The Validity Of Learning Devices Of Cooperative Models Based On Blended Learning To Improve Learning Outcomes

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Abstract: Less active and low learning outcomes of students influenced by the learning model used. Among innovations is using technological developments. Therefore, a study was conducted involving the development of learning devices. The research carried out was the development of cooperative learning mathematical learning tools in the form of Blended Learning Based on Student’s Worksheets. This study aims to produce a blended learning based learning tool that is practical to improve student learning outcomes. This development research uses the Plomp model which consists of three phases namely the initial preliminary phase, the prototyping phase, and the assessment phase. The subjects of this study were 10th-grade Islamic senior high school student of KMM Kauman Padangpanjang. The validation sheet conducted by three mathematical education experts, one educational technologist expert and one Indonesian language expert obtained an average score of 97. The student’s mark of each meeting also increases with an average score of 83. Based on these results we conclude that instrument of the cooperative mathematics learning model based on blended learning is valid.

1. Introduction
Mathematics as a science that underlies the development of modern technology, has an important role in various disciplines and advances the power of human thought. Mathematics learning is needed in life. Mathematics is needed, both for everyday life and in the face of advances in science and technology [1]. Mathematics is also very helpful in advancing science and technology as we use it now. Along with the development and progress of science and technology that is increasingly rapid, the world of education also needs to innovate or renew in various fields, including in its implementation strategy. As an educator, the teacher must be able to develop his ability to follow the development of science and technology (science and technology). Technology can be used as a means of supporting learning, such as learning media that support the achievement of learning objectives.

Based on the results of interviews with the X grade math teacher at one of the Madrasah Aliyah in Padangpanjang, it was found that students had been facilitated with Wi-Fi and they were encouraged to bring laptops/notebooks to school but had not been fully utilized. Learning is still dominated by teachers and the low learning outcomes of students in the cognitive field, seen from the results of the mid-grade X Religious Class assessment of TP 2018/2019, students from 38 students, 82% of their grades are below the minimum achievement criteria.
One way to make active students is by cooperative learning. Cooperative learning is a form of learning by means of students working in small groups collaboratively whose members consist of four to six people with heterogeneous group structures[2]. This definition implies that Cooperative is learning based on learning in small groups that emphasize students both individually and in groups.

Blended learning comes from the word blended which means combination/learning and learning which means learning. Technological advances have an influence on the methods of learning carried out at school. Blended learning is learning that combines learning delivery strategies using face-to-face activities, computer-based learning (offline) and online computers (internet and mobile learning) [3]. Blended learning is a combination of face-to-face learning and online learning so that instruction occurs both in class and online or outside the classroom, and where online learning becomes a continuation of learning in the classroom [4]. Integrated learning (blended learning) is the integration of face-to-face learning experiences with online learning experiences [5]. From some of the opinions above, it was concluded that blended learning is learning that combines face-to-face learning in class and outside the classroom by utilizing internet media as a communication learning tool (online learning). The blended composition that is often used is 50/50 which means 50 percent face to face and 50 percent online learning. Some also make 75/25 or vice versa, it depends on the needs and competency analysis to be achieved. In this study, researchers took a composition of 50/50 learning. Learning outcomes with blended learning are higher than learning the only face to face [6]. In this study face-to-face learning in the classroom is done using the developed lesson plan and student’s worksheet. Students are given the opportunity to communicate remotely with the teacher through a blog or email as a form of online learning.

In this study face-to-face learning in class using lesson plan for Teachers assisted with student’s worksheet. As for online learning, use blogs and e-mail. The blog that is used with the address https://alfahusaini.blogspot.com/ and e-mail address alfahusaini@gmail.com. e-mail is also used as a means of sending assignments to the Teacher. In online learning, students are given the opportunity to find additional sources of teaching material on the internet, so as to add teaching materials to students.

Laptops/notebooks are used as online communication media between teachers and students, laptops/notebooks are also used to find learning materials and send assignments to teachers via e-mail that has been provided. Learning with technology media can increase the value of students, their attitude towards learning and evaluation of their learning experiences [7]. With advances in technology, especially in internet access, it is very beneficial for education because of its ability to process large amounts of data. Besides that, the internet can be a medium in online learning. Mathematics teachers are expected to take advantage of learning in the 21st Century as a tool to enrich students’ knowledge and interests [8]. The advantage is to take advantage of existing technological developments to support the achievement of better learning outcomes.

That online learning can strengthen learning efficiently [9]. In online learning in this study more learning is focused on online discussion. It is also not possible for students to search for materials widely on the internet. Online discussions provide opportunities for students to freely ask teachers without having to be hindered by shame. Online learning also gives students and teachers the flexibility of time to ask questions and answer questions. In this study, researchers used blogs and e-mail to send assignments or things related to learning with the address mentioned earlier.

As a study guide in class, Student Worksheets is sheets that contain tasks that must be done by students[10]. Worksheets are usually in the form of instructions, steps for completing a task. A task ordered on a worksheet must be clear on the basic competencies to be achieved. Student worksheets are learning tools as a compliment or supporting means of implementing learning plans in the form of worksheets that contain information and questions that must be answered by students [7]. the statement shows that student’s worksheet is part of a device that can be developed according to teaching material.

With the advancement of science and technology, education practitioners must follow these developments. Teachers must be able to choose the right approach, strategy, model and/or teaching method to teach mathematics and to make learning more meaningful, easy to understand and useful for
current students and future life [11]. This can be done by using the development of the technology itself in learning.

Based on the understanding of learning outcomes above, the writer can conclude that the learning outcomes are a result obtained by students after the students carry out learning and learning activities as well as evidence of the success achieved by someone involving cognitive, affective and psychomotor aspects, expressed in the symbol, letters, and sentences. The purpose of this research focus is on the cognitive domain.

2. Materials and Methods

The type of research carried out is research and development which aims to produce learning devices that are valid and appropriate to the conditions in the field. Research and Development is a research method used to produce certain products and test the effectiveness of these products [12]. The product to be developed is a mathematics learning device consisting of student’s worksheet for 10th grade Islamic senior high school.

The development model is a set of sequential procedures to carry out the design and development of learning that is manifested in the form of diagrams or narratives. The development model used is Ploomp’s model. Which was developed by Tjeerd Ploomp. It consists of three stages, namely the initial investigation stage (preliminary research), the stage of developing or making a prototype (development or prototyping phase) and the assessment phase. Ploomp model’s have used by many researchers in the development of mathematics learning tools, for example see [13], [14], [15], [16]. Each phase is explained in Table 1.

| Table 1. Development Phase in the Ploomp’s Model |
|-----------------------------------------------|
| Fase                                         | Aktivitity                                      |
| Preliminary research                        | Problem analysis and literature studies         |
| Prototyping phase                           | Development of the prototype to be tested and revised based on the formative evaluation, the initial prototype was carried out through expert assessment |
| Assessment phase                            | Assess whether users can use the product (practicality) |

Source: [17]

The instruments used to collect data are validation sheets and test sheets. Both instruments were validated before use. The steps taken to determine the validity of the student’s worksheet based on the validation sheet data obtained as follows:

a. Score the answers on data validation sheets, then arranged according to Likert scale refers to Table 2.

| Table 2. Score Answers on Validity |
|-----------------------------------|
| Alternative Answers | Score |
| Strongly agree          | 4     |
| Agree                 | 3     |
| Disagree              | 2     |
| Strongly disagree      | 1     |

Source: [18]

b. Determine the average of each item using the formula:

\[
\bar{x}_i = \frac{\sum_{i=1}^{n} x_i}{n}
\]  

[19]
\[ \bar{x}_i = \text{Average of each item} \]
\[ x_i = \text{Score given by validator-i} \]
\[ n = \text{Number of validators}, \]

c. Determine the validity of each item using the formula:

\[
\text{Validity} = \left( \frac{\text{average score for each item}}{\text{maximum score for each item}} \right) \times 100
\]

The validity obtained are grouped according to the student’s worksheet validity criteria in Table 3:

| Percentage Range | Criteria          |
|------------------|-------------------|
| 0 – 20           | Not valid         |
| 21 – 40          | Less valid        |
| 41 – 60          | Valid enough      |
| 61 – 80          | Valid             |
| 81 – 100         | Very valid        |

Source: [18]

Then analyze the results of observations in the learning process, as well as analyze the results of interviews. Learning outcomes of students are calculated based on individual completeness obtained by students. Assessment of learning outcomes tests aims to see learning outcomes within the planned timeframe while using the developed student’s worksheet. Granting learning outcomes test scores by:

\[
\text{Test scores for learning outcomes} = \left( \frac{\text{scores obtained by students}}{\text{maximum score}} \right) \times 100
\]

3. **Results And Discussion**

This cooperative learning model of mathematics based on blended learning requires students to be active in learning, besides being active in group discussions, students are also required to be individually active in understanding teaching material, by finding learning resources especially using internet access, students can also actively conduct online discussions, both discussions with teachers and with fellow students. It expected to improve student learning outcomes [20]. Which has proven that learning based on blended learning can improve student learning outcomes. After expert validation, the average value obtained by experts is 97. The details are in Table 4:

| Assessment Indicator | Validation Value |
|----------------------|------------------|
| Purpose              | 100              |
| Rational             | 90               |
| Fill in              | 97               |
| Characteristics      | 98               |
| Language             | 97               |
| Physical form        | 98               |

Based on the validity criteria on Table 3, the validity of this instrument intervals of 81 to 100, or very valid. After obtaining a valid device, a try out was carried out. Can be seen in the graph that there is an increase in learning outcomes at each meeting as in the following graph. Try out done for some meeting and student’s achievement can be seen in Figure 1.
Figure 1. Obtaining the average value of students

The decline in the 4th meeting is because the value taken is the daily test score on the basic competencies taught. However, this value has met the requirements of Minister of Education and Culture No. 81A in 2013 which stated that students were said to be complete if more than or equal to 75% of students scored above minimum achievement criteria.

4. Conclusion
Based on the results of the research, it has been produced learning devices that is very valid. According to the characteristics of student’s worksheet based on blended learning, it improve learning outcomes.

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