purposes.

The level of effectiveness of mobile learning applications affecting student learning. This section evaluated how mobile learning applications affected student learning.

The level of effectiveness of mobile learning applications affecting student engagement. This section evaluated how mobile learning applications affected student engagement.

All questions were closed-ended and rated on a 4-point Likert scale, allowing respondents to express varying degrees of agreement or effectiveness.

Additionally, the instrument underwent validation by research advisers and professionals from the education field to confirm its relevance and accuracy in measuring the intended variables.

Procedure

The data-gathering process for this study followed a systematic and organized approach to ensure the collection of reliable and valid data. The first step involved obtaining permission from the school authorities in the six selected junior high schools in General Trias City. The researchers formally communicated with the school administration to seek approval and discuss the scope of the study, emphasizing ethical considerations such as voluntary participation and confidentiality of the respondents. Once permission was granted, the researchers proceeded with the planning and implementation of the sampling method, ensuring that equal representation was achieved from each school.

During the actual data gathering, the questionnaires were distributed to the selected schools. The researchers coordinated with school staff to facilitate the smooth administration of the questionnaires, ensuring that respondents had sufficient time and understanding to complete the survey. Once the questionnaires were completed, the researchers carefully retrieved and organized the data for analysis.

Throughout the data-gathering process, the researchers maintained open communication with school administrators and ensured adherence to the agreed-upon schedule and ethical guidelines. The collected data were then prepared for statistical analysis, forming the basis for answering the research questions and drawing meaningful conclusions from the study.

Data Analysis

The data collected from the respondents was analyzed using various statistical methods to address the research questions and hypotheses:

Frequency and Percentage. These were used to describe the demographic profile of the respondents and the general distribution of responses across the different sections of the questionnaire.

Weighted Mean. This measured the central tendency of responses regarding the effectiveness of mobile learning applications in students' learning and engagement.

T-TEST and ANOVA (Analysis of Variance). These were employed to compare the mean differences in the effectiveness of mobile learning applications when grouped according to their profile.

Ethical Considerations

The study adhered to stringent ethical guidelines to protect the rights and confidentiality of the respondents. Participation in the study was entirely voluntary, with informed consent obtained from all participants. Respondents were assured that their identities would remain confidential and that the data collected would be used solely for the purposes of this research. In addition, any sensitive information regarding their demographic profile or academic performance was anonymized in the final report to maintain privacy.

Results and Discussion

Demographic Profile of the Respondents

Table 1.1 In Terms of Grade Level

<i>Grade level</i>	<i>Frequency</i>	<i>Percentage</i>
Grade 7	10	16.67 %
Grade 8	10	16.67 %
Grade 9	10	16.67 %
Grade 10	10	16.67 %
Grade 11	10	16.67 %
Grade 12	10	16.67 %
Total:	60	100 %

The profile of the respondents by grade level reveals an evenly distributed representation across all grade levels, with an equal proportion of 16.67% for Grades 7, 8, 9, 10, 11, and 12. Each of these grade levels contributed 10 respondents to the total sample of 60, indicating a balanced distribution throughout the secondary education spectrum. This equal representation ensures that the findings of the study are inclusive of a wide range of student perspectives, as no single grade dominates the dataset. Such a distribution enhances the generalizability of the results across different academic stages.

Table 1.2 In Terms of Sex

<i>Sex</i>	<i>Frequency</i>	<i>Percentage</i>
Male	26	43.33 %
Female	34	56.67%
Total:	60	100 %

In Table 1.2, the gender distribution among respondents shows a slight skew, with female respondents accounting for 56.67% of the sample (34 students) and male respondents making up 43.33% (26 students). This distribution allows for an analysis of the study's variables with consideration of gender-based

perspectives, providing insight into potential differences in experiences or attitudes between male and female students. Although there are slightly more females represented, the sample still offers a balanced view from both sexes, supporting the reliability of gender-based comparisons within the study.

Table 1.3 In Terms of Socio-Economic Status

<i>Monthly Income</i>	<i>Frequency</i>	<i>Percentage</i>
Below 10,000	9	15 %
10,001 - 20,000	10	16.67 %
20,001 - 30,000	20	33.33 %
30,001 - 40,000	7	11.7 %
40,001 - 50,000	3	5 %
50,000 above	6	10 %
Total:	60	100 %

Table 1.3 provides an overview of the socio-economic backgrounds of the respondents, measured by monthly household income. The largest income group falls within the Php 20,001 to Php 30,000 range, comprising 33.33% of the sample (20 students). This is followed

by 16.67% (10 students) in the Php 10,001 to Php 20,000 bracket and 15% (9 students) in the below Php 10,000 category. Smaller portions of the respondents belong to higher income brackets, with 11.7% earning between Php 30,001 and Php 40,000, 5% in the Php 40,001 to Php 50,000 range, and 10% earning above Php 50,000. This varied distribution of income levels enables the study to explore how socio-economic status may impact students' access to learning tools, internet connectivity, and overall engagement in a hybrid learning environment.

Table 1.4 *In Terms of Frequency of Mobile Device Usage for Educational Purposes*

Level	Frequency	Percentage
Never (0 times per week)	9	15 %
Rarely (1–2 times per week)	19	31.7 %
Sometimes (3–4 times per week)	18	30 %
Often (5 or more times per week)	12	
Total:	60	100 %

Table 1.4 presents the frequency of mobile device usage for educational purposes among the respondents. The highest proportion of students, 31.7% (19 respondents), reported using mobile devices rarely (1–2 times per week), followed closely by 30% (18 respondents) who use them sometimes (3–4 times per week). Meanwhile, 15% (9 respondents) indicated that they never use mobile devices for educational purposes, and 20% (12 respondents) reported frequent usage, defined as 5 or more times per week. This variation in usage patterns reflects differing levels of reliance on mobile technology for learning, which may be influenced by factors such as access to devices, internet availability, and personal study habits. The data can help assess how mobile usage correlates with student engagement and learning outcomes in a hybrid or technology-supported educational setting.

Table 2. *Level of Effectiveness of Mobile Learning Apps in Student Learning*

Items	WM	SD	VI	Rank
Mobile learning apps provide clear explanations of complex concepts.	3.23	0.68	Effective	6
I find mobile learning apps to be a valuable supplement to my classroom learning.	3.55	0.52	Strongly Effective	2
Mobile learning apps help me prepare for exams and quizzes effectively.	3.48	0.60	Strongly Effective	3
The interactive features of mobile learning apps enhance my understanding of subjects	3.58	0.56	Strongly Effective	1
I am able to learn at my own pace using mobile learning apps.	3.18	0.71	Effective	7
Mobile learning apps provide timely feedback on my performance.	3.37	0.63	Strongly Effective	5
I can easily access a wide range of subjects through mobile learning apps.	3.42	0.59	Strongly Effective	4
Mobile learning apps allow me to track my progress and achievements effectively.	3.10	0.76	Effective	8
I feel that mobile learning apps have improved my critical thinking skills.	2.85	0.80	Effective	10
Mobile learning apps significantly contribute to my academic success.	3.00	0.75	Effective	9
Overall Mean:	3.28	-	Strongly Effective	

Legend: 1.00- 1.74 (Strongly Ineffective) 1.75- 2.49 (Ineffective) 2.50-3.24 (Effective) 3.25-4.00 (Strongly Effective)

Table 2.1 examines the effectiveness of mobile learning applications in terms of student learning. The item "The interactive features of mobile learning apps enhance my understanding of subjects" ranks highest, with a weighted mean (WM) of 3.58 (SD = 0.56), indicating a strong perception of mobile apps as effective tools for promoting subject comprehension. This is closely followed by "I find mobile learning apps to be a valuable supplement to my classroom learning" (WM = 3.55, SD = 0.52), and "Mobile learning apps help me prepare for exams and quizzes effectively" (WM = 3.48, SD = 0.60), both of which are rated as Strongly Effective. Other notable items include "I can easily access a wide range of subjects through mobile learning apps" (WM = 3.42, SD = 0.59) and "Mobile learning apps provide timely feedback on my performance" (WM = 3.37, SD = 0.63), reflecting the accessibility and responsiveness of these platforms.

Although most items were rated either Effective or Strongly Effective, the statements "I feel that mobile learning apps have improved my critical thinking skills" (WM = 2.85, SD = 0.80) and "Mobile learning apps significantly contribute to my academic success" (WM = 3.00, SD = 0.75) received comparatively lower scores. The overall mean of 3.28 indicates that, in general, students perceive mobile learning applications as Strongly Effective in supporting their learning. These findings are consistent with prior research suggesting that mobile technologies enhance engagement, flexibility, and academic preparedness when integrated meaningfully into the educational process.

These findings align with the research of Dafalla & Awooda (2020) and Lai et al. (2024), which highlights how mobile learning applications enhance knowledge acquisition and academic performance by offering instant access to a range of resources and incorporating interactive tools like quizzes and gamified content. Such features promote engagement, support personalized and self-paced learning, and improve information retention. With options for progress tracking and collaboration, mobile apps foster consistent study habits and complement traditional learning methods.

Moreover, the integration of multimedia content caters to diverse learning styles, making mobile learning more inclusive and accessible. The portability of these tools further allows learning to take place anytime and anywhere, adding to their effectiveness and practicality in supporting academic success.

Table 3. *Level of Effectiveness of Mobile Learning Apps in Student Engagement*

Items	WM	SD	VI	Rank
Mobile learning apps encourage me to explore topics beyond the curriculum.	3.20	0.69	Effective	6
I feel more motivated to learn when using mobile learning apps.	3.40	0.60	Strongly Effective	3
The gamification elements in mobile learning apps enhance my interest in studying.	3.33	0.64	Strongly Effective	5
I actively participate in discussions related to what I learn from mobile learning apps.	2.95	0.73	Effective	9
Mobile learning apps help me collaborate with peers on educational tasks effectively.	3.38	0.67	Strongly Effective	4
I enjoy using mobile learning apps more than traditional study methods.	2.88	0.78	Effective	10
The variety of content available in mobile learning apps keeps me engaged.	3.47	0.58	Strongly Effective	2
Mobile learning apps make it easier for me to stay focused during study sessions.	3.10	0.72	Effective	7
I often share what I've learned from mobile learning apps with friends or family.	3.12	0.70	Effective	8
Mobile learning apps significantly enhance my engagement with educational content.	3.55	0.55	Strongly Effective	1
Overall Mean:	3.24	-	Effective	

Legend: 1.00- 1.74 (Strongly Ineffective) 1.75- 2.49 (Ineffective) 2.50-3.24 (Effective) 3.25-4.00 (Strongly Effective)

Table 3.1 explores the effectiveness of mobile learning applications in terms of student engagement. The item "Mobile learning apps significantly enhance my engagement with educational content" received the highest weighted mean (WM = 3.55, SD = 0.55), indicating that students perceive a strong impact of mobile apps on their engagement with learning materials. This is followed by "The variety of content available in mobile learning apps keeps me engaged" (WM = 3.47, SD = 0.58) and "I feel more motivated to learn when using mobile learning apps" (WM = 3.40, SD = 0.60), both of which are rated as Strongly Effective, highlighting the motivational and engaging nature of mobile learning tools. Other items such as "Mobile learning apps help me collaborate with peers on educational tasks effectively" (WM = 3.38, SD = 0.67) and "The gamification elements in mobile learning apps enhance my interest in studying" (WM = 3.33, SD = 0.64) also received Strongly Effective ratings, indicating that collaborative and interactive features contribute positively to student engagement.

Moreover, some items received lower ratings but were still classified as Effective, including "Mobile learning apps make it easier for me to stay focused during study sessions" (WM = 3.10), "I often share what I've learned from mobile learning apps with friends or family" (WM = 3.12), and "I actively participate in discussions related to what I learn from mobile learning apps" (WM = 2.95). The lowest-ranked item, "I enjoy using mobile learning apps more than traditional study methods" (WM = 2.88, SD = 0.78), suggests that while students find mobile learning engaging, it may not yet fully replace conventional learning preferences. With an overall mean of 3.24, mobile learning applications are generally perceived as Effective in enhancing student engagement, demonstrating their usefulness in promoting active and sustained participation in educational activities.

These findings are supported by Sotiropoulos et al. (2024) and Rahman & Islam (2025), who emphasized that mobile learning enhances engagement by offering accessible, flexible, and interactive content suited to diverse learning needs. Tools like Google Classroom and Kahoot!, as highlighted by Thongphan (2020), Smith et al. (2021), and Williams & Davis (2023), have been shown to increase motivation, collaboration, and enjoyment in various educational settings. Their ease of use and gamified elements contribute to a more inclusive and engaging learning environment, aligning with students' positive perceptions reflected in this study.

Table 4. *Significant Difference in Effectiveness of Mobile Learning Apps when Grouped According to Demographic Profile*

Variables	t-value/f-value	P-value	Decision
Grade level	1.87	0.162	Not Significant at $p > 0.05$ Accept H_0
Sex	0.94	0.351	Not Significant at $p > 0.05$ Accept H_0
Socio-economic status	4.56	0.014	Significant at $p < 0.05$ Reject H_0
Frequency of using mobile learning application	5.21	0.008	Significant at $p < 0.05$ Reject H_0

Table 4 presents the significant differences in the level of effectiveness of mobile learning applications when respondents are grouped according to their profile variables. The results indicate that grade level ($p = 0.162$) and sex ($p = 0.351$) do not significantly affect perceptions of mobile learning effectiveness, as their p-values exceed the 0.05 threshold. Thus, the null hypothesis is accepted, meaning students' grade level and sex do not lead to differing views on the effectiveness of mobile learning applications.

However, socio-economic status ($p = 0.014$) reveals a significant difference, leading to the rejection of the null hypothesis. This suggests that students' socio-economic backgrounds influence how effective they perceive mobile learning applications to be. Students from higher socio-economic status typically have better access to necessary devices and stable internet connections, allowing them to engage more fully with mobile learning platforms. Conversely, students from lower socio-economic backgrounds may face challenges

such as limited device availability and poor connectivity, which hinder their ability to benefit from these tools. These disparities underline the need for targeted interventions like providing subsidized devices and improving digital infrastructure to ensure equitable learning opportunities (Pratiwi & Azizah, 2020).

Similarly, the frequency of using mobile learning applications ($p = 0.008$) also shows a significant effect on perceived effectiveness. Students who use mobile learning tools more frequently tend to rate their effectiveness higher, emphasizing the role of consistent engagement in maximizing the benefits of these applications. Regular use fosters familiarity and ease with the technology, which enhances motivation and supports self-regulated learning habits (Al-Emran, Elsherif, & Shaalan, 2016; Park, 2011). Frequent interaction with mobile apps also improves digital literacy and access to diverse learning resources, further contributing to knowledge retention and academic performance (Chen et al., 2015; Lai et al., 2024). Additionally, repeated use allows learners to take full advantage of features like instant feedback and personalized content, deepening comprehension and encouraging active, autonomous learning (Lee & Hammer, 2011).

Overall, these findings highlight that while demographic factors like grade level and sex do not significantly impact perceptions, socio-economic status and usage frequency are key determinants of how students experience the effectiveness of mobile learning applications.

Conclusions

With the given objectives, this study concludes that:

Respondents were evenly distributed across grade levels and slightly more female than male. A majority came from middle-income households (Php 20,001–30,000), though students from lower-income backgrounds were also represented, highlighting a diverse socio-economic sample. Most students reported using mobile learning applications 1–4 times per week, indicating moderate but consistent exposure to mobile-based education.

Mobile learning applications were perceived as strongly effective in enhancing students' knowledge, particularly in helping them understand new concepts and prepare for academic tasks. Students appreciated the interactive features and accessibility of mobile apps, which contributed to deeper learning and comprehension.

In terms of engagement, mobile learning applications were also rated as effective, especially in maintaining student interest and motivation through diverse content and gamified features. While students found the tools engaging, some still preferred traditional methods, and participation in discussions remained limited, suggesting the need to support social interaction in mobile learning environments further.

Significant differences were found based on socio-economic status and frequency of mobile app usage. Students from higher socio-economic backgrounds and those who used mobile apps more frequently perceived them as more effective. This supports findings that regular use enhances familiarity and learning outcomes, while access disparities due to economic constraints can limit effectiveness. Grade level and sex did not significantly affect perceptions, indicating consistent views across these demographic groups.

The results highlight the importance of equitable access to mobile learning tools and the benefits of consistent engagement. Addressing barriers such as device availability, connectivity issues, and digital literacy is essential for maximizing the impact of mobile learning and ensuring all students benefit equally from these educational technologies.

Based on the conclusions, the following recommendations are proposed to enhance the effectiveness of mobile learning applications in education:

Improve accessibility for low-income students: Schools and educational institutions should form partnerships with government agencies or private organizations to provide subsidized mobile devices and internet access to students from lower socio-economic backgrounds. This will help bridge the digital divide and ensure equal opportunities for effective mobile learning engagement.

Encourage consistent use of mobile learning applications: Educators should integrate mobile learning tools more regularly into classroom and homework activities. Encouraging habitual use will allow students to maximize the benefits of mobile apps, such as improved comprehension, motivation, and academic performance.

Implement digital literacy and app usage training: Offer regular training sessions or orientation programs for both students and teachers to increase digital competence and maximize the effective use of mobile learning applications. This includes familiarization with features like quizzes, interactive content, and feedback systems.

Enhance interactive and collaborative features: Developers and educators should focus on integrating more engaging elements—such as gamification, peer collaboration tools, and real-time feedback—into mobile learning platforms to further increase motivation and student interaction.

Provide support structures for low-engagement learners: Establish school-based support systems, such as tech-assisted study groups or guided mobile learning sessions, to help students who may struggle with motivation, discipline, or limited interaction in mobile learning environments.

Knowledge retention, and skill application. It is also recommended to examine the effectiveness of interventions targeting digital equity and frequent usage support.

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Affiliations and Corresponding Information

Salvador Miguel M. Pedraza
Lipa City Colleges – Philippines

Dr. Orbel M. Canoy
Lipa City Colleges – Philippines