Implementation of physics mobile learning media to improve student physics perseverance

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Abstract In this Country, the teacher only focuses on cognitive skills, but often ignores the affective skill, perseverance, which makes students give up easily. The cause learning outcomes are less than optimal. The purpose of this study was to implement mobile physics learning media to improve student perseverance in physics. This type of research is a pre-experimental design with one group pre-test posttest. Perseverance level data is obtained using a questionnaire. Data were analysed using descriptive statistics and inferential statistics. To see the distribution of students' perseverance before and after learning, descriptive statistics are used. Inferential statistics are used to find out whether there is a significant increase in students' perseverance after using the physics of mobile learning media. The results found that students' perseverance had a high level of perseverance. While the average value of classroom perseverance before and after learning has increased but it is not significant after analysing with T-paired test. This is due to the short time of the implementation of the media in learning, teachers have not been able to control the use of students' smartphones and teachers simply move the habits of conventional learning into smartphones.
Keywords: *physics mobile learning media, perseverance, implementation time, teacher control*

1. Introduction

In general, education only prioritizes cognitive skills which are used as indicators of student achievement in the learning process by putting aside affective and psychomotor skills [1]. The Ministry of Education of the Republic of Indonesia in the Minister of Education and Culture regulation number 65 of 2013 which explains the standard processes in primary and secondary education which elaborate on three domains, namely attitudes, knowledge, and skills. The combination of cognitive abilities with a good attitude in students becomes a determining factor for student achievement in learning [2]. One example of the attitude that must be developed because it relates to the success of students in the academic world is perseverance [3]. Perseverance is the attitude of students to complete tasks in the learning process in a timely, conscientious manner and use their best abilities even though there are disturbances in completion [4]. Perseverance in learning becomes important because it can help students in dealing with the effects of boredom for students if learning is applied continuously and without variations in learning [5]. Building the attitude of perseverance can not only by conveying theoretically to students, but it is built by students themselves through a learning environment and interpersonal support [6]. In learning, teachers can familiarize students not easily give up in undergoing learning, especially in learning physics requires the ability to think creatively, constructively and critically [7]. The ability to think is difficult to achieve when students give up easily in learning and do not want to

try again after failing [8]. Because the level of perseverance is not high enough, students in Indonesia prefer to learn by memorization. Because of their learning models by memorization, sometimes they have difficulty in working on problems in physics that are different from usual [9]. This shows the ability of students to solve problems in Indonesia can be said to be still low [10]. The level of the perseverance of students at SMA Negeri 1 Boja is still relatively low, where only 28% of students have a high level of perseverance. This shows that in this country perseverance has not been given much attention as a determining factor in the success of learning. To improve affective skills, perseverance, teachers and education practitioners utilize technology in learning.

The use of learning technology can improve learning outcomes when compared to learning that does not use technology [11], [14]. One form of the use of technology in learning is to take advantage of learning media with the assistance of technology that is currently developing. There has been quite a lot of media development, starting from a personal computer (PC) based, websites to Android or IOS based. Learning media that are being developed are android-based learning media. Besides being easy to develop, most students have gadgets with the Android operating system. In its development the Android-based learning media can be categorized as mobile learning media having the following characteristics (a) the mobility of students, (b) learning anywhere and anytime, (c) through mobile devices (d) involving students, (e) encourage collaborative learning, and (f) enable authentic learning [12]. Mobile learning has several advantages besides ease of access. These advantages consist of providing opportunities for learning individually and also in groups, facilitating alternative and new learning processes that are effective for learning and providing opportunities for students to respond to the learning process [13]. In addition to improving learning outcomes, mobile learning physics media can improve effective skills. Several studies utilizing android-based learning media can increase learning motivation [15], interest in learning [16], self-efficacy [17], collaboration [18], emotional intelligence [19] and scientific argumentation [22].

The research will be carried out implementing mobile learning physics media in optical learning to improve student perseverance. The media used should contain animations or illustrations about physics learning materials, especially for optics. This is because optics cannot be directly seen by us, so if the teacher does not show illustrations of students it will be difficult to imagine and does not rule out the possibility of a long time. Besides this the presence of learning videos and video discussion questions on the application allows students to repeat the discussion over and over until they understand the concept. The process of students understanding the learning video and video discussion about this problem will form a habit of perseverance, conscientiousness and not easily give up in solving problems in physics.

2. Research method

This study was a pre-experimental study with a one group pretest posttest design shown in table 1.

Table 1. Research design.

O_1	X	O_2

Where O_1 is a pretest, O_2 is a test post and X is an implementation of mobile physics learning media. The study aims to observe the increase in students' perseverance, in learning physics before and after learning using mobile physics learning media on optics. Media in learning has been tested for eligibility. Mobile learning physics media is used because it has several advantages, one of which is that it can be used without the internet, so it can be used anytime and anywhere by students. Besides, there are also exercises with the discussion video shown in figure 1. Students can play repeatedly until finally, they can understand the exercises. This will accustom students not to give up easily in solving problems in physics. One of the factors that must be prepared by the teacher forming student perseverance is creating habits related to perseverance [2]. Besides, students will also be comfortable in understanding the material because videos can be played repeatedly without having to use the internet. Moreover, with this video students do not have to ask friends or teachers if they do not understand, because some students

are sometimes embarrassed to ask the teacher to repeat the learning material or the theme itself. Physics mobile learning media is implemented using the learning implementation plan and student worksheets that have been tested for eligibility. learning implementation plans and student worksheets that are used using the problem-based learning model. The model selection is adjusted to the learning that is usually done by the teacher so that researchers can better see the improvement caused by the implementation of mobile physics learning media.

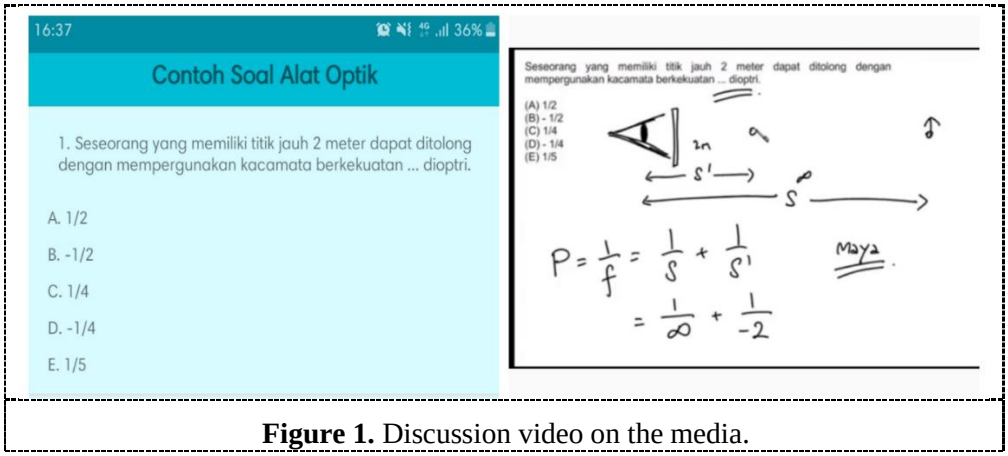

Figure 1. Discussion video on the media.

The instrument for collecting student perseverance data was a questionnaire, where the questionnaire had been validated beforehand. The perseverance questionnaire used consisted of four indicators. Indicators of perseverance consist of being diligent, conscientious, on time and not easily giving up. Questionnaires are distributed before learning to find out the students' perseverance before learning. After learning to use media, the questionnaire was distributed back to see students' perseverance after treatment. The questionnaire instrument uses 4 scales namely always, often, rarely, and never. The perseverance questionnaire consisted of 30 statements, with 15 positive statements and 15 negative statements. The sampling technique used in the study was purposive sampling. Purposive sampling is used because in the implementation of mobile learning physics media the classroom requires that students have a smartphone with an Android operating system. The sample in this study was students of class XI IPA MAN 3 Sleman with the number of students 35. Learning was carried out on optics especially on eye material, glasses, and magnifying glasses. Learning is done within 2 hours of learning or 90 minutes. The problem-based learning model is used so that students solve optical problems related to everyday life contained in media applications.

The analysis technique is divided into two, namely the analysis technique with descriptive statistics and inferential statistics. Descriptive statistics are used to describe the distribution of student perseverance before and after learning. Student score data will be converted into qualitative data by categorizing in table 2. With the X value is the score obtained by students, X_i is the ideal average value that can be determined by adding up the maximum score and ideal minimum score then divided by two. Whereas SB_i is the ideal standard deviation value, which can be determined by the difference from the ideal maximum score with the ideal minimum score, then divided by six.

Table 2. Perseverance rate categories.

Perseverance interval	Categories
$X \geq X_i + 1.0\ SDi$	Very high
$X_i + 1.0\ SDi > X \geq X_i$	High
$X_i > X \geq X_i - 1.0\ SDi$	Low
$X_i < X_i - 1.0\ SDi$	Very low

Inferential statistics are used to determine whether the use of physics mobile learning media provides a significant increase in students' perseverance in learning. Paired t-test is used to determine this, but before the data obtained in the normality test first.

3. Results and Discussion

Data on the distribution of students 'perseverance before learning to use physics mobile learning media can be seen in table 3 and the percentage distribution of students' perseverance after learning to use physics mobile learning media can be seen in table 4. The data is the percentage of students at each level of perseverance consisting of very low, low, high and very high levels.

Table 3. Percentage distribution of perseverance before learning.

Perseverance interval	Categories	Percentage of number of students
$X \geq 90$	Very high	45.71%
$90 > X \geq 75$	High	48.58%
$75 > X \geq 60$	Low	5.71%
$X_i < 60$	Very low	0%

Table 4. Percentage distribution of perseverance after learning.

Perseverance interval	Categories	Percentage of number of students
$X \geq 90$	Very high	45.71%
$90 > X \geq 75$	High	48.58%
$75 > X \geq 60$	Low	5.71%
$X_i < 60$	Very Low	0%

Table 5. Average grade perseverance scores before and after learning.

Time	Total score	Average	Perseverance rate
Pretest	3084	88.1	High
Posttest	3086	88.2	High

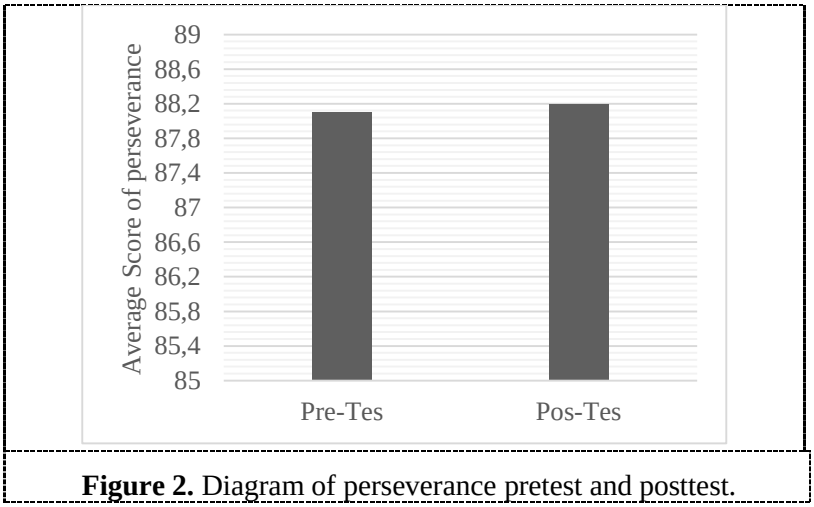

Figure 2. Diagram of perseverance pretest and posttest.

From the data in table 3 and table 4, we can see no change in the number of students in the distribution of student perseverance in learning physics. Where 45.71% of students had very high perseverance,

48.58% of students had high perseverance and the remaining 5.71% of students had low perseverance. Judging from the average scores obtained by students before and after learning using physics mobile learning media can be seen in table 5 and illustrated by the diagram shown in figure 2. The increase that occurs at the level of perseverance is very small, where before students learn in class, it has a high rate of perseverance and after learning, there is no change in the level of class perseverance. The inferential analysis is used to determine the increase that occurs in the class is significant. Previously conducted a research data normality test.

Table 6. Normality test.

Time	Shapiro-Wilk		
	Statistic	Df	Sig.
Pretest	.970	35	.444
Posttest	.969	35	.415

The normality test using SPSS helps get the results in table 6. From table 6 we get that the significance of the pre-test score and perseverance test post > 0.05 so that it can be concluded that the data is normally distributed, so it can be continued with the T-Paired test. The Paired t-test was carried out with the help of SPSS with the results in table 7.

Table 7. Paired t-test.

	Statistic	Df	Sig.
Pretest and Posttest	-0.572	34	0.57

From table 7 we get that the significance value is 0.57, this value is greater than 0.05 so it can be concluded that the increase in student's perseverance score is not significant.

The insignificant increase in the level of perseverance proves that there is no guarantee of the use of mobile media in increasing the effectiveness of learning [25]. Interviews conducted by researchers to students after learning stated that the learning time carried out using physics mobile learning was too short. So students are less able to feel the benefits of the implemented media. The use of mobile learning media like this should be able to create habits that can improve skills in the effective domain [20]. The affective domain is one of the domains in education that is difficult to change in only a short time, for example, perseverance in the field of education, requires more time to increase students' perseverance through habituation [8]. In addition to being practical and very helpful for teachers in learning, another response obtained by researchers from teachers who implement this media is the difficulty in controlling students in the use of smartphones while learning. The teacher still found some students who used their smartphones to open other applications besides physics mobile learning media. This has become one of the weaknesses in the implementation of mobile learning media because students sometimes lose concentration in the learning process using media on smartphones [21]. In an implementation, teachers should have the ability to integrate learning using mobile learning in the classroom and can create a learning environment that is conducive to learning using mobile learning [24]. In addition to factors from students and teachers, the implemented mobile media is adjusted to the situation of students in the classroom. So that there is a need for support from learning media developers so that the implementation of learning media has an impact on learning [25]. Other research in the implementation of mobile media, teachers not only replace learning using technology but also implement learning models that are appropriate for the use of media [23], [26]. There are many learning models and methods that can be used in implementing mobile media. In this study, researchers only replaced the learning activities of students who use books in smartphones, so learning the actual environment does not change. Appropriate if it does not include a significant increase.

4. Conclusion

The implementation of physics mobile learning media in optical learning cannot significantly increase student perseverance. This is due to the very limited implementation time, which is only one time, face to face or 90 minutes. Another thing that causes no significant increase in student perseverance is the lack of teacher control over students in using smartphones. In the learning process, some students open other applications besides physics mobile learning media which disrupts the concentration of students in learning. Also, the learning process is undertaken by teachers in implementing media only moves conventional learning into smartphones without adjusting the learning process using smartphones.

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