Utilization of Photomath Among Grade 7 Junior High School Students

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Abstract: This study investigates the efficacy of introducing the Photomath mobile app into the mathematics curriculum for Grade 7 students. The study takes a mixed-methods approach, combining quantitative analysis and qualitative observations to assess Photomath's impact on students' learning results. The study intends to offer light on how Photomath affects students' mathematical knowledge, problem-solving abilities, and overall academic achievement via the lens of educational technology. The quantitative component entails examining pre- and post-intervention assessment scores and comparing the performance of students who used Photomath to those who used standard teaching methods. In addition, surveys and interviews are used to collect qualitative data about students' perspectives, attitudes, and experiences using Photomath. This dual-method approach enables a more nuanced assessment of the complex implications of incorporating this technology into the Grade 7 mathematics curriculum. The study's findings are intended to contribute not only to scholarly discussions on technology-assisted learning, but also to practical issues for educators and legislators. By investigating the efficacy of Photomath at a specific grade level, the study hopes to shed light on the possible benefits and drawbacks of using similar instructional tools. Finally, this investigation aims to inform evidence-based decisions on the use of technology to improve mathematics teaching for Grade 7 pupils.

Keyword: Photomath, Technology-Assisted Learning, Dual Method Approach.

1. INTRODUCTION

Education is the fundamental thing to achieve in life (Ridhab Sami Abd-Ali, et al., 2020).

According to Rahat Raja (2018), "technology has certainly changed the way we live". In terms of learning, major part of the student has trouble solving math problems meanwhile some students also can-do mathematics effortlessly. Since students find technology a better way to help them, everyone tends to think if they are using technology, specifically apps that will help them with their studies. A common mobile application called PhotoMath enables users to solve mathematical equations by just taking a picture of the issue. It uses optical character recognition (OCR) technology to read the equation and understand it, offering detailed solutions and explanations.

Since it provides an easy and convenient solution to solve math problems, the software has attracted a lot of interest. The potential of Photomath to improve students' comprehension and engagement with mathematics is one argument in favor of its use (Alicia Shaw, 2019). The software can assist students in understanding the underlying ideas and problem- solving techniques by offering step-by-step answers and explanations. This may result in a better understanding and retention of mathematical concepts (Braithwaite & Sprague, 2021).

Photomath can be a useful tool for individual study and self-evaluation (Rojas, et al., 2022). The software allows students to examine their responses and find any errors or misunderstandings they might have. They can spot their areas of weakness and work to strengthen their problem-solving abilities with the aid of this quick feedback.

According to Zain, et al. (2023) we can't deny the fact that we are currently living in a world where technology is advanced, and it would be useless if it will only serve one useless purpose. In connection to the prior studies, the study of Saundarajan, et al, (2020) states that Photomath is a mobile application that is flexible to everyone in which it provides answers with structured solutions.

However, there are also considerations against using Photomath in grade 7 parts excessively (Wendel & Otten, 2022). One worry is that frequent usage of the software can impede the growth of analytical thinking and problem- solving skills. If students depend too much on the app to answer equations, they can have trouble understanding and reasoning through more challenging problems. There is a chance that pupils will use Photomath improperly to avoid studying and applying mathematical ideas (Nurhayati, et al, 2022). They might only rely on the app to offer solutions without fully comprehending the underlying principles, rather than actively engaging with the material and building their own problem-solving skills (Klara, et al.).

Statement of the Problem
The primary goal of this study is to examine the efficacy of using Photomath in grade 7. This study tries to determine the following:
1. Quantify 7th grade students' efficacy and time accuracy in answering arithmetic problems using Photomath against the traditional technique.
2. Determine the number of students who have improved their problem-solving skills after utilizing photomath.
3. Identify the substantial change in math proficiency before and after using photomath.

Scope and Delimitation
This study aims to investigate the efficacy of Photomath on the Academic performance of

Seventh-grade learners in Bayugan National Comprehensive High School, using standardized mathematical tests to assess the learners' solving capabilities. The respondents will be limited to 2 sections with the least scores on the pre-test. Our participants will only be composed of 30 students. The learner's performance grades from the math subject teacher that is visible on the report card will also be excluded and instead the study will focus only on the scores they get on the pre-test and post-test to be given by the proponents.

Significance of the Study
This study ought to determine the efficacy of utilizing Photomath with G7 students and increase a significant positive perspective on utilizing Photomath as a student's source of understanding about mathematics. In particular, the findings of this study are beneficial to the following:

G7 students: Help students see Photomath as a way of learning the process of solving mathematics and not just as a dependable app for a source of answers to a certain mathematical problem.

Parents and siblings: This study will help the parents and siblings with their homework and easily teach them the process of solving mathematics instead of just providing answers to their homework.

Teachers: This will help teachers teach students to focused more on teaching the logic behind problems and developing their problem-solving skills. By doing so, the teachers will help students develop an understanding of and explain the processes used to arrive at solutions from Photomath, rather than remembering and applying a set of procedures.

Future Researchers: The result of this study can be helpful to future researchers as their reference for their future research about utilizing Photomath.

Researchers: This study will help the researcher to determine the efficacy of utilizing photomath on students. The aim of the current study was to examine the students utilizing photomath as their source of knowledge in mathematics. The expected outcome of this study is to know how effective utilizing photomath as the student's source of knowledge.

2. RELATED WORK

The advent of digital technology in education has transformed traditional teaching methodologies, making learning more interactive and accessible. One of the notable advancements in this domain is the development and utilization of mathematical applets. These digital tools are designed to engage students in a more interactive learning experience, breaking down complex mathematical concepts into understandable segments (Jones et al., 2023). Recent statistical analysis reveals a significant improvement in students' mathematical learning, attributing this success to the widespread use of such applets. With an overall usability rating of 72%, these tools have been recognized for their effectiveness in enhancing students' comprehension and mastery of mathematical principles (Zaoral et al, 2023).

Chew, 2024 posited in his work that among the various mathematical apps evaluated, Symbolab emerges as the frontrunner with an 81% success rate in boosting students' understanding. This app specializes in solving mathematical problems and providing step-by-step explanations, making it a valuable resource for students seeking to grasp complex mathematical concepts. Its high success rate underscores its effectiveness in demystifying mathematics, encouraging students to explore and understand topics they might otherwise find daunting. Symbolab's intuitive interface and comprehensive coverage of topics make it an indispensable tool in the mathematical learning process.

Following Symbolab, PhotoMath also shows a significant positive impact, with a 67% success rate. This app allows students to scan printed or handwritten math problems and then provides them with solutions and step-by-step explanations. PhotoMath's ability to bridge the gap between traditional homework and digital learning aids makes it a highly useful tool for students who might struggle with textbook explanations or those who prefer visual learning aids. Its success lies in its simplicity and the instant assistance it offers, making mathematics more approachable to a broader audience.

MathWiz and MathLab, with success rates of 54% and 43% respectively, also contribute positively to the mathematical learning landscape, albeit to a lesser extent compared to Symbolab and PhotoMath. These apps offer unique approaches to learning and problem-solving, catering to different student needs and learning preferences. MathWiz is known for its interactive lessons that gamify learning, making it particularly appealing to younger audiences or those who benefit from a more engaging learning experience. MathLab, on the other hand, focuses on providing a simulated laboratory for mathematical experiments, offering a hands-on learning experience that complements theoretical knowledge. The varied success rates of these apps highlight the diverse nature of student learning preferences and the importance of providing multiple avenues for education.

The successful integration of mathematical applets as stipulated in the work of Yin and Xiang, 2024 into the educational curriculum has proven to be a significant boon for student learning in mathematics. The varied yet substantial success rates of apps like Symbolab, PhotoMath, MathWiz, and MathLab demonstrate the potential of digital tools to cater to diverse learning needs, making mathematics more accessible and understandable. As educators continue to explore and integrate technology in teaching, the future of learning mathematics looks promising, with digital tools playing a pivotal role in shaping innovative and effective educational experiences.

3. METHODOLOGY

Research Design

This study adopted a quasi-experimental quantitative research approach, which focuses on establishing the extent of associations between variables through the analysis of statistical data. This design aims to uncover and interpret relationships among various factors, identifying trends and patterns within the data. The study will not delve into proving causation for observed

patterns; it solely explores data, relationships, and variable distributions. This type of observational research doesn't involve manipulating variables but rather entails their identification and examination in a natural context.

Selection of Participants
The participants will be selected grade seven students enrolled at Bayugan National Comprehensive High School, that is located in Narra Avenue, Poblacion, Bayugan City, Agusan del Sur, for the academic year 2023–2024. Thirty selected Grade 7 students will take a pre-test given by the researchers, and only student with the lowest pre-test scores will take the post-test with the utilization of photomath.

Research Instruments
The primary tool for this study will be a customized questionnaire designed to assess problem-solving skills among Grade 7 students. The questionnaire will present mathematical problems and utilize Photomath for solving these problems. The pre-test and post-test will measure the students problem-solving abilities before and after using Photomath.

Data Gathering Procedure
To determine the effectiveness of using Photomath, this study will use a questionnaire that contains equation-based math problems. Selected Grade 7 students will take the test after first getting permission from the Grade 7 Mathematics teachers, and the two sections with the lowest scores will compete in the finals. The researcher will utilize quantitative research to assess the data once we have gathered all the data.

Data Analysis
The answers obtained from the pre-test of the 7th grade sections will be analyzed by getting the mean of their scores. The two sections that have the lowest score will be tested through a pre- test and a post-test. The data gathered will be analyzed using descriptive statistical analysis to determine the efficacy of utilizing Photomath with G7 students. The researchers will calculate the mean, standard deviation, and standard error mean of the pre-test and post-test to know the difference between the scores of the two sections. Then, the data proceeded to a paired t-test to determine the significance of the data obtained from the two sections.

4. RESULTS AND DISCUSSIONS

Result 1 summarizes an important stage in the evaluation procedure for a thirty-person student selection group. This preliminary assessment functions as a crucial factor that will be used to divide pupils into separate groups later the experimental group and the controlled group for which intervention may be necessary. The pretest's objective is to evaluate the students' foundational knowledge and skills, providing knowledge of their academic status prior to any experimental or intervention policies are put into action. The pre-test scores add up to become crucial in determining how each student's academic experience unfolds.
The controlled group serves as the reference point or standard by which the uncontrolled group is evaluated. It is made up of students who have passed the post-test. To assess the efficacy of

the intervention or experimental measures administered to the uncontrolled group, this group acts as the control variable. Conversely, the experimental group consists of students whose pretest results are over 50% but below 50%, and just one kid out of the thirty received a perfect score.

These people have a range of academic ability, and they are chosen to participate in certain interventions or experimental settings that are intended to improve their learning results. The decision was made with the intention of determining how well Photomath can be used to improve the academic performance of learners in Grade 7 in this specific class. It is important to note that pupils are designated for intervention if their pretest scores are both above and below the 50% criterion. To address their academic issues and close the gaps in their current understanding, this subgroup needs more support and focused interventions.

This pretest discussion's main objective is to provide an organized framework for later interventions and experimental designs. Teachers and researchers can better address the specific needs of each group by grouping students according to their pretest results. This allows for a more sophisticated and successful approach to academic growth. Frequent tracking and assessment of each group's results will provide insightful information for the continuous improvement of teaching tactics and procedures.

The findings of the controlled post-test, which were obtained after the students had finished the pre-test, are shown in Table 2. A student is represented by each row, and their allotted student number is shown in the first column. The post-test results attained by each student are shown in the second column, and a rating is derived from these results in the third column. The "Passed" rating in the table indicates that every student has passed the post-test satisfactorily. This indicates that the pupils performed well on the assessment and that the results were generally positive.

Students range in score from 7 to 10, with higher scores corresponding to a more thorough comprehension of the subject matter, according to an analysis of the individual results. Student 15 attained the maximum score of 10, signifying an exceptionally strong comprehension of the subject matter. Students 5, 11, 25, and 29 on the other hand, received a 7, which is the lowest score in the table. Even though these pupils passed, the findings might encourage more research into possible problem areas or extra help to deepen their comprehension.

The steady trend of passing scores for every student point to a generally successful pre- posttest teaching or learning process. Still, a more thorough examination—comparing pre- and post-test results, for example, or taking outside influences into account—would offer a deeper understanding of the learning objectives represented in Table 2. All pupils successfully met the requirements for passing the post-test, which suggests that over all the results are positive.

The post-test results for the students, which show their ratings and scores after finishing the test without using Photomath, are shown in Table 3. With respect to each student, each row in the table represents a unique number. The post- test results are displayed in the second column, where every student received a perfect score of 10. An overview of the ratings given to each student based on their performance may be found in the third column. Notably, all the study's participants passed the post-test with a "Passed" rating, demonstrating their

proficiency. All the participants' consistently high scores and passing rates point to a shared mastery of the topic, confirming the efficacy of the study's instructional strategy or resources. These post-test results highlight the proficiency and comprehension displayed by the students, who together exhibit a high degree of understanding and mastery of the content covered in the evaluation. Without using outside resources like Photomath, all the participants achieved the same level of accomplishment, indicating both the effectiveness of the chosen teaching strategy and a solid foundation in the subject.

Future educational initiatives and practices that aim to maximize student learning outcomes can benefit from these insights. Data gathering, as seen in chapter 2, has been complied with. A pretest has been administered to gather initial data as to where our research should focus. An intervention is being made that causes this intervention to take effects in the process. Constant observation and evaluation of both groups will yield significant understanding of the long-term impacts of the intervention.

5. CONCLUSION AND RECOMMENDATION

This chapter presents the summary of findings, conclusions, and recommendations drawn by the researcher from the results obtained in this study.

5.1 Conclusions

Ultimately, the examination of the pre-test data revealed a wide range of student performance, with a sizable percentage falling short of the necessary levels in spoken translation. All of the students in the controlled and experimental groups, however, showed a notable improvement in their post-test performance, with passing grades. This indicates that using PhotoMath can improve students' comprehension of verbal translation.

Additionally, there was no discernible difference in performance between the experimental post-test results, where reading practice was not included, and the controlled post- test findings, where students practiced reading every day. This suggests that rather than more reading practice, the progress shown can be due to the use of PhotoMath itself.

After using PhotoMath, students spent significantly less time answering questions, according to a time analysis of the pre- and post- tests. The difference in time between the pre-test and post-test, which was 45–70 minutes, suggests that participants' problem-solving efficiency and skill had improved.

Overall, the results indicate that PhotoMath is a useful technique for raising students' verbal translation proficiency and provides a quick fix without the need for more reading practice. The findings highlight PhotoMath's usefulness in promoting effective learning and comprehension of difficult subjects and call for more research into this area of study.

5.2 Recommendations

The study's findings on the effectiveness of PhotoMath in enhancing grade 7 students' verbal translation proficiency provide significant proof for educators and academic staff to consider utilizing this innovative tool into their teaching practices. The final findings show that PhotoMath has a profound favorable impact on students' comprehension, suggesting that it is

a useful tool for improving verbal translation skills. Furthermore, the study questions traditional methodologies by demonstrating that the observed growth is independent of extra reading practice, establishing Photo Math as a stand-alone resource for skill development. Photo Math's time efficiency is very distinctive. The significant reduction in student question-answering time, along with increased problem-solving skills, provides a tangible benefit to both students and instructors. This efficiency not only helps to shorten the learning process, but it also indicates Photo Math's ability to quickly correct competence gaps. As a result, academic staff are advised to investigate the use of Photo Math as a quick and effective solution to improving verbal translation proficiency without the need for substantial additional reading practice. Furthermore, The study emphasizes Photo Math's broader function in fostering effective learning and comprehension of difficult subjects. Academic staff should embrace the integration of PhotoMath into courses, promoting a dynamic and engaging learning environment. As education moves forward, tools like Photo Math provide a link between conventional practices and current learning methodologies, allowing instructors to adaptand meet the different requirements for their students. The good findings of this study should act as a catalyst for additional research, motivating academic staff to investigate the broader applications of PhotoMath in a variety of educational situations and subjects.

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