Development Of Learning Media Based On Interactive Multimedia In Mathematics Learning For Class VIII Junior High School In Indonesia

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Abstract:— Learning outcomes found in several schools are still low. This happens because students lack an understanding of mathematical problems related to real-life around students so students are less creative in thinking. This is due to the learning media used by teachers that have not been implemented optimally. One effort that can be done to overcome these problems is to use interactive multimedia-based learning media on mathematics learning for grade VIII of junior high school students that are valid, practical and effective. This type of research is the development (Research And Development) using the Plomp research design. The Plomp development model consists of three stages of development, namely: preliminary research, development or prototype phase, and assessment phase. Data collection instruments used were validity sheets, practicality sheets by teachers and students, observation sheets and objective questions. The data analysis technique used to measure effectiveness is the Kolmogrov Smirnov test to test normality, and the Paired T-Test to test hypotheses. The purpose of this study was to reveal the validity, practicality, and effectiveness of interactive multimedia-based learning media on mathematics learning for students of class of junior high school. The results showed that multimedia obtained value with a very valid category that is 81%. The results of the practicality assessment conducted by the teacher were 90.60% and students were 89.21% obtained by multimedia with a very practical category. Multimedia effectiveness test results on cognitive competency have very effective criteria.

Index Terms:— Interactive Multimedia, Mathematics, Junior High School

1. INTRODUCTION

Mathematics is a basic science that must be possessed by students at various levels of education. Mathematics is studied by all levels of the education unit, starting from elementary school (SD), junior high school (SMP), and senior high school (SMA). This is because mathematics is a science that is considered important in the development of science. Mathematics is one of the subjects that is very closely related to other sciences. In line with the opinion of Erman Suherman states that mathematics is the queen and servant of science [1]. Given the enormous role of mathematics at every level of education, the mathematics lessons in schools must have good quality, but the results of learning mathematics students are still not by what is expected. The low mathematical ability can be seen from the results of the Program for International Student Assessment (PISA) which places Indonesian students at the lowest rank compared to other Organisation for Economic Co-Operations and Development (OECD) countries [2]. One of the government’s steps to deal with this problem is by improving the curriculum, improving facilities and infrastructure, applying various teaching methods and strategies. One of them is applying the learning process with a scientific approach which consists of observing, thinking, trying, reasoning, associating, concluding, and communicating to all subjects as well as mathematics. [1] This is because the steps of the scientific approach can provide more understanding to students so that they are expected to be able to improve student learning outcomes.

The problem of low learning outcomes also occurs at SMPN 1 Pariangan. From the results of observations made to a school, mathematics learning outcomes in class VIII junior high school 1 Pariangan obtained are still low. This can be seen in the midterm (UTS) and final exam (UAS) scores of the last 2 years that most students have not yet reached the specified Minimum Mastery Criteria (KKM). One reason is that the media used does not provide a learning experience for students. The limitations of the media on learning cause students to be less able to understand learning material. Teachers’ limitations in developing media are also one of the reasons students do not understand mathematics subject matter. Based on interviews and observations obtained information that the teacher only uses mathematics textbooks, mathematical modules to convey material, and in certain material uses powerpoint media. While students only use textbooks as a guide in the learning process, so the learning process is only focused on textbooks. This is in accordance with research conducted by Chumaidi in class X of Wahid Hasyim Model High School, found that teachers still use the media in the form of Electronic School Books (BSE) and Student Worksheets (LKS) with the lecture method, and discussion, so that the motivation of students in following the learning process is reduced [3]. Based on the results of interviews conducted by researchers with one of the mathematics teachers at junior high school 1 Pariangan who stated that the implementation of the mathematics learning process was by the established curriculum. The teacher has delivered the material by the syllabus of mathematics learning in the classroom, but the use of instructional media in the classroom is still not optimal. This is because the teacher's skills in developing media are not good enough so that assistance is needed in media development. The use of media in learning mathematics must be the center of attention for teachers. A teacher must be able to create learning media that can support and motivate students in learning [4]. so that there is good communication between students and teachers, to be able
to improve student learning outcomes. Learning media are aids to teachers in teaching as well as a means of carrying messages from learning sources to recipients of messages to students. So, learning media is the delivery of information, stimulates the mind, and encourages an interesting learning process and learning objectives are achieved easily [5]. One of the media that can be developed is interactive multimedia using Macromedia Director software. The software supports the development of interactive multimedia that contains text, images, videos, sounds and animations [6],[7]. The use of interactive multimedia can use a laptop or computer. Interactive Multimedia is packaged in exe format so that it can be directly run without installing each of this software. Interactive multimedia is felt to provide an interesting learning process and can improve student learning outcomes. Based on the description above, the researcher is interested in conducting development research with the title "Development of Learning Media Based On Interactive Multimedia in Mathematics Learning for Class VIII Junior High School"

2. METHODS
This type of research used in this research is research and development. According to Sugiyono the research development method is a method used to produce certain products and test the effectiveness of these products [8]. The development model used in this study is the plomp model. This development model consists of three stages, namely preliminary research phase, development or prototyping phase and the assessment phase [9],[10]. The preliminary research phase aims to clearly define product details in the form of learning tools to be designed. Activities carried out at the initial investigation stage include the analysis of problems and needs, analysis of student characteristics, curriculum analysis, and concept analysis. Analysis of problems and needs aims to get information about the problems contained in mathematics learning. Characteristics analysis of students aims to determine the characteristics of students, desirable learning and media preferred by students. Curriculum analysis aims to determine the goals and objectives of learning mathematics. Concept analysis aims to determine the content and subject matter needed. At the development or prototyping phase, the activities carried out are the development of Interactive Multimedia products accompanied by formative evaluations aimed at improving and improving the quality of the products being developed. Furthermore, the learning device that has been designed is validated. Two stages are invalidating the learning tools, namely self evaluation using a checklist and expert review by five experts. After the revision is based on the validator's suggestion and the learning device is said to be valid then proceed with a one-to-one evaluation trial. One-to-one evaluation trials were conducted on three students of class VIII of junior high school 1 Pariangan. The results of the revision in the one-on-one trial phase were followed by small group evaluations. A small group evaluation was carried out on three students. At this stage, the practicality of learning tools on a small scale is seen. The results of the analysis and revision obtained in the evaluation of small groups were tested on large groups (field tests). Large group evaluations are carried out in one class at junior high school 1 Pariangan. This large group test aims to see the practicality and effectiveness of learning tools. Furthermore, the assessment phase is a semi-summative evaluation phase which aims to determine the effectiveness of the product that has been produced at the development or prototype phase. Data collection instruments used in the preliminary research stage were questionnaires for students, interview sheets for teachers and students, and observation. The validity instrument is its self-evaluation in the form of a checklist and an expert validation instrument. Practical instruments are student questionnaires, teacher questionnaires, and observation of learning implementation. The effectiveness instrument is the result of the student's final learning test.

3. RESULTS AND DISCUSSION
This research was carried out based on the stages of the development of the Plomp model consisting of the preliminary research phase, the development or prototyping phase, and the assessment phase. In the initial investigation phase, several activities were carried out including the analysis of problems and needs, analysis of student characteristics, curriculum analysis, and concept analysis. Based on the results of the analysis of the problems and needs obtained information that the mathematics material class VIII is very much and dense, but during the learning process teachers still often do the learning process with the lecture method, the teacher is also still not optimal in the use of instructional media. This is due to the limited resources obtained and the limited ability to use media. The analysis of students' analysis information is carried out with interview guidelines. In the analysis of student characteristics seen from the way of learning, students, in general, are more interested in learning by using media. This is because learning media makes students unsaturated in learning and provides motivation and ease in understanding concepts. Based on the results of curriculum analysis, the subject matter of mathematics lessons is learned by students of class VIII of junior high school 1 Pariangan in the even semester, namely Pythagoras, building flat side spaces, circles, statistics, and opportunities. In the concept analysis stage, information is obtained that in learning mathematics, teachers use teaching materials in the form of textbooks and students in the form of worksheets. While for instructional media, teachers use media in general such as rollers, books, and occasionally use powerpoint media. Based on the results of preliminary research, activities will continue at the development or prototyping phase. The product designed is an interactive multimedia-based learning media. After the process of designing and making interactive learning multimedia is completed. The results of making media are called prototype I. The next stage to be carried out is self-evaluation using a questionnaire in the form of a checklist. Furthermore, the results of product validation were evaluated by 5 experts using an interactive learning multimedia validation questionnaire. The validation results obtained an average value of learning media based on interactive multimedia of 81% (very valid). The next step is to revise interactive multimedia based on expert advice. After the revision process is complete, the interactive multimedia learning media product is called the prototype II. At the prototype II development stage, the formative
evaluation activities carried out were one-to-one evaluation. At this stage involved three students with different levels of ability (high, medium, and low). After the one-on-one evaluation activity, a revision of the activity was carried out such as font size, background, and the addition of some sound effects. After doing the One to one evaluation test, a trial is carried out in a small group (Small Group Evaluation). This trial was conducted on 6 students who have different levels of ability. The trials conducted at this stage aim to see the practicality of media use. The results of interactive multimedia practicality are classified as very practical with a score of 81.09%. Although classified as very practical, there are still some revisions made such as the addition of several learning videos. After the revision is complete, the activity is continued at the large group trial stage (Field Test). The trial was conducted in one of the eighth-grade students of junior high school 1 Pariangan, totaling 18 people for six meetings. At this stage, the VIII grade mathematics teacher at the school becomes a teacher and researcher as an observer. After all, meetings are completed, a questionnaire is given to students and teachers. The provision of this questionnaire aims to measure the practicality of interactive multimedia-based learning media. Based on the results of the teacher practicality questionnaire of multimedia used during learning, the results obtained that multimedia used is very practical with a figure of 90.60%. Based on the results of the practicality questionnaire by 18 students on interactive multimedia obtained an average practical multimedia test results of 89.21% with a very practical category. With the data obtained from the practicality questionnaire of teachers and grade VIII students of junior high school 1 Pariangan, it can be concluded that interactive multimedia-based learning media designed are very practical. The next stage is product effectiveness testing. The effectiveness test is done by assessing students’ learning competence in the cognitive domain. Cognitive domain competence is carried out by giving learning outcomes tests to students of class VIII at junior high school 1 Pariangan. The question is given to test the level of students’ understanding of the material that has been learned. The test given was 15 objective questions. This test was conducted by 36 students, where 18 students took the test after following the learning process using interactive multimedia called the experimental class and 18 other students took the test after following the learning process without using interactive multimedia called the control class. The average student test results of the experimental class students were 83.46 and the average results of the learning tests of the control class students were 78.43. Based on the average learning outcomes of students in the cognitive domain of the control and experiment classes it can be seen that the learning outcomes of students who use interactive multimedia are higher than those of students who do not use interactive multimedia. So it can be concluded mathematics learning using interactive multimedia-based learning media has been effective and can improve student learning outcomes.

4. CONCLUSIONS
Based on the results of the study it can be concluded that:
1) Students have been able to operate interactive multimedia-based learning media well.
2) Learning media based on interactive multimedia is practical and effective used in learning mathematics.
3) Interactive multimedia-based learning media can improve student learning outcomes.

REFERENCES