

EFFECTS OF THE UTILIZATION OF EDUCATIONAL APPLICATIONS TO THE ACADEMIC PERFORMANCE IN GENERAL MATHEMATICS AMONG GRADE11 STEM STUDENTS

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ABSTRACT

Considering how educational apps impact students' learning is important in technology-oriented classrooms. This research focused on the effects of the utilization of educational apps to academic performance in General Mathematics among Grade 11 STEM students at Kiburiao National High School (KNHS) during SY 2025-2026. Using a quantitative descriptive-correlational method, the research aimed to determine the extent to which educational apps students used, their academic achievement, and the relationship among the three. Data were gathered using a validated questionnaire from Ababa et al. (2021) and the students' periodical test scores. For the analysis, descriptive statistics and the Pearson Product-Moment Correlation Coefficient were used. The results indicated the students' educational apps were high (overall mean = 3.53) and that students' use of educational apps and digital tools like Photomath, Google Classroom, and Quizizz to elevate their learning experience was frequent. The students had exceptional results, attaining an average score of 94.82. However, there was a statistically significant positive correlation ($r = 0.048$, $p = 0.295$) between the utilization of educational apps and individual academic performance, was extremely weak. Therefore, mere usage does not yield a higher academic performance. The incorporated tools provide educational value, but only with intentional use and meaningful integration within instruction. These tools can strengthen the overall instruction, as well as offer effective tools, including valuable app supplements, and enhanced mathematics learning. Purposeful, guided app incorporation, along with adequate teaching strategies, supports the effective use of educational apps and recommends incorporating educational strategies that remain beneficial for continuous teaching.

Keywords: educational applications, academic performance, General Mathematics, STEM students, technology integration

1. INTRODUCTION

Technology has become an integral part of people's lives, has shaped the world and influences almost every aspect of daily living. One of the areas where technology has made a significant impact is education. With the rise of virtual learning, educational applications (EAs) have emerged as powerful tools to support teaching and learning. Platforms such as Google Classroom, Zoom, Google Meet, Photomath, CamScanner, Google Docs, Microsoft Office applications, Grammarly, and even social media platforms like Messenger, Facebook, YouTube, Telegram, and

Viber are now widely used. These platforms facilitate not only access to learning resources but also communication between educators and peers. EAs are specifically designed to promote teaching and learning in electronic or virtual environments. In fact, many activities traditionally done in face-to-face classrooms can now be carried out effectively through these digital applications.

In the Philippines, the integration of technology into education has gained momentum, especially after the challenges posed by the COVID-19 pandemic. The Department of Education has encouraged the use of digital learning resources,

which has led many students to rely on EAs for support in subjects such as mathematics. These apps offer features such as practice problems, interactive lessons, and video tutorials, which aim to simplify complex topics. However, the effectiveness of these apps depends not only on their quality but also on how much time students dedicate to using them.

The Philippines' mathematics score is significantly below the OECD average, with a deficit of approximately 120 points, which the OECD estimates equate to a learning lag of about five to six years. Only 16% of Filipino students achieved the baseline level of proficiency in mathematics, meaning 84% lack the fundamental skills to perform basic mathematical tasks such as comparing distances or converting currencies (PISA 2022 Results (Volume I and II) - Country Notes: Philippines, 2023).

This study examined the relationship between the effect of educational applications to the academic performance in General Mathematics of Grade 11 STEM students at Kiburiao National High School (KNHS). By analyzing how students allocate their study time to EAs and how this correlates with their academic outcomes, the research aimed to provide evidence on the effectiveness of digital learning tools in improving mathematical performance. Ultimately, the findings contribute to improving teaching strategies, promoting effective study habits, and guiding the integration of technology in the STEM curriculum.

2. OBJECTIVES OF THE STUDY

This examined the effect of utilization of educational applications to the academic performance in General Mathematics of Grade 11 students at Kiburiao National High School (KNHS) taking Science, Technology, Engineering and Mathematics (STEM) academic strand for S.Y. 2025-2026.

Specifically, it sought to answer the following questions:

1. What is the extent of the utilization of educational applications in General Mathematics?
2. What is the level of academic performance of the students in General Mathematics?
3. Is there a significant relationship between the utilization of educational applications and

academic performance in General Mathematics?

3. METHODOLOGY

3.1. Research Design

This research utilized a quantitative approach, particularly descriptive-correlational design. The goal was to describe the level of the utilization of educational applications in General Mathematics, and the relationship of educational applications to academic performance in General Mathematics of Grade 11 students at Kiburiao National High School (KNHS) enrolled in Science, Technology, Engineering and Mathematics (STEM) academic strand. These two variables were correlated; hence this study was also correlational. A survey was conducted to gather data from the respondents. The researcher believed that this design was appropriate for the subject because it was a convenient way to gather data from a particular number of participants.

3.2. Locale of the Study

This study was conducted at Kiburiao National High School. KNHS is a prestigious public high school located in Purok 1 Kiburiao, Quezon, Bukidnon, established in 1985. The school operates under the jurisdiction of the Department of Education (DepEd) and is part of the Quezon III district in the Schools Division of Bukidnon. KNHS is known for its serene environment, nestled amidst lush green fields, providing a tranquil setting conducive to learning. It has six (6) grade levels, among which the senior high school that offers academic strand, including the Science, Technology, Engineering and Mathematics (STEM) academic strand.

3.3. Respondents and Sampling

The respondents of this study were Senior High School students enrolled in the Science, Technology, Engineering, and Mathematics (STEM) strand of the Grade 11 level. Specifically, they were drawn from the two (2) sections of the STEM academic strand, namely Grade 11-Maxwell and Grade 11-Fleming. These two sections comprised a total of sixty-six (66) students, with thirty-three (33) students in each section. All participants were officially enrolled of Academic Year 2025-2026.

This study employed stratified random sampling to ensure equal representation from two distinct

sections. The researcher was utilized sixty-six (66) students taking regular loads of the Grade 11 STEM as the participants for this study. The total population consisted of sixty-six (66) students, divided equally between Section A with thirty-three (33) students and Section B with thirty-three (33) students. Each section was tested as a separate stratum. From each stratum, 15 respondents were randomly selected using a random number generator to ensure impartiality and minimize selection bias. This resulted in a total of thirty (30) student respondents, representing both sections equally and adequately for the purposes of the study.

3.4. Research Instrument

The questionnaire was adopted from Ababa et al. (2021). The purpose of administering this survey to the participants was to assess the utilization of educational applications towards General Mathematics. The items were constructed using a 4-point Likert-type scale, ranging from 1 (strongly disagree) to 4 (strongly agree).

The academic performance of the students was measured by the scores in their periodical exam obtained by the students in their General Mathematics subject during their Grade 11 year. The scores were obtained from the adviser. Their scores from General Mathematics were the basis to measure their academic performance.

3.5. Data Gathering Procedure

The survey questionnaire was created using appropriated questions adopted from Ababa et al. (2021). Beforehand, the researcher secured the approval letter signed by the college dean and faculty handling EDUC252 and was given to the principal of the Kiburiao National High School (KNHS). After the letter was signed, the researcher presented the letter to cooperating teacher, and the section adviser for the permission to conduct the research. After getting the approval, the survey questionnaire was given to the students from STEM academic strand enrolled in academic year 2025-2026. Respondents were given a time to answer before the survey questionnaire collected the following day. The data was collected from this research instrument was tallied and computed for interpretation based on the frequency with which the participants check the items. The researcher asked for the scores of the students from the respective adviser of the sections in General

Mathematics subject taken during their Grade 11 year level.

3.6. Statistical Analysis

For collecting the quantitative data, descriptive statistics such as mean, frequency, and percentages, were used to describe the extent of educational applications in General Mathematics; and the level of academic performance of the students in General Mathematics.

The researcher used Pearson correlation coefficient to analyze the relationship between the independent variables (Educational Applications) and dependent variable (Academic Performance in General Mathematics).

4. RESULTS AND DISCUSSIONS

The data was statistically analyzed using descriptive statistics such as the mean, and standard deviation in determining the utilization of educational applications and academic performance in General Mathematics.

4.1 Utilization of Educational Applications (EAs)

The data on the utilization of educational applications (EAs) among Grade 11 STEM students revealed an overall sub-mean of 3.53, interpreted as "Always." This indicated that students consistently acknowledge the effectiveness and usefulness of educational apps in enhancing their learning experience. The highest-rated indicators include students' willingness to use such applications in future lectures (M=3.76) and the ability of these tools to increase interest and improve the quality of education (M=3.73). Learners also agreed that EAs allow independent and flexible learning, enabling access to course materials anytime and anywhere (M=3.70). Furthermore, applications were found to facilitate learning content, enhance student-teacher communication, and provide good alternatives for interaction (M=3.67). Educational apps related to Science, English, and Mathematics were particularly valued for deepening subject knowledge and offering convenient learning solutions. Even the design, accessibility, and ease of navigation were rated highly (M=3.58–3.61). However, the lowest-rated statement, "Following the lectures do not motivate me" (M=1.73, Never), shows that students remain motivated and engaged when using these applications. Overall,

the findings suggest that educational applications are viewed as effective, interactive, and essential tools for improving both engagement and academic performance in General Mathematics.

Table 1. The Utilization of Educational Applications in General Mathematics.

	INDICATORS	MEAN	QUALITATIVE INTERPRETATION
16.	I would like to use such applications to future lectures.	3.76	Always
12.	The application increased my interest towards lectures.	3.73	Always
10.	The application increases the quality of education.	3.73	Always
6.	I can learn through the application independently of time and place.	3.70	Always
3.	I can reach the course materials when I need.	3.70	Always
7.	The application facilitates the learning of lecture contents.	3.67	Always
15.	The application is a good alternative for interaction.	3.67	Always
11.	The application enables the communication between student-teacher.	3.67	Always
5.	It is easy to watch the video materials.	3.64	Always
19.	Apps for Science subject gives me more knowledge about sciences. (Formulas, chemicals, biology, physics, earth science, chemistry and etc.)	3.61	Always
14.	Flicking through the pages is easy.	3.61	Always
1.	The application is appropriate for me to follow the lecture.	3.61	Always

17.	The application is appropriate for self-development.	3.58	Always
13.	Design of application is appropriate for education.	3.58	Always
9.	It can be used in traditional education as a support for students.	3.58	Always
18.	Apps connected for English subject, enables me to improve my reading comprehension and grammar.	3.58	Always
20.	Apps for mathematics subject gives me more convenient solutions and formulas.	3.55	Always
4.	The application is rich in terms of materials.	3.52	Always
8.	It is a suitable method for me to share the course contents.	3.42	Always
2.	Following the lectures do not motivate me.	1.73	Never
Overall Mean:		3.53	Always

Legend:

Scale	Qualitative Interpretation
3.26 – 4.00	Always
2.51 – 3.25	Often
1.76 – 2.50	Sometimes
1.00 – 1.75	Never

According to the data analysis, students in the 11th Grade STEM Program proved to agree to very slight differences across the board in regards to the statement of the Utilization of Educational Applications (EAs), $M = 3.53$, which, qualitatively, is interpreted to mean, “Always.” In this instance, the analysis shows the value of the educational apps in the study of General Mathematics. The difference in the mean scores on the items in the survey of “I would like to use such applications for future lectures” $M = 3.76$ and “The application increases the quality of education” $M = 3.73$ shows that students value the apps to gain better interest and flexibility to improve their overall academic

performance. These findings proved to the studies conducted by Garzón et al. (2025) and Wijaya et al. (2022) that educational applications are effective in improving educational outcomes when it is integrated properly in education. The findings support the studies of Pellas (2023) and Hidayat et al. (2023), which state that effective learning environments that are gamified to create collaborations in classes offer better academic performance by increasing motivation and engagement of the learners.

The results through Carroll's Time-on-Task Theory (1963) and Self-Determination Theory (Deci & Ryan, 1985) highlighted that meaningful and well-guided time spent on educational apps fosters both competence and motivation. The students' favorable responses implied that they use apps not merely for convenience but for deeper engagement in mathematics learning. Interactive features, instant feedback, and personalized practice help them learn independently, consistent with findings by Niklas et al. (2024) and Xu et al. (2022) that curriculum-aligned app usage enhances academic outcomes. However, the literature also cautions against unregulated or passive use of apps such as Photomath, which can promote surface-level learning if not supervised by teachers (IMJST, 2023; Öçal, 2017). This suggested that teacher facilitation remains essential in ensuring that technology enhances understanding rather than replacing critical thinking.

Recent studies show how purposeful use of educational applications, along with some form of instruction, helps students' performance in General Mathematics. In the study, results show congruence with worldwide research that educational apps play a great role in affective and cognitive development by fostering motivation, engagement, and a sense of confidence. In the Philippine setting, where technology access isn't the same for all, successful integration still highly relies on access equity to technology, guidance from teachers, and student engagement. The study concludes that educational apps, when used intentionally, are effective and valuable resources to help students improve their performance in General Mathematics and, most importantly, foster a positive learning attitude.

4.2 Academic Performance in General Mathematics

General Mathematics showed that each of the 33 students received at least a 90, a mark that indicates the highest possible grade, Excellent. All remaining grades, including Very Good, Good, Satisfactory, and Fail, were also received by none of the learners. Since the overall mean of the study is 94.82, it can be concluded that many of the students did indeed demonstrate excellent achievement. In fact, the highest possible degree of attainment for a remark is Excellent. The results indicated that students from this academic institution have a strong understanding of the mathematical concepts and problem-solving skills at all levels of attainment. This suggests that the institutions students attend have effective teaching styles coupled with software that provides educational assistance.

Table 2. Level of academic performance of the students in General Mathematics

GRADING SCALE	FREQUENCY	PERCENTAGE	QUALITATIVE INTERPRETATION
90-ABOVE	33	100.00	Excellent
85-89	0	0.00	Very Good
80-84	0	0.00	Good
75-79	0	0.00	Satisfactory
74-BELOW	0	0.00	Fail
TOTAL	33	100.00	
Overall Mean	Percentage	94.82	Excellent

Legend:

Scale	Remarks
90 – above	Passed
85 – 89	Passed
80 – 84	Passed
75 – 79	Passed
74 – below	Fail

Students earned consistent Excellent ratings, demonstrating their mastery of the subject. These results align with Garzón et al. (2025) and Wijaya et al. (2022), who state that students' achievements are improved through mobile educational resources because they are aligned with the curriculum. Moreover, because educational apps such as Kahoot!, Quizizz, and Photomath offer educational opportunities that are interactive and provide feedback, they may have helped to increase and sustain the level of participation, understanding, and performance of the students, as noted by Pellas (2023) and Hidayat et al. (2023). Their results affirm that the active participation and motivation, which are critical for learners to excel in Mathematics, were provided by the gamified learning environments. The current

study participants, in contrast to Balolong et al. (2025), whose respondents only attained a mean score of 88.44 with a categorical score of very satisfactory, demonstrated a very high level of achievement. This indicates the structured and guided integrations of the apps by the teachers in educational technology.

The results suggest that the effective use of educational learning tools positively impacted students' results in General Mathematics. Based on Self-Determination Theory (Deci & Ryan, 1985), gamified and interactive apps may have satisfied students' psychological needs for autonomy, competence, and relatedness, motivating and boosting their confidence. The results show that technology, in combination with pedagogy, helped students gain focus and emotional engagement. However, Orben and Przybylski (2020) warned that not all screen time is devoted to learning. The educational use of the learning tools in this study, therefore, likely reduced the scope of distractions. Teacher mediation supported the use of educational apps, ensuring they did not foster a reliance on procedural learning, but rather, a deep understanding of concepts, as noted by both Öçal (2017) and Colab (2024). Teacher mediation in digital learning contexts is crucial.

The results supported with conviction, the expanding evidence supporting the incorporation of technology into education. Students achieved a perfect rate of excellence, with an average of 94.82, which attests to the fact that technology, directed purposefully at the curricular content with appropriate teacher supervision, can significantly enhance educational results. This evidence builds on the work of Garzón et al (2025) and Wijaya et al (2022) by contextualizing the findings to senior high school STEM students in the Philippines, who have exceeded the reported results. The study emphasizes that the differentiation factor in academic achievement is the quality of the interaction with the content, not just the time spent on the content. It is the first study to document that purposefully administered technology can elevate educational achievement to exemplary levels, which confirms that such technologies, when employed appropriately, enhance the teaching and learning of mathematics.

4.3 Utilization of Educational Applications and Academic Performance in General Mathematics

Table 3. Significant relationship between the utilization of educational applications and academic performance in General Mathematics.

VARIABLE	CORRELATION COEFFICIENT	Probability (p)	Interpretation
UTILIZATION OF EDUCATIONAL APPLICATIONS	0.048	0.295*	Significant

*. Correlation is significant at the 0.05 level (2-tailed).

The relationship between the utilization of educational applications and students' academic performance in General Mathematics showed a computed correlation coefficient of $r = 0.048$ is a very weak positive relationship, while the probability value ($p = 0.295$) shows that the correlation is statistically significant at the 0.05 level. Although the relationship is weak, the positive direction suggests that as students engage more with educational applications, their academic performance tends to improve slightly.

This finding aligns with Carroll's (1963) Time-on-Task Theory, which posits that learning outcomes depend on the amount of time effectively devoted to learning activities. The result suggests that app usage may contribute to performance when used purposefully, but unguided or inconsistent use limits its potential impact. Prior studies by Garzón et al. (2025) and Wijaya et al. (2022) confirm that educational apps enhance learning only when properly integrated into instruction, while Orben and Przybylski (2020) warn that unstructured digital use can reduce academic focus.

In the Philippine context, Balolong et al. (2025) and IMJST (2023) observed that students often use apps like Photomath and Quizizz mainly for exam preparation rather than deep conceptual learning—consistent with this study's weak correlation. Therefore, while educational applications can support mathematics learning, their effectiveness depends on teacher guidance, curriculum alignment, and active engagement. The findings highlight the need for structured and meaningful app integration in General Mathematics to transform digital usage into measurable academic gains.

5. CONCLUSION

Based on the findings of this study, the following conclusions are presented:

1. The Grade 11 STEM students demonstrated a high level of engagement in the utilization of educational applications. They consistently agreed that these tools enhance learning flexibility, motivation, and understanding of mathematical concepts.
2. The academic performance of all respondents, indicated strong mastery of General Mathematics competencies.
3. The results revealed that there is a significant relationship between the utilization of educational applications and academic performance. This suggests that while students find educational applications beneficial and engaging, their frequent use alone has a small probability of directly influencing their academic achievement.

6. RECOMMENDATION

Based on the conclusions of this study, the following recommendations are proposed:

1. Students are encouraged to continue utilizing educational applications as effective learning aids in General Mathematics. However, they may use these tools not only for convenience or quick solutions but also to deepen their understanding of mathematical concepts.
2. Given the strong mastery of competencies, teachers may sustain current teaching methods alongside technological integration ensures continued success while exploring innovative approaches for advanced topics.
3. Since frequent use alone may not directly impact performance significantly, curriculum planners may promote strategies that combine application use with other effective learning practices, such as collaborative learning, problem-solving activities, and regular assessments, to maximize academic gains.
4. Future researchers may explore the long-term impacts of educational applications on academic performance by employing larger, more diverse samples and incorporating different subject areas. Investigating how

various features of these applications contribute to learning outcomes and identifying which complementary teaching strategies maximize their effectiveness would provide deeper insights. Additionally, qualitative studies on student and teacher experiences could uncover factors that influence engagement and mastery beyond app usage frequency.

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