



## Ketergantungan pada teknologi: intelektual virtual photo math solves equations with mobile camera

Helsa<sup>1</sup>, Ariani<sup>2</sup>, Andika<sup>3</sup>, Zainil<sup>4</sup>, Masniladevi<sup>5</sup>, Ranuharja<sup>6</sup>

Universitas Negeri Padang, Padang, Indonesia  
\*Correspondence: E-mail: [yullys@fip.unp.ac.id](mailto:yullys@fip.unp.ac.id)

### ABSTRAK

Tujuan dari penelitian ini adalah untuk menghasilkan bahan ajar Matematika Dasar dengan menggunakan Photo Math android. Kemampuan matematis siswa di prodi pendidikan guru SD pada awalnya berbeda-beda. Diharapkan kemampuan matematika siswa dapat ditingkatkan melalui penelitian ini pada akhir mata kuliah ini. Untuk itu siswa membutuhkan media sebagai alat bantu dalam membantu mereka dalam menjawab soal matematika yang membutuhkan penalaran yang lebih tinggi. Penelitian ini menggunakan metode campuran sequential exploratory design. Hasil penelitian menunjukkan bahwa bahan ajar valid berdasarkan tata letak media (79%), bahasa (83%) dan isi (80%). Hal ini menunjukkan bahwa bahan ajar Matematika Dasar dengan menggunakan Photo Math android layak untuk digunakan dan dilanjutkan ke tahap uji penilaian efikasi.

### ABSTRACT

The purpose of this study is to produce instructional materials for Basic Mathematics using Photo Math android. The mathematical ability of the students in the primary teacher education department was initially different. It is expected that the students' mathematical skill can be improved through this research at the end of this course. For that, the students need the media as a tool in helping them to answer math problems that require higher reasoning. This research uses a mixed method of sequential exploratory design. The results show that the teaching material is valid regarding media layout (79%), language (83%) and content (80%). This indicates that the instructional materials of Basics Mathematics using Photo Math android are feasible to be used and proceeded to the efficacy assessment test stage.

### ARTICLE INFO

#### Article History:

Received: 2022-08-09

Revised: 2022-10-28

Accepted: 2022-11-01

Available online: 2022-11-15

Publish: 2022-11-20

#### Kata Kunci:

Matematika Dasar,  
Media Pengajaran,  
Photo Math.

#### Keywords:

Basic Mathematics,  
Photo Math,  
Teaching Media.



## 1. INTRODUCTION

Mathematics is a subject that commonly included in every level of education (Zolotova, 2014). It is believed that many students do not like to learn math (Li & Ge, 2016). The difficulty of solving problems related to high order thinking level questions or HOTS questions makes the students often feel unable to do it (Gading et al., 2017). They need to analyze the math problems quickly (Suárez et al., 2018). Thus, a tool that can make this matter becomes possible is needed. By the existence of technology, the teacher can utilize a technology-based instructional media that can be used in learning mathematics (Sulisworo & Permpayoon, 2018). One of the efforts that can be done is by using Android-based smartphones application in the process of learning mathematics (Di et al., 2012) such as Photo Math (Wei, 2013).

Photo Math is an application that can be used as a tool to answer questions (Iyad & Aslan, 2015). It is a free application from Apple that works by holding a cell phone or tablet to mathematical equations in textbooks (Zhang et al., 2016). Photo Math is commonly used by the students because most of them use android. Moreover, every student can use Photo Math applications (Bagus Nur Rahma Putra et al., 2018). Photo Math is very suitable for the students in solving problems (Meng, 2017). In addition, PhotoMath is an android application that utilizes a smartphone camera to find answers to mathematical questions (Arsaythamby & Zubainur, 2014).

There are some advantages of Photo Math: (1) it is easy to use by photographing math questions. Then, the questions will automatically be analysed by PhotoMath and the completion of the math problem will be displayed, (2) it is free and very easy to download, (3) it is easy to carry everywhere because this application is found in smartphones (Cahyono, 2018). With the advantages mentioned, it is obviously useful to solve mathematical problems (Rahmawati et al., 2019).

In addition to the above advantages, the Photo Math application relies on the main camera on the cell phone by capturing the math problems when the students want to solve math

problems. At the moment the students capture the math problem, this application will automatically scan the math problem that is targeted by the cell phone camera. When the shot has hit the target, the answer to the target question will automatically be displayed by this application (Lundgren & Kinemuchi, 2018).

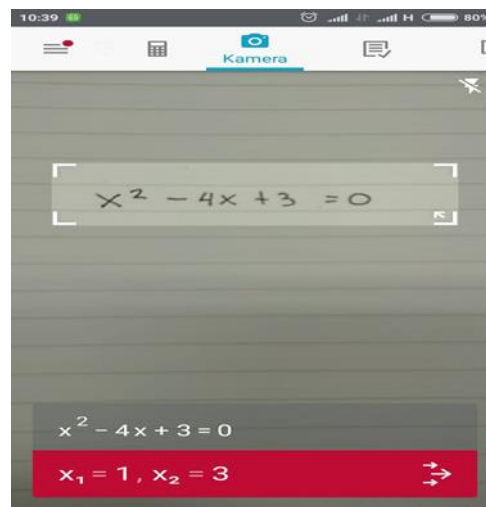
## 2. METHODS

This research used Mixed Method research design which aimed to obtain comprehensive research results (Sabiev et al., 2017). This method was carried out by combining quantitative and qualitative research (Dequan et al., 2012). The combination of the two methods was done to build synergies and strengths that exist between them to understand more complete phenomena (Lo, 2016). The purpose of this mixed method was to overcome problems that exist in both qualitative and quantitative methods (Wang et al., 2017). Thus, the researchers used sequential exploratory design.

The sequential exploratory design combined qualitative and quantitative research methods in sequent. The first level of research done by applying qualitative methods and followed by quantitative methods at the second level for a wider sample. The data obtained from interview and questionnaire. Therefore, interviews were given in qualitative methods to see the students' ability to solve math problems in the Mathematics Basics subject. The interview form was used to obtain answers from the students qualitatively, while the questionnaire was used to obtain the students' response quantitatively. The first stage of this research was conducted to identify aspects of ability to answer mathematical questions through interviews. In conducting interviews, the researcher listened carefully and recorded what was stated by the students. This technique allowed the researchers to investigate deeply, explore new information, open more space to see problems from different dimensions, and get information in an inclusive, precise and clear manner.

### 3. RESULTS AND DISCUSSION

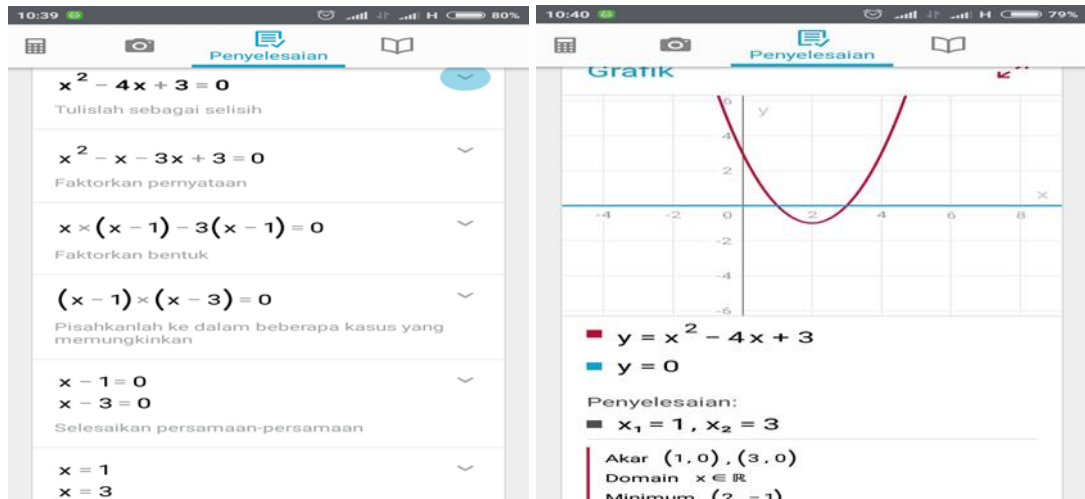
The design for using the Photo Math android application was to help the students to solve math problems. The questions that had been validated before was used as a tester before it was attempted to the students. The question given was about the quadratic equation. Furthermore, the matter was tried out to the students. The math problem that solved using Photo Math can be photographed first by selecting the camera menu.



**Figure 1.** In addition to taking photos, the students can also type the questions by selecting the edit menu on the menu bar

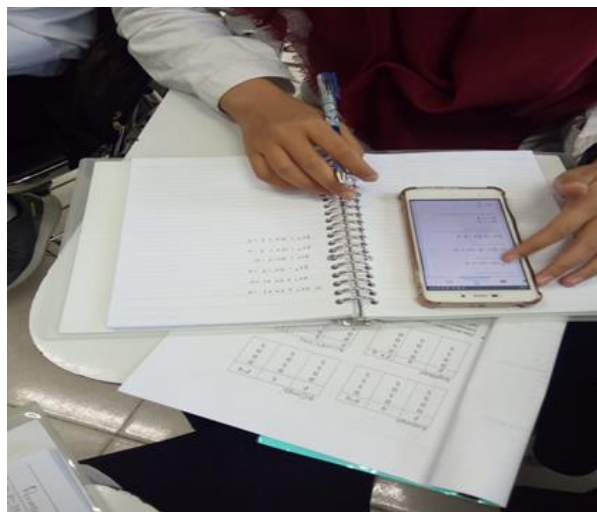


**Figure 2.** The answer from quadratic equation questions that was photographed or typed would appear with a red mark



**Figure 3 and 4.** By clicking on the red sign, the solution appeared

The students were very enthusiastic and eager when they tried to solve quadratic equation problems using Photo Math. They really liked to learn math using the Photo Math application in solving problems because it was very interactive. They can also solve math problems easily and quickly. The picture below showed the students' enthusiasm in completing the questions using Photo Math.



**Figure 5**



Figure 6

Some field trials were carried out 2 times. The data collection was conducted by providing question instruments that had been validated by experts. The first meeting lasted for 90 minutes by giving a briefing introduction on how to use Photo Math and some examples of questions that were tested by the lecturer first. Then, the second meeting was done in the following week in 90 minutes providing 10 questions. The students tried to solve the questions that given by the researchers by using the Photo Math application with the guidance of the lecturers. The completion of the students' answer was collected after the time was over. The student answers could be seen below.

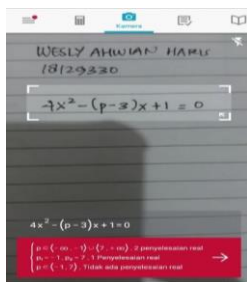


Figure 7

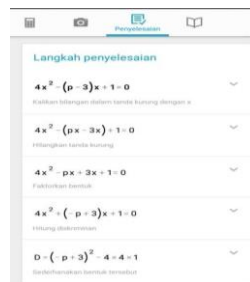


Figure 8



Figure 9

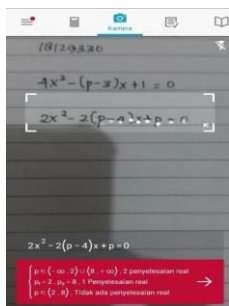


Figure 10

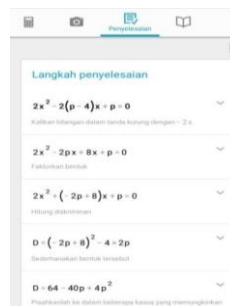


Figure 11

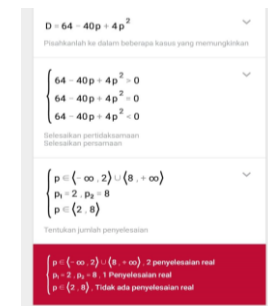


Figure 12

Based on several answers from the students, they claimed that they were able to solve the math problem using the Photo Math application. The students were guided and helped to solve math problems in other materials using Photo Math application. The researchers hoped that there would be no more primary teacher education students in Universitas Negeri Padang who were no longer able to solve math problems, do the problem, and like the learning process using this Photo Math. The students were able to solve mathematical problems that they consider to be difficult so far by using Photo Math applications.

#### 4. CONCLUSION

Based on the results of the research, it can be concluded that the students can solve the problem using Photo Math application easily and quickly. The results considered to be good too. It indicates that the teaching materials seen from its layout of media scored 79%, its language scored 83%, and its content scored 80%. This conclusion shows that the Basic Mathematics teaching materials using android Photo Math are suitable to be used and proceeded to the efficacy test.

#### 5. REFERENCES

- Cahyono, A. N. . M. (2018). Mobile technology in a mathematics trail program: how does it works? *Unnes Journal of Mathematics Education*, 7(1), 24–30.
- Iyad, M. H., & Aslan, A. M. (2015). Math teachers attitudes towards photo math application in solving mathematical problem using mobile camera. *Educational Research and Reviews*, 10(14), 1930–1936.
- Rahmawati, S., Subali, B., & Sarwi, &. (2019). The Effect of Ethnoscience Based Contextual Learning Toward Students' Learning Activity Article Info. *Journal of Primary Education*, 8(2), 152–160.
- Suárez, Á., Specht, M., Prinsen, F., Kalz, M., & Ternier, S. (2018). A review of the types of mobile activities in mobile inquiry-based learning. *Computers and Education*, 118, 38–55.

- Sulisworo, D., & Permpayoon, K. (2018). What is the better social media for mathematics learning? a case study at a rural school in Yogyakarta, Indonesia. *International Journal on Emerging Mathematics Education*, 2(1), 39.
- Wei, B. (2013). College english learners' beliefs and awareness of mobile learning based on smart-phones. *Advanced Materials Research*, 765–767, 1589–1591.