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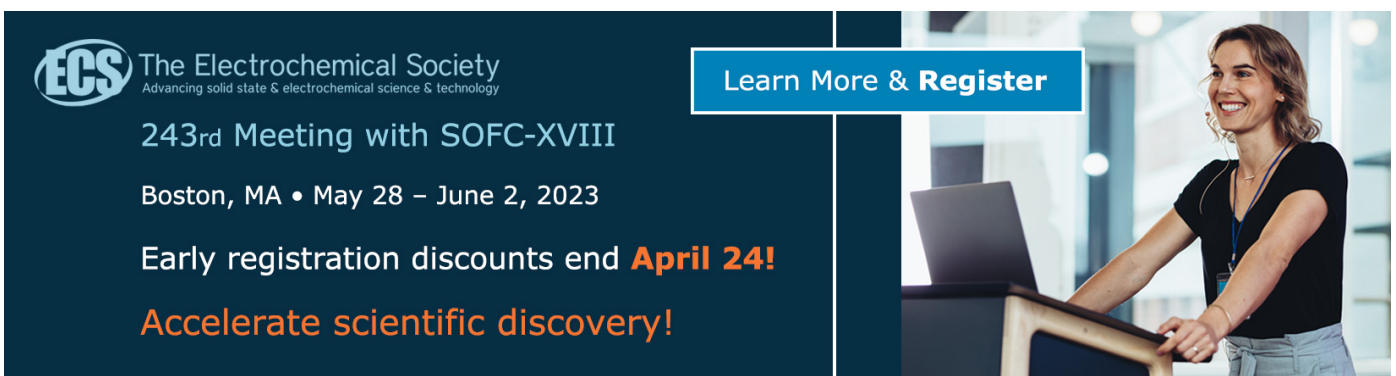
Effectiveness of Android-Based Mathematics Learning Media Application on Student Learning Achievement

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Effectiveness of Android-Based Mathematics Learning Media Application on Student Learning Achievement

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Abstract. This study aims to implement android-based learning media in mathematics basic concepts courses on student achievement, and the effectiveness of android-based learning media in mathematics basic concepts courses on student achievement at PGMI Nurul Jadid University. This research uses a quantitative research approach. The data collection is done through documentation and tests. The determination of the sample of this research was carried out by random sampling technique which included the fourth-semester PGMI Study Program students. While the data analysis in this study uses paired sample t-test analysis techniques. Based on the results of data analysis, it can be concluded that $t\text{-count} = -18,378$ with $\text{significance} = 0,000 < 0.01$. Thus, it can be stated that H_1 is accepted and H_0 is rejected, so it can be concluded that the android-based learning media on the subject of mathematics basic concepts are convincingly effective in improving student achievement.

1. Introduction

Education and learning become a serious concern with the growth and development of the times [1]. Educational and learning orientation leads to the achievement of educational goals [2], namely learning to know, learning to do, and learning to live together [3]. Education must introduce students to the urgency of topics faced by the community, as well as being able to provide solutions to these problems [4]. Education seeks to encourage students to understand their own cultural context, as well as to understand the culture of others outside their environment as part of the process of communication and natural cultural transformation.

Learning is an important activity of students in the world of education [5]. The activity is a form of transformation of student learning processes as an effort to develop intellectual and self competency skills. In fact, when an educator teaches in the classroom, students certainly pay attention and listen to the discussion of the material. This academic climate is contradictory to the activities experienced by today's students [6].

The basic concept mathematics course is the destiny course of the PGMI study program that focuses on the delivery techniques and understanding of basic concepts that are full of formulas and calculations. One indication of the cause of the low ability of students' basic mathematical concepts is



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the delivery of material concepts in the basic mathematics concepts course using only the lecture method [7]. The automation of learning activities is still centred on lecturers (teacher-centred).

Educators are obliged to implement the basic mathematical concept material by giving encouragement and stimulation to students. Based on the results of Kim's research, that the optimization of mathematics learning can be understood one of them using teaching aids or learning media that is appropriate to their level of development [8]. Learning media that are applied in the learning process are able to arouse and even arouse the interests, feelings, and wishes of students [9]. Each particular learning material has varying degrees of difficulty, starting from the most easily explained, described and so on, to the most difficult [10]. Therefore, to facilitate students in understanding the subject matter, media is needed.

2. Mathematics Learning Media

Learning media can influence instructional effectiveness programs. Three ways of delivering learning material, including; verbal information, real experiences, and media [11]. Among the three ways of learning that have high effectiveness is the use of media in the learning process. The Association of Education and Communication Technology (AECT) observes the nature of the media in the form of all channels and forms used by humans to convey messages and information [12]. Learning media can be in the form of hardware or software that is used to help the learning process so as to facilitate the comprehension of students in receiving subject matter.

Learning media that utilize computer technology will have a higher value than using other media [13]. Learning media using technology can enable students to learn with high motivation because they use technology that is able to display text, images, video, sound, or animation.

The purpose of the use of mathematics learning media in addition to attracting students' interest in learning mathematics, especially in mathematics basic concepts courses, is also to improve the ability to plant basic concepts of numeracy material so that students are more skilled in instilling the concept of numeracy skills in teaching practice [14]. Counting skills are a major ability in life [15]. All human life really requires calculating skills and is a way to be able to manage the problems encountered. In general, mathematical problem solving is dominated by mathematical calculations.

3. Android Based Learning

Advances in technology have an effect on learning in the use of instructional media in schools and in other institutions including tertiary education. The development of science and technology encourage the learning process to be applicable, interesting and generate student learning achievement in an effort to improve the quality of education [16].

Android-based learning is a learning that is carried out using media in the form of applications that are loaded on an android system as an effort to make the learning process more innovative and creative [17]. Android-based learning is a learning that is carried out using media in the form of applications that are loaded on an android system as an effort to make the learning process more innovative and creative [18]. Vice versa, students will feel anxious, anxious, and uncomfortable which results in suboptimal results if the student learning process is too forced.

Android is a mobile Operating System (OS) that is growing in the middle of other OS that is growing today and is very popular [19]. The development of Android is growing rapidly and is consistently releasing the latest versions to satisfy consumers. In fact, until now the position of Android can pass the development of Windows and Apple. Therefore do not be surprised if every day we see new gadgets on the market that use the Android operating system. Educators in their learning can utilize the android in giving or delivering learning material to their students [20]. Through this technological sophistication, the learning process will certainly become more interesting and the more creative the educator will be in utilizing technology, the better the student's ability to absorb learning material [21].

The advantages of the Android operating system, including; First, the application framework allows a user and component removal available in the Android operating system. Second, the Android

operating system supports mobile devices. Third, graphics in the form of 2D and graphics in the form of 3D based on the Open GL library. Fourth, storing data using SQLite. Fifth, support a variety of media both in the form of video and audio and a variety of images. Sixth, it has features that can pamper the user in the form of GSM, Bluetooth, EDGE, 3G, 4G, and WiFi but in accordance with the specifications of existing devices. Seventh, also equipped with a camera, GPS, compass, NFC, and accelerometer [22].

While Android weaknesses include, as a developer who has to try some suitable hardware to ensure that the software he makes can be operated on all types of Android and applications made for Android may not be able to run even though the tools used are using the Android operating system [23].

4. Student Learning Achievement

Achievement is the result obtained from learning activities that have been done by someone [24]. Achievement is a measure of the results that have been obtained or achieved from activities that have been carried out or done. Success in achieving the learning objectives in learning activities is an indicator of student achievement.

Learning is an activity carried out by someone to obtain new knowledge as a change in themselves in interacting with their environment [25]. In addition, learning is also a process of changing behaviour through practice, skills and experience. In order to improve learning achievement, students must be able to manage the factors that influence the learning climate. These factors include internal factors such as learning motivation and external factors such as the environment of daily life. In addition, students also need to pay attention to the psychological aspects of self-concept.

The concept of self is the views and feelings of students towards themselves formed since childhood and will continue to develop along with the development of individuals as the core of one's personality [26]. In addition to the efforts of the students, educators must also have an effort to support the academic achievements of students by means of effective and optimal learning. In addition, educators can also provide academic guidance such as; student achievement, tutoring, study plans, and student counselling problems.

5. Research Method

This research uses a quantitative research approach with the Pre-Experiment Design method, namely One Group Pretest-Posttest Design. The data analysis technique of this study used a paired sample t-test. The research method is the method used to examine a particular population or sample. The sampling technique is done randomly. Data collection using research instruments. Data analysis is both quantitative and statistical in order to test the established hypothesis [27]. This research was carried out in the PGMI Nurul Jadid University on 22 February 2020 to 24 April 2020 with a period of ± 3 months 8 meetings, each time a meeting of 60 minutes duration. The population in this study is the fourth-semester students. The sample in this study amounted to 22 grade IVa students. In this study, researchers tended to use data collection tools or instruments, including; instrument development, and instrument testing. This study aims to determine the effectiveness of android-based mathematics learning media on student achievement.

6. Result and Discussion

After the researchers implemented the Android-based learning media on the basic mathematics concept courses in the PGMI Nurul Jadid University for 8 face-to-face in class IVa. So by using the Android-based learning media on the basic mathematics concepts courses here can make students more interested and active in the following learning and facilitate students in understanding material that is difficult to understand if only explained through narration by educators. Retrieval of student learning test data is carried out both in the control class and in the experimental class. In the experimental class, the treatment was the application of learning media in the treatment control class in the form of a demonstration model learning. With the calculation of analytical techniques using paired sample t-tests can be seen in table 1.

Table 1. Output Paired Sample T-Test

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRETEST	66.4545	22	4.22833	.90148
	POSTEST	85.0909	22	5.04182	1.07492

Based on data processing and analysis, it is known that there is effectiveness in learning achievement in mathematics basic concept courses using android-based learning media. The effectiveness as an indicator of the learning process that uses learning media has a better learning outcome value than the learning that has been used by educators on campus. The treatment of the experimental class and the control class in the test found that there is a positive impact of learning the basic concepts of mathematics courses using android-based learning media. The positive impact was proven by the results of testing the known hypothesis $t\text{-count} = -18,378$ with significance $= 0,000 < 0.01$. Which means H_1 is accepted and H_0 is rejected. From this explanation, it is clear that there is an effect of android-based learning media in the subject of basic mathematical concepts in improving student achievement.

Classification of the level of effectiveness of the media is taken from the results of research data. Determination of norms in measuring the level of effectiveness is based on the principle of norms of *das sein*, namely norms derived from something found in reality [28]. The fact in question is the percentage of the results of the analysis. The smaller the percentage of data, the greater the intervention of the desired goals.

Table 2. Android Media Effectiveness Level

Percentage	Information
0% - 33,3%	Very effective
34,3% - 66,6 %	Effective enough
67% - 100 %	Ineffective

Based on the results of the analysis conducted, it is known that the effectiveness of android-based mathematics learning media on student achievement in the PGMI Nurul Jadid University is 32.55%. It can be interpreted that the use of android-based mathematics learning media is very effective in student learning achievement.

7. Conclusion

Based on the analysis of the data obtained, the researcher can conclude that the trial of an Android-based learning media product on the subject of basic mathematical concepts to the learning achievement of PGMI Nurul Jadid University students received positive responses. By using Android-based learning media on the subject of basic mathematical concepts can cause feelings of pleasure and quickly understand in accepting the subject matter. In addition, the use of Android-based learning media makes students more interested in learning numeracy material in mathematics basic concepts courses. The use of android-based learning media, especially in arithmetic material is quite effective in student learning achievement. Then the hypothesis used is H_1 accepted and reads There is Effectiveness of Android-Based Learning Media Application in Subjects Basic Mathematics Concepts on Student Achievement in the PGMI Nurul Jadid University. The effectiveness of the Android-based learning media on the subject of basic mathematical concepts on student achievement in the PGMI Nurul Jadid University is known to be 32.55%.

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