USING PHOTOMATH MOBILE APPLICATION AS A LEARNING TOOL IN TEACHING ALGEBRA DURING DISTANT LEARNING

Loregen P. Amparo, Renilyn V. Dacup, Karl Ryan O. Sales, Harriet Kaye D. Tocbo, Janneth Q. Rondina
University of Science and Technology of Southern Philippines, Lapasan, Cagayan de Oro City
Correspondence Tel.: +63532612492, E-mail: janneth.rondina@ustp.edu.ph
Alyssa Mae L. Cabiao, Margelyn A. Olohoy
Misamis Oriental General Comprehensive High School, Velez St. Cagayan de Oro City

ABSTRACT: *Due to recent global events, such as the COVID-19 pandemic, the use of technology in the mathematics classroom has posed a challenge to teachers' ability to coordinate student learning. In that vein, researchers are attempting to determine the efficacy of Photomath, a camera calculator, as a tool in teaching algebra during distant learning. This study employs a quasi-experimental Pretest-Posttest One Group design. The respondents are randomly selected Grade 10 students from Misamis Oriental General Comprehensive High School. The participants are first given the pretest thru Google Meeting, and then the intervention activity integrating Photomath into instruction. The post-test was conducted after the intervention. The results of the analysis showed a significant increase in students' mathematics performance when taught using Photomath. Researchers recommend further conducting a study integrating photomath in mathematics.*

Key Words: photomath; distant learning; mathematics performance

1. INTRODUCTION

Mathematics has a significant influence on students' thinking and ways of how they respond to the real-life problems they encounter, in which they develop individuality and self-reliance [1]. Many students in the math community overlook the fact that mathematics is a discipline that can help them understand the world and some students agreed that mathematics is a very powerful subject for developing human life more advanced. Changes in the learning situation of mathematics, as well as students' own conceptions of mathematics, will influence students' views on the role of mathematics in their future studies and careers, this, in turn, will have an impact on their perceptions of the relevance of mathematics in their future studies and careers [2]. The learning outcomes gained can be influenced by students' conceptions and approaches to learning, priorexperiences, perceptions, and comprehension of their subject, and the teaching and learning context [3]. Due to the recent events which had happened worldwide, the COVID-19 pandemic, the use of technology in the mathematics classroom has posed a challenge to teachers' capacity to coordinate student learning. Instruction has shifted from the traditional face-to-face delivery to instruction that is done from a distance. Distance education is an instruction that occurs when the instructor and student are separated by distance, time, or both [4]. Some common technologies used in the current distance education are interactive video, video lessons, PowerPoint presentation slides, audio tapes, audio and/or video conferencing using Facebook messenger, google meeting, zoom meeting, and the like. [5] go so far as to say that the use of technology adds to the complexity and, as a result, puts the stability of educational techniquesin jeopardy: techniques that are used in "traditional" settings can no longer be applied in a routine-like manner when technology is available [6]. In that point of view, it is critical in the sense that the way in which teachers approach the use of these certain technologies has contributed to major consequences for the effects of their use in the classroom. Nonetheless, as [7] pointed out that it has a significant impact on student achievement in mathematics when technology is introduced into the classroom. [8] pointed out, that it seems more effective to integrate mathematical content and technology in such a way students can engage in playful mathematical explorations. [9] claimed that Photomath in teaching elementary algebra had an effect on the development of educational practices and that they can fully utilize Photomath in learning the subjects. In this context, this study was conducted.

2. LITERATURE REVIEW

2.1 Distant Learning During the Pandemic Situation

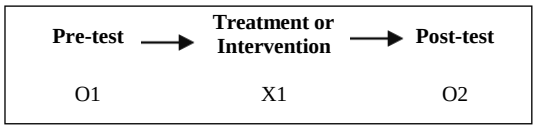
According to [10] distance education is an instruction that occurs when the instructor and student are separated by distance, time, or both. Some common technologies used in the current distance education are interactive video, video lessons, PowerPoint presentation slides, audio tapes, audio and/or video conferencing using Facebook messenger, google meeting, zoom meeting, and the like. These innovations somehow changed the face of education and revolutionized the concepts of teaching and learning. These tremendous innovations served as the primary medium for instruction and learning in online instruction which is basically delivered via the web. However, [11] stated that technology in and of itself has no special powersto improve learning. It has been argued that distance technologies could offer more opportunities than face-to-face when embedded with instruction that addresses the cognitive and social processes of knowledge construction. Teaching distance education is not thesame as teaching in a face-to-face environment and for students, learning in a face-to-face environment is unlike learning online [12]. Students must be persistent in attending class to understand the lesson. [13] claimed that the most important factor in student satisfaction and persistence has more to do with the social organization of the school. In simple terms, students who experience consistent, positive relationships with their teachers were less likely to drop out.

2.2 “Photomath” Usage in MathematicsClassroom

As mathematics on mobile devices is a rapidly expanding field of study, Photomath is one application that answers mathematical problems from texts by just capturing images to it. It not only presents the solution, but it also provides step-by-step instructions. Several studies have shown that Photomath has a positive effect on learning algebra. [14] finds that the application Photomath has a positive impact on enhancing the learning of algebraic equations among students. In their preliminary study, when Photomath was employed throughout the learning process, students got

Figure 1. Pre-test/Post-Test One Group design model

considerably higher outcomes. Another study conducted by [15] showed that there was an increase in student learning outcomes after Photomath was introduced to the students.



There was also a positive outlook by the students about the usage of Photomath in improving their mathematics skills. Furthermore, [16] revealed that the Photomath made it simple for anyone to solve math problems based on student feedback. In addition, students stated that Photomath provides a visually appealing computational assistance tool with straightforward interaction. Despite these positive outlooks toward the usage of Photomath, there are several studies that show concerns about the use of Photomath as a cheating tool for their class works. Teachers, on the other hand, are afraid that this software would impair pupils' capacity to think critically and solve mathematical problems, As a result, pupils may relinquish the role of mathematical teachers in teaching and guiding mathematical problem-solving strategies. [17] addresses the issue of potential cheating in students' classwork with applications like Photomath. With this pressing issue about Photomath being used as a cheating tool, [18] asserted that teachers need ways to navigate theseconcerns as they guide students' tool use. As newcompute tools become available, instructors might opt to prohibit them, limit their usage, or utilize them to review learning objectives. To becleared the third option that was presented basically asserts that students should be learning more than what Photomath could deliver as a solution. One way to do this is for teachers to use Photomath as a tool to assess the mathematical flexibility of students. This response to the existence of an application such as Photomath is one way to alleviate the concerns about this application and also innovate this kind of tool to catch up with the advancement of today's learning environment.

3. METHODOLOGY

3.1 Research Design

A pre-experimental Pretest-Posttest One Group design is used in this study which aims to determine the effectiveness of using Photomath as a learning tool in teaching Algebra during distance learning.

3.2 Research Instrument

Modified Mathematics Scoring Rubric by Cushway and Norris (2013).

Aspect	0	1	2
Accuracy	The solutionand answer is incorrectand or the student did not answer.	The answer is correct but the there are few errors made inthe solution.	The answer is correct and the solution is accurately completed.
Organization	The solution is confusing and hard to follow and the student did not answer.	The solution is clear and easy to follow, however, somenumbers and symbols were written incorrectly.	The work is well-organized, clear, and detailed.

A teacher-made achievement test was used to determine the effectiveness of the Photomath mobile application as a learning tool in teaching. The test questionnaire consisted of quadratic equation problems which were used both for the pre-test and post-test. The content validity of the test questionnaire was evaluated by a high school mathematics teacher. The teacher suggested some changes and correctionsto the test items. In order to score the solutions provided by the students, the researchers modified a scoring rubric made by [19]. The participant's solution was evaluated in two aspects which is accuracy and organization. The participants were given a total of 2 points for each aspect which means that they got a total of 4 points per item.

3.3 Research Participants

Students in Grade 10 at Misamis Oriental General Comprehensive High School for the school year 2021-2022 were the participants of the study. The researchers used a random sampling method to select the participants.

3.4 Data Gathering Procedure

The data of the study was collected using the teacher-made achievement test. Pre-test means given before the treatment served as covariance while the post-test mean given after the treatment served as a criterion. Within the duration of the study, quizzes were given but not included in the analysis of the data.

RESULTS AND DISCUSSION

Table 1. The Mean and Standard Deviation of Students' Pre-test & Post-test Scores

	NMean	Standard Deviation	Remarks
Pre-Test	105.00	1.41421	Beginning
Post-test	107.90	2.96086	Developing

Perfect Score: 20

Mean Level	Descriptive Level
0 – 5	Beginning
6 – 10	Developing
11 – 15	Proficient
16 – 20	Advanced

Table 1 shows the pre-test and post-test distributions of the participants' scores. The analysis revealed that the students had low scores prior to the start of the experiment period. The calculated mean for the pre-test of 5.00, indicated that the students have poor knowledge in solving quadratic

equation problems. They are at the developing level. The calculated standard deviation is 1.41, indicating that the scores of the students are clustered. Meanwhile, the estimated mean of the post-test, is 7.90, indicating that it is at the developing level. The participants' scores had improved. There is a modest variation in test scores among students following the experiment, based on the computed standard deviation of 2.96, which is higher than the pre-test. Researchers may say that the participants' performance has been underwhelming, despite the fact that the majority of them improved from pre-test to post-test. To determine that the increase in score is significant, further analysis was done using *the Analysis of Wilcoxon Signed Rank Test.*

Table 2. Analysis of Wilcoxon Signed Rank Testof Students' Scores

	Post Test – Pre Test
Z	-2.257[a]
Assymp. Sig. (2-tailed)	0.024

a. Based on Negative Ranks

The results of the Wilcoxon signed-rank test of student scores before and after the Photomath-related activity are presented in Table 2. The computed value of Z is -2.257, with a corresponding p-value of 0.024. The result indicated a significant positive change in students' scores after using photomath in their activities. Researchers may say that using Photomath in mathematics significantly improved the achievements of the students.

4. CONCLUSION AND RECOMMENDATION

Based on the findings presented, the researcher concluded that using Photomath during distant learning improves students' mathematical proficiency. It is therefore recommended that Photomath will be integrated into the classroom activities. Furthermore, researchers are encouraged to conduct a study using Photomath in a bigger population and wider scope.

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