Application of BAPER Learning Media on Student Learning Outcomes

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Abstract. The learning process at the Universitas Muhammadiyah Palangkaraya in the Basic Science Course has not been fully maximized in the use of learning media. The purpose of this study was to find out the student learning outcomes in the sub-material sub-field from basic science subjects through the use of BAPER (BAwah PERmukaan/subsurface) learning media in the form of underground maps at the Campus II location of Universitas Muhammadiyah Palangkaraya. The research method used an experimental design pre-post control group design. The study population was third-semester students participating in the Basic Sciences Course at Universitas Muhammadiyah Palangkaraya. The results showed an increase from the pre-test score with an average of 65.71 to a post-test score with 85.29, as well as increase in psychomotor skills with an average pre-test score of 60 being a post-test score of 80. These results indicate an increase in student learning outcomes, both cognitive and psychomotor.

1. Introduction

One of the goals of Higher Education is to develop the potential of students to become human beings who believe and fear God Almighty and have noble, healthy, knowledgeable, capable, independent, skilled, competent, cultured, and have creativity [1][2]. Expectations for education, as outlined in the rule of law, emphasize all aspects of education, both lecturers or students, to carry out the learning process [3][4]. Meanwhile, the definition of creative and skilled is not yet maximally seen in the lecture process, especially in various universities, including in Indonesia [5][6].

The concept of learning Natural Science Basic on the material structure of the earth prioritizes the activeness of students to build their own knowledge, comparing new information with existing understanding, and using all the knowledge or experience they have to learn through the differences that exist in old and new knowledge to form a new understanding [7][8]. The use of instructional media is expected to provide a more in-depth understanding of students regarding the structure of the earth's layers [9]. For more details related to the structure of the earth in the crust layer, the researchers tried to develop a new learning object media called BAPER, an abbreviation of BAwah PERmukaan (subsurface) to describe student learning outcomes of the material. The media used is the result of development from previous research which concluded that from the electrical potential data that has been analyzed shows that the mapping of the subsurface layer has an anomaly in the form of minerals such as sulfide minerals, specifically in the position of 2.3-2.35 South Latitude and 113.905 East Latitude or in the Universitas Muhammadiyah Palangkaraya campus II area [10].

This study aims to determine the student learning outcomes for the sub-material of sub-field from basic science subjects through the use of BAPER. The output of this research will further prove the reliability of BAPER in increasing the effectiveness of student learning, especially for the related subject matter. The limitation of this study is that the research subjects are second-year students at Universitas Muhammadiyah Palangkaraya who take basic science subjects.

2. Methodology

The research method used an experimental design pre-post control group design. The experimental research method can be interpreted as a research method used to look for the effect of specific treatments on others under controlled conditions [11][12]. The design for the pretest-posttest group model was carried out as presented in Table 1.

Table 1. The pretest-posttest group design

Group	Pre-test	Treatment	Post-test
Control	T_1	-	T_2
Experimental	T_1	X	T_2

This research was conducted for four months from July to October 2019 at Universitas Muhammadiyah Palangkaraya. This research was conducted in the third semester students from Universitas Muhammadiyah Palangkaraya who took basic science subjects in the academic year 2019/2020 on non-exact study programs such as primary school teacher education, economic education, state administration, counseling guidance, Islamic education, madrasah ibtidaiyah teacher education, Islamic law, communication science, and information technology education. The number of subjects of this study were 60 people from various study programs and determined by the random sampling method. The control class consists of 25 students who are divided into six groups of between four to five people. While the experimental class numbered 35 people also divided into six groups containing five to six people.

The work stages of this research began with the determination of the control class and also the experimental class. As a control class determined is in the communication science study program, while the experimental class in the elementary school teacher education study program. The next stage is to pre-test the two classes. The pretest is done to find out the initial ability of students regarding the concept of the earth's structure in basic science subjects. After that, the experimental class was given treatment using BAPER learning media, while the control class did not use BAPER media but only a standard presentation using Microsoft PowerPoint. After the treatment is given, the measurement of the psychomotor skills is done through a psychomotor assessment sheet, which is followed by the implementation of a post-test to determine the final ability of student learning outcomes after receiving treatment [13]. Assessment for pretest and posttest questions is done using multiple-choice questions with a total of 20 questions with different items for the pretest and posttest.

3. Results and discussion

A comparison of the results of the pretest and posttest from the control and experimental class is presented in Table 2. Based on Table 2, it appears that the cognitive values obtained from the two classes both show an increase as a result of the learning process. However, the increase that occurred in the experimental class was higher than the control class (19.58 versus 15.00). The increase was quite high, reaching almost one-third of the value in groups not treated with BAPER learning media. However, each group of students showed a varied increase ranging from 5 to 17 points. This shows that the use of BAPER learning media influences student learning outcomes.

Table 2. Results of cognitive learning outcomes

Student group	Control class		Experimental class	
	pretest	posttest	pretest	posttest
A	61.25	75	65.83	85.83
B	47.5	72.5	65.83	81.67
C	63.75	68.75	63.33	78.33
D	65	81.25	65	85.71
E	61.25	73.75	66	89
F	61	78	69	93
Average	60.00	75.00	65.71	85.29

A comparison of the results of the psychomotor assessment sheet for each control and experiment group is presented in Table 3. The results obtained show a linear pattern with the results of cognitive tests, where the experimental class showed a higher increase than the control class (20 versus 10). About the increase in psychomotor scores also varies greatly, where there are groups of students who have increased up to 30 points in the group given treatment, and there are those who did not experience any increase at all in the group that did not get treatment.

Table 3. Results of psychomotor skills outcomes

Student group	Control class		Experimental class	
	pretest	posttest	pretest	posttest
A	60	70	60	90
B	60	60	60	70
C	60	70	60	70
D	60	80	60	90
E	60	60	60	80
F	60	80	60	80
Average	60	70	60	80

Qualitative observation shows that student worksheets from groups of students who are treated with learning media BAPER that discuss the earth's structure in the lithosphere are better able to understand the structure of the earth's layers. Two-dimensional illustrations produced by students can resemble the results produced from previous experiments by Kartini and Dewi, where there is an anomaly of the assumption that the measured self-potential is caused by differences in ion concentration in the medium or soil coating [10]. Some of them are between the layers of sand and clay or between mediums containing freshwater and saltwater, the presence of liquid water (groundwater) in the soil coating [14], where water in the soil contains ions that cause potential emergence at the soil surface, and the presence of mineral content in the form of sulfide compounds [15]. The composition results in an estimated location of 2.3-2.35 South Latitude and 113.905 East Longitude, which shows the coordinates of the Universitas Muhammadiyah Palangkaraya campus II area.

4. Conclusion
This research shows that BAPER learning media can improve student learning outcomes, both cognitive and psychomotor. The improvement shown is quite significant, where the increase in psychomotor learning outcomes is more dominant than the cognitive results. Further research is needed with a higher number of classes and students and was carried out by other lecturers on other universities. Development is also needed to be applied to sub-materials and other subjects related to underground surface structures.

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