Development of mathematic learning devices using Project Based Learning on a flat side room

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Abstract. Project based learning is a teaching model that systematically involves students in learning knowledge and skills through a process of inquiry. This study aims to develop learning tools on flat-sided building materials with PjBL in order to produce valid, practical and effective tools. This research includes development research, namely Analysis, Design, Development, Implementation, Evaluation. Based on the validity trial data, the learning tools that have been validated and revised are in the valid category based on the evaluation of the three validators who gave valid statements. There are 5 students who complete the learning process or 83%, so it is stated that the learning tools developed are effectively used in learning. Practical learning devices are in accordance with the responses or responses of all students who are positive and because the three validators state that the tools are practical and can be used. The results obtained can be concluded that the learning device with PjBL on the material of the flat-sided shape that has been developed meets the valid, practical and effective categories so that it is suitable for use.

1. Introduction

Education is an endless topic to discuss because the educational process takes place in every life cycle and follows the times and is adapted to needs. Developments in the field of education can be seen in government policies to change the education curriculum from year to year. The aim is none other than to achieve an advanced and reliable human resource (HR) in various fields. The world of education, which consists of educators and students, is the target of various changes implemented by the government in the field of education.

Educators, namely teachers are a key or one of the determining factors in education to improve human resources that are more qualified and competitive. The teacher is said to be a key determinant of the success of students because the teacher is a bridge of knowledge and knowledge in the learning process. Therefore, the professional attitude of teachers is needed to achieve the goal of increasing human resources. Efforts to increase human resources through learning activities require a professional attitude of teachers not only in classroom attitudes and management, but also on the completeness of administrative support for learning, namely learning tools consisting of syllabus, details of effective weeks, semester programs, annual programs, KI / KD mapping, lesson plan (RPP), student worksheets (LKPD), evaluation of learning outcomes (EHB), educational calendar.

Learning tools, namely RPP, LKPD and EHB are a design used by teachers in learning activities, therefore learning tools should have good quality in order to produce a good and systematic learning process. A good learning process is determined by the quality of the teacher as a teacher and the tools
used, but good learning outcomes also depend on the conditions of students at school. The condition of the school, teaching staff and students will move forward in a better direction, influenced by various factors that come from outside and from within the school. This influence can bring benefits as well as the opposite, namely losses for the school education system. Like some of the problems that the researchers found from the results of interviews and observations at 9 public junior high schools in the Touluaan, the learning process was still dominated by teachers.

Teachers are still the center of attention in learning activities because during the transition of the curriculum from the KTSP curriculum to the 2013 curriculum. The LKPD used do not attract the attention of students fully to learn and often do not use LKPD in the learning process. The evaluation of learning outcomes shows that the results are not too good because the average score of students has not reached the minimum completeness criteria (KKM), namely 65. Lack of independence in solving problems results in teachers having to solve problems that should be done by students.

The problem of students' self-confidence to appear in learning activities is also a challenge for learning progress. When given time for students to argue in learning activities there is no response, so that communication only goes one way and learning is created that is only teacher-centered. The problems of students in learning are more detailed in mathematics at 9 public junior high schools in the Touluaan, it turns out that students are more likely to use memorization techniques rather than understanding problems. So that the material of flat-sided shapes, especially in the material of cubes and blocks, there are difficulties for students to understand the use of formulas, even for drawing the shapes of flat-sided shapes.

Students are not able to distinguish what kind of shape and shape it is. Therefore, it is necessary to change the way of learning and the mindset of students towards math problems. Changes in students depend on the teacher's strategy to process learning through learning models and even other supporting media that are right for the problems encountered.

Teachers must arrange learning tools that are in accordance with the character and environment of students at school. Learning devices are things that must be prepared by the teacher before carrying out learning.

In the KBBI's Big Indonesian Dictionary [1], a device is a tool or equipment, while learning is a process or way of making people learn. So, learning devices are tools or equipment that must be prepared by the teacher which is the teacher's way of making students learn. In this case the authors highlighted valid and reliable lesson plans, LKPD, and EHB learning tools. Talking about RPP, according to Permendikbud Number 81A of 2013 concerning Implementation of the General Guidelines for Learning Curriculum, that the first stage in learning according to the standard process is learning planning which is realized through the preparation of a Learning Implementation Plan (RPP) [2].

Furthermore, it is explained that the lesson plan is a learning plan that is developed in detail from a specific subject matter or theme that refers to the syllabus. Next is LKPD which is a worksheet that must be answered by students. According to the Ministry of National Education (2007) [3], LKPD is a sheet containing tasks that must be done by students. The tasks ordered in the LKPD must refer to the basic competencies that will be achieved by students.

To measure the achievement of students, namely the evaluation of learning outcomes. EHB is one of the most widely used measuring tools to determine a person's success in a teaching and learning process or to determine the success of an educational program. Increased or not the ability of students will be seen through the test results given to students.

2. Formulation of the problem
How are the results of the development of learning materials for the Flat Side Building Space using Project Based Learning that meet the valid, practical and effective criteria?

3. Research methods
The research method used is a type of research and development. Research and Development aims to produce a new product through the development process. Research activities are integrated during the
product development process. Research and development products in education can be in the form of models, media, tools, books, modules, evaluation tools and learning tools; curriculum, school policies, and others as stated by Mulyatiningsih [4].

4. Research results
The analysis stage in this research includes needs analysis, curriculum analysis, and character analysis of students. RPP and LKPD are arranged in three meetings, EHB as many as five items. This initial design is prototype 0.

At the development stage, researchers brought prototype 0 to be developed. This assessment is carried out to determine the validity and feasibility of learning tools developed in the form of lesson plans, student worksheet, and EHB. Learning devices that have been approved by the supervisor are then validated by validators, namely expert lecturers and mathematics subject teachers. The results of device validation that have been declared valid by the validator are referred to as prototype 1.

The prototype 1 learning device can be applied after going through the validation process by the validator and revised again by the researcher when there are suggestions from the validator. Products that have gone through the trial process on research subjects are revised according to the results in the field to improve the product. The results of the revisions that have been tested are referred to as prototype 2.

5. Research discussion
The three validators gave ratings of 4 and above, meaning that the components in the lesson plan got a good assessment. The three validators concluded that the lesson plan could be used with a few revisions. The three validators gave an assessment of 4 and above, meaning that the components in the LKPD received a good assessment. The three validators concluded that LKPD could be used with minor revisions.

The evaluation of the three validators of the EHB component is valid, for content validity, very understandable and understandable for language and question writing. And can be used without revision for the recommendations of this test. Respondents gave ratings of happy and very happy, clear and interesting. Of the 6 respondents, all of them were happy with the device used. The three validators gave good responses in the questionnaire so that the instrument was considered practical by the validator. The percentage of students completeness is 83%. This shows that the learning tools developed are effective in their use in learning activities.

6. Conclusion
- Development research conducted at 9 public junior high schools in the Touluaan with the research subjects of grade VIII students for the 2019/2020 academic year has produced a valid, practical and effective learning tool after being tested and has gone through the validation process.
- The tools developed are RPP, LKPD, EHB with project based learning on the material of flat-sided building.
- Validated learning tools produce valid data because the three validators provide valid assessments.
- In terms of practicality, the practical learning tools are in accordance with the positive responses or responses of all students and because the three validators state that the tools are practical and can be used.
- Effective learning tools in terms of response of all students to learning, student activities and good EHB, namely the percentage of classical completeness of 83%.
References

[1] KBBI's Big Indonesian Dictionary 2007
[2] Permendikbud Number 81A of 2013
[3] Ministry of National Education 2007
[4] Multytianingsih 2012 *Metode Penelitian Terapan Bidang Pendidikan* (Bandung: Alfabeta)