

The Effectiveness of Student Worksheets Based on Project and Integrated Information Technology in Geometry Space Subject

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Abstract- Student learning outcomes in Space Geometry subject are still low in Mathematics Education Department STKIP PGRI Sumatera Barat. This caused the lecturers and students still use teaching materials in the form of old published textbooks whose language is not communicative so that it is difficult to understand. Lecturers have created student worksheets but the expected learning outcomes cannot motivate students to be active, creatively and independently involved in carrying out the learning process. Therefore, they have been developed student worksheet based on project and integrated information technology in the subject of Space Geometry. The aim of this study was to determine the effectiveness of student worksheets based on project and integrated information technology in the subject of Space Geometry. This type of research is a quasi-experimental study with the design of one group pretest-posttest design. The study population was students of the Mathematics Education Department at STKIP PGRI Sumatera Barat in the 2015/2016 academic year consisting of 3 classes. The sampling technique was done by purposive sampling. The use of student worksheets based on project and integrated information technology can significantly improve student learning outcomes in Space Geometry subject in the mathematics education department at STKIP PGRI Barat Sumatera

Keywords- effectiveness, student worksheets, project-based learning, the subject of Space geometry.

I. INTRODUCTION

National education aims to empower all Indonesian citizens to develop into quality and proactive human beings to answer the challenges of an ever-changing era. Students need to be prepared to face the challenges of the future, able to think critically, systematically, logically, creatively, and able to solve problems (Daryanto and Aris, 2014). This will be achieved if the learning process given to students is in accordance with the Process Standards, contained in the Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 65 of 2013. The process of learning on a standard process is interactive, inspiring, fun and challenging, motivating students to actively participate and providing sufficient space for initiative, creativity, and independence in accordance with the talents, interests and physical and psychological development of students.

In fact, student learning outcomes in Space Geometry subject are still low and still below the standard in the Mathematics Education Department STKIP PGRI Sumatera. This is caused by the lecturers and students still using teaching materials in the form of old published textbooks that the language is not communicative so that it is difficult to understand. Lecturers have created student worksheets but the expected learning outcomes cannot motivate students to be active, creatively and independently involved in carrying out the learning process. Therefore, they have been developed student worksheet based on project and integrated information technology in the subject of Space Geometry. Student worksheets based on project and integrated information technology can facilitate students to find their own concepts according to their knowledge and skills (Chu, 2017). The use of student worksheets based

on proyek can encourage the creation of independent, interactive, inspirational, challenging, and motivating students in the learning process and will make learning more effective and efficient (Erkul and Kargin, 2014). The aim os study was to determine the effectiveness of student worksheets based on project and integrated information technology in the subject of Space Geometry.

II. METHODS

This type of research is a quasi-experimental study with the design of one group pretest-posttest design. The study population was students of the Mathematics Education department at STKIP PGRI Sumatera Barat in the 2015/2016 academic year consisting of 3 classes. The sampling technique was done by purposive sampling. Data analysis techniques learning outcomes about the effectiveness student worksheets based on project and integrated information technology, with the formulation:

$$t = \frac{M_d}{\sqrt{\frac{\sum X^2 d}{N(N-1)}}}$$

III.

IV. Tests are carried out with reject criteria if, with a significance level of 0.05 (Arikunto, 2005)

V.

III. RESULTS AND DISCUSSION

Student worksheets based on project and integrated information technology in the subject of Space Geometry are arranged based on the stages contained in Project Based Learning. Student worksheets consist of 6 learning activities with Prisma and Limas material. This student worksheet discusses the properties, elements, networks, volume, and area of building space. Each section examines the results of the answers, students involve the Wingeom software to get problem-solving. Students find it easier to understand the nature of space and make networks build space after they are taught using Wingeom software.

Project-based learning steps: a. Start with the Essential Question. b. (Design a Plan for the Project c. Create a Schedule. Monitor the Students and the Progress of the Project. Assess the Outcome. Evaluate the Experience. This research was conducted on the subject of prism by discussing the characteristics and prism elements, prism nets, and volume and area of prism The study was conducted in 5 (five) meetings. The implementation of learning began by giving a pretest to determine the level of students' understanding of the material to be studied then students were divided into small groups Furthermore, at the second meeting held in a computer laboratory and students learn to use student worksheets with material and prism elements, students are given problems on the basic questions, students are asked to design project implementation, to evaluate their work. third meeting Working in groups can improve their way of thinking can not solve the problem better (Sudjana, 2002). Students emphasize their work and others respond and ask questions, then the lecturer gives reinforcement. At the end of the meeting, posttes were given to students who followed the geometry of space geometry. Posttest results can be seen in Table 1

Table 1. Results of pre-test and test post

Type of test	Mean	S	X _{max}	X _{min}
Pre-Test	51.52	40.09	79	25

Post-test 73.95 61.3 86 60

Calculation performed by test, the value of $t_r = 5.12$ with $N = 23$ and $\alpha = 0.05$, while $t_{table} = 1.68$. If the value of $t_r > t_{table}$, then H_0 is rejected. So it can be concluded that the average student learning outcomes are better than the average student learning outcomes before using project-based student worksheets and integrated information and communication (Figure 1).

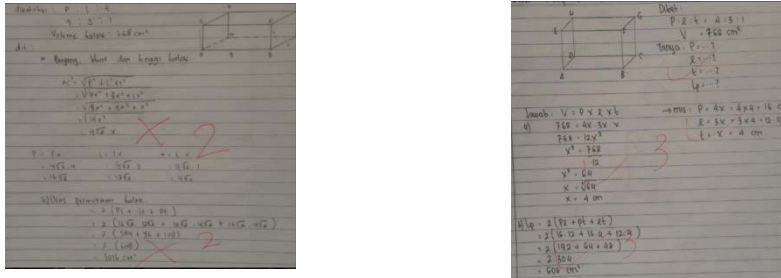


Figure 1. Results of student answers

Based on Figure 1, it can be seen that students have not been able to restate a concept and apply concepts or algorithms in problem-solving. Furthermore, in the posttest answers students have begun to be able to use formulas. This is due to the use of student worksheets based on project and integrated information technology. This student worksheet can help students add information about concepts learned through learning activities systematically and be able to enhance students' creativity and critical thinking (Garcia, 2016). The effectiveness test of student worksheets based on Mastery learning in Genetics subject can improve student learning outcomes (Megahati and Yanti, 2017).

Project-based learning is a systematic learning method that is able to involve students to improve their knowledge and skills through a structured process, real and rigorous experience designed to produce a product (Ravits, 2008). Student worksheets based on project and integrated information technology facilitate students to find their own concepts in accordance with their knowledge and skills (Chu, 2017). The use of student worksheets based on project can encourage the creation of independent, interactive, inspirational, challenging, and motivating students in the learning process and will make learning more effective and efficient (Ergul and Kargin, 2014). Project-based learning can improve cognitive abilities and skills of students in the learning process (Sart, 2014). The use of teaching materials based on project-based learning can make students actively and enthusiastically involved in following the learning process (Habok and Nagy, 2016).

IV. CONCLUSION

The use of student worksheets based on project and integrated information technology can significantly improve student learning outcomes in Space Geometry courses in the mathematics education program STKIP PGRI Sumatera Barat.

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