



# Evaluation of Photo Math in Teaching Elementary Algebra

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## ARTICLE INFO

### Article history:

Received 10 August  
2020

Received in revised  
Form 06 September  
2020

Accepted 18 October  
2020

Available online 01  
November 2020

### Keywords:

Photomath

Elementary Algebra

Math Education

## ABSTRACT

This study aims to evaluate "Photo Math" in teaching Elementary Algebra. Specifically, it aimed to identify the effect of teaching Elementary Algebra with the use of "Photo Math". To achieved these objectives, the researchers used qualitative, quantitative and experimental design. This was conducted through a separate teaching demo in Elementary Algebra of the two Grade 7 sections. Pre-test was administered before the conduct of the demo and post-test after the teaching demo. The study showed that there was a significant difference between the pre-test and post-test results of the section with "Photo Math" as intervention. Moreover, there was also a significant difference between the pre-test and post-test results of the section without the said application as intervention. However, it showed that there was no significant difference between the two section. The first section showed that there was an effect to the performance of the students when "Photo Math" was applied as teaching tool but it was not fully claimed when compared with the traditional method of teaching. This was because the sample size of the study is small so it was recommended to have a larger number of sample size to see the effect of "Photo Math" in teaching Elementary Algebra. The study implied that

Photo math as a teaching tool had an effect on teaching elementary algebra.

## 1. Introduction

Education is a fundamental process for the nation's development. Education is very important for the advancement of human resources; good quality education will produce good quality human resources (Asarta & Schmidt, 2020; Chen et al., 2012). Good education quality must be supported by education components. These components are input (students), educators, infrastructure, environment, and curriculum (Saprudin et al., 2019; Sarmiento & Orale, 2016).

In the era of the Industrial Revolution 4.0 as it is today, the development of science and technology is very rapid. This requires each individual to be able to utilize information technology appropriately. Therefore, it requires qualified Human Resources (HR). The quality of human resources can be improved through education. Education plays an important role in preparing human resources and being able to make changes for the Indonesian nation towards a better direction, especially in development growth (Chen et al., 2012; Srisawasdi & Sornkhatha, 2014). Education will also give birth to students who are smart and have competencies and skills to be developed during society (Anghileri, 2006; Casinillo, L. F. & Casinillo, 2020). Education is one of the tools to produce a change in a person so that it can form a better character through the learning process. In a narrow sense, education is closely related to learning.

Mastery of elementary algebra is the basis for mastery of other higher level courses in higher education, such as differential equations, problems initial values and boundary conditions, matrix and vectors, and numerical method (Chansky, 1966; Chazan et al., 2008; Litke, 2020). This condition indicates that the success of students in elementary algebra courses will have a positive impact on students' learning outcomes. Therefore, the efforts to increase students' learning outcomes and learning motivation should be attempted as soon as possible. But in fact, students' learning outcomes at elementary algebra courses have not been very encouraging.

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Based on the conditions above, it is necessary to pursue a lecture model that can enhance students' activity in lectures and stimulate their learning motivation which ultimately leads to an increase in students' learning outcomes. So far, there has been no visible effort to the inclusion of lectures activity in especially learning practicum in a computer laboratory (Chiu & Mok, 2017; Hall, 1990; Lynch & Star, 2014; Trouche et al., 2018). Along with the rapid technological developments, has developed several mathematical application packages such as Maple, Mathematica, MathLab, and PhotoMath, which allow students explore elementary algebra in greater breadth and depth. In line with this, previous research states that the dissemination of knowledge must be carried out in a communication at various levels, method and media, so the use of application programs in lectures in an effective way of disseminating knowledge because it is able to avoid students trapped in complex mathematical computations (Ozdogan & Aygor, 2012; Richardson et al., 2009; Taylor & Sangwin, 2007).

In education, from stakeholders to teachers to students, has a mobile phone. It became an essential thing for it is used as a medium for communication. People tend to use mobile phone anytime and everywhere. Some research shows that students check their phones in the classroom an average of more than 11 times a day. Spending up to 20% of them in-class time texting, emailing, and checking social media. Due to this scenario, teachers are alarmed that this may cause distractions. With the given problem, teachers were able to realize to use mobile phone as a part of their lesson. As for math teachers, it is for a great help that there are new ways to teach mathematics that can boost the interest and motivation of the students in learning the subject. Such as using different applications like the PhotoMath.

There are many debates whether to allow phones inside the classroom because it causes distraction to students. And when students are distracted, it's a recipe for extra stress, frustration, and catch-up time for everyone. But instead of looking at negative things why not try to look in a fresh perspective. Why not use the given technology in our full advantage in where everyone can benefit, like using Photomath? But of course, it's important to set ground rules and keep a close eye on how they are being used.

Several previous research results indicate that learning communication with application/computer programs is able to increase students' learning motivation and learning outcomes (Hall, 1990; Taylor & Sangwin, 2007). In addition, other research shows that the use of the Maple program in calculus courses can increase motivation and learning achievement. Based on the previous research above, the researcher is interested in evaluating efforts to increase student achievement and learning motivation in linear algebra I through the use of the Photomath application program.

The research to evaluate Photomath in teaching Elementary Algebra in Grade 7 students of Visayas State University Integrated High School. Specifically, it aimed to identify the effect of teaching Elementary Algebra with the use of Photomath.

## 2. Methods

In this study, all Grade 7 students of VSU Integrated High School were considered. The population has a total of 92 students from two sections. The population was divided into two groups based on the sections. One section used Photomath as teaching tool in Elementary Algebra while the other did not use Photomath as teaching tool.

The research designs were qualitative, quantitative and experimental. The research conducted separate teaching demo in Elementary Algebra of the two Grade 7 sections. The first section used Photomath in the teaching demo as a teaching tool while the second section used teaching demo without Photomath as a teaching tool. The Grade 7 students answered a survey questionnaire, a pre-test before the teaching demo and a post-test after the teaching demo. The data was collected and analyzed to determine the influence of Photomath in learning Elementary Algebra.

The background of the data was obtained through conducting a pre-test and post-test. The same questionnaire was used for the pre-test and post-test. Intervention was introduced in Rosal by using Photomath during the demo-teaching. On the other hand, there were no intervention introduced to Marigold before conducting the post-test. In this study, both primary and secondary sources were considered. The primary data was collected from the scores of students in the standard test taken by the student. The data was separated from those students who were taught with Photomath and those students who were not. The data led us to the investigation of the effect of Photomath in the academic performance of students in Elementary algebra. The secondary data taken from the review of related literature which site from different journals in Education.

The answers obtained from the standard test were analyzed to determine the effect of Photomath in teaching Elementary Algebra. The researchers calculated the mean, the standard deviation and the standard error mean of the pre-test and post-test to know which have a higher response between the pre-

test and post-test of the two sections. Then, the data proceeded to paired T-Test to know the significance of the data obtained. The score difference of the two sections were compared through calculating the mean, std. deviation and std. error mean and test the significance through independent sample t-test.

### 3. Result and Discussion

#### Results

The background of the data was obtained through conducting a pre-test and post-test. The same questionnaire was used for the pre-test and post-test. Intervention was introduced in Rosal by using Photomath during the demo-teaching. On the other hand, there were no intervention introduced to Marigold before conducting the post-test.

The data was obtained separately from pre-test ad post-test of Marigold and Rosal. The post-test serves as the basis for comparison. It reveals information for the effect of using Photomath in teaching Elementary Algebra.

**Table 1.** Grade 7 Rosal's descriptive pre-test and post-test results

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test score (Rosal)	17.33	46	5.051	0.745
	Post-test score (Rosal)	20.13	46	5.741	0.846

Table 1 shows it has a Higher response in post-test than the pre-test. This means that there was an improvement after the intervention was introduced.

**Table 2.** Rosal's paired t-test results

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-test score (Rosal) - Post-test score (Rosal)	-2.804	3.763	.555	-3.922	-1.687	-5.054	45	0.000

deviation of 3.763 and standard error mean of 0.555. tested at p-value <0.05. This means Table 2 shows that there is a significant difference. With a mean of -2.804, standard that there is a high significance.

**Table 3.** Grade 7 Marigold's descriptive pre-test and post-test results

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test score (Marigold)	17.2609	46	3.99129	0.58848
	Post-test score (Marigold)	18.5870	46	5.58003	0.82273

Table 3 it shows it has a Higher response in post-test than the pre-test. This means that there was an improvement without the intervention introduced.

**Table 4.** Marigold's paired t-test results

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pre-test score (Marigold) - Post-test score (Marigold)	-1.32609	4.32591	0.63782	-2.61072	-0.04145	-2.079	45	0.043

Table 4 shows that there is a significant difference. With a mean of -1.32609, standard deviation of 4.32591 and standard error mean of 0.63782. Tested at p-value <0.05. This means that there is a high significance.

**Table 5.** Group Statistics of Marigold and Rosal

	Group	N	Mean	Std. Deviation	Std. Error Mean
Score difference	Marigold	46	1.3261	4.32591	0.63782
	Rosal	46	2.8043	3.76309	0.55484

Table 5 shows that Marigold obtained a mean of 1.3261, standard deviation of 4.32591 and a standard error mean of 0.63782. While Rosal obtained a mean of 2.8043, standard deviation of 3.76309 and a standard error mean of 0.55484. This means that Rosal has a higher response than Marigold.

**Table 6.** Independent sample t test results for Marigold and Rosal

		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Score difference	Equal variances assumed	.109	.742	-1.749	90	.084	-1.47826	.84538
	Equal variances not assumed			-1.749	88.306	.084	-1.47826	.84538

Table 6 shows that the significance value obtained from Levene's Test for Equality of Variances is 0.742. This means that it is not significant for it exceeds the p-value 0.05.

## Discussion

Based on descriptive statistics, the study finds out that there was a high response on Grade 7 students with Photomath as intervention in teaching method based on mean and standard deviation. There was a significant difference between the pre-test and post-test of the section with Photomath as intervention. This implies that there was an effect of Photomath as intervention to the performance of the students. The study concluded that Photomath had an effect on teaching elementary algebra, based on the results with Photomath as a teaching tool. The study contributed to the development of educational practices that teachers and administrators might consider integrating such technology in the classroom. Therefore, students and teachers can fully utilize Photomath in learning the subject.

Along with the rapid technological developments, has developed several mathematical application packages such as Maple, Mathematica, MathLab, and PhotoMath, which allow students explore elementary algebra in greater breadth and depth. In line with this, previous research states that the dissemination of knowledge must be carried out in a communication at various levels, method and media, so the use of application programs in lectures in an effective way of disseminating knowledge because it is able to avoid students trapped in complex mathematical computations (Ozdogan & Aygor, 2012; Richardson et al., 2009; Taylor & Sangwin, 2007).

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