Development of student worksheets based on guided inquiry for grade VIII SMP 22 Kota Bengkulu cube and cuboid material

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Abstract. The purpose of this research development is to develop guided inquiry-based worksheets on the material of Cubes and Beams in Class VIII SMP Negeri 22. This research uses the Plomp development research model including the initial investigation phase (preliminary research), the development or prototype phase (development or prototyping phase), and the research phase (assessment phase). The LKS product test results show that the LKS developed on the material of Cubes and Beams are valid, effective and practical. So it can be concluded that this worksheet can be used in learning mathematics.

1. Introduction
Learning is a combination that has been arranged covering human elements, materials, facilities, equipment and procedures that influence each other to achieve learning objectives. Humans are involved in a teaching system consisting of students, teachers, and other personnel [1]. Learning is to teach student learning to use the principles of education and learning theory for the main determinant of a student's success in education. The role of a teacher is not merely providing information but also leads to and provides learning facilities so that the learning process is more adequate [2].

Ideal mathematics learning is a teaching and learning process that is not only focused on the results achieved by students, explaining how an effective mathematics learning process is able to provide good experience, intelligence, perseverance, opportunity and quality and can provide behavioral change and apply mathematics in daily life.

However, the reality in the field shows that mathematics learning in grade VII in SMP Negeri 22 on cube and block material is not yet effective. This is because students still look passive in class, school textbooks are still poorly understood by students and final exam scores are still below Kkm. Related to this, there needs to be an improvement in mathematics learning. Researchers are trying to develop mathematical learning tools for guided cube and block material based on inquiry. Learning tools developed in the form of student worksheets (LKS).

LKS is one of the learning resources used to assist students in adding information about concepts learned through systematic learning activities. LKS can assist students in achieving learning goals. But in fact, many worksheets are not in accordance with the current curriculum, so by using these worksheets students have not optimally done hands-on experience to find concepts and principles to be learned.

Trianto revealed LKS is one of the learning resources used in the learning process in order to facilitate students in learning [3]. LKS is used to help students achieve their basic competencies. The worksheet...
contains a set of basic activities that must be carried out by students to maximize understanding in the effort to form basic abilities according to the indicators of attainment taken. The initial knowledge of students' knowledge and understanding is empowered through the provision of learning media in each of the experimental activities so that the learning situation becomes more meaningful, and can impress students' understanding. Because the nuance of concept integration is one of the impacts on learning activities, the material content of each student worksheet in each activity is strived to reflect that.

In addition, Sukamto revealed the usefulness of LKS [4], including:

- Provide concrete experiences for students;
- Help with learning variations;
- Arouse student interest;
- Increase the retention of teaching and learning; and
- Utilize time effectively and efficiently.

Nurseto revealed that, LKS has several functions [5], including:

- The purpose of the exercise, students are given a series of work assignments / activities
- Explain the application (application), students are guided to go to a method of solving problems with the framework of solving a series of specific problems
- Research activities, students are assigned to collect certain data, then analyze the data. For example, in statistics
- Discovery, in this worksheet students are guided to investigate a particular situation, in order to find the pattern of the situation and then use the general form to make an estimate
- Open research, the use of student worksheets involves a number of students in research in a particular field.

One approach as a solution to the above constraints is Guided Inquiry. Teaching and learning using the Guided Inquiry method. Students are required to find concepts through instructions as needed from a teacher. The instructions are generally in the form of a guiding question. In addition to questions, the teacher can also provide explanations as needed when students conduct experiments, for example explanations of ways to conduct experiments.

The Guided Inquiry Method is usually used for students who have no learning experience using the Inquiry method. At the initial stage more guidance is given, little by little the guidance is reduced. In an effort to find a concept students need guidance teacher assistance step by step. Students need help to develop their understanding ability to understand new knowledge. Although students must try to overcome the difficulties encountered, teacher assistance is still needed.

2. Methods

This research is a development research (design research). Plomp states that, this research is research that can be used to develop an intervention (such as programs, teaching and learning strategies and materials, as well as products and systems) as a solution to complex educational problems [6]. In this research, design research is conducted with the aim of developing products as solutions. The product developed is a Guided Inquiry-based Student Worksheet for Grade VII Middle Schools.

Development of this Student Worksheet using the Plomp development model [6]. According to Plomp in the design research regarding development study (development study) the research phase consists of the above, the initial investigation phase (preliminary research), the development phase or prototype development (development or prototyping phase), and the research phase (assessment phase) [6]. The initial investigation phase includes analysis of needs and context, literature review, concept development and theoretical framework in research. The prototype development and manufacturing phase (LKS) is the design phase followed by formative evaluation as an important activity aimed at improving and improving a product. Furthermore, the assessment phase is a semi-summative evaluation.
phase which aims to determine the actual effectiveness of the interventions that have resulted in the development and prototype stages.

Product trials are conducted to obtain effective and practical data. The trials were conducted using guided inquiry-based student worksheets as test subjects. The trials in this study consisted of two phases, namely the one-on-one evaluation phase, and the large group trial phase. Class selection is based on the following criteria for students' conditions in accordance with the needs of researchers. The type of data collected in developing this student worksheet is primary data. Primary data is data obtained directly through research instruments. The first data obtained is the validation data from the practicum guide by the validator. The second data is the data obtained in the implementation of the trial taken in the form of observations of student activities, student and teacher responses after the student worksheets were tested, and student competencies. The instruments used to collect data in this study were: Observation Sheet, questionnaire and achievement test.

3. Results and discussion
In preliminary research (preliminary research) needs and context analysis is carried out. This phase is carried out with several activities including:

- Analysis of needs (analysis of the problems that exist in the student worksheet learning tool). Information obtained by observing the implementation of learning and learning outcomes and analyzing the existing rpp. Rp. Rp according to Rp. 2013.
- The analysis literature review provides an overview of the issues to be included in the worksheet, the level of material depth and material development.

During the development phase, Lx validation was carried out by three experts, one mathematician, one linguist and one educational technology (media) expert. The aspects assessed in the worksheet are didactic, content, language and media aspects. LKS validation is carried out in two stages, namely self-evaluation and expert review.

In the self-evaluation phase, it is done first, then the researcher asks a friend to read the learning device to see the typing class, punctuation marks, and others. After the repairs were carried out, the next step was to validate the worksheet by three experts. The validity aspect of mathematicians was 3.12 with valid criteria. This shows that the material made is in accordance with 2013 curriculum material and is suitable for the junior high school level. The validity aspect of linguists was 3.40 with very valid criteria. This shows that the worksheets are made easy to understand, the punctuation used is appropriate and the language used is appropriate for junior high school students. The validity aspect of the media experts was 3.05 with valid criteria. This shows that the shape and size of the location are proportional, the layout of the contents of the worksheet is correct, the picture presented is clear and the display of letters and the size of the letters are proportional is 3.18 with very valid criteria.

Based on the results of the validity of the inquiry-based worksheets obtained by experts the criteria are very valid and can be used by teachers as a guide and media in the learning process at school. Practicality of Learning Tools Based on Inquiry learning tools are said to be practical if teachers and students can use the worksheets properly and maximally without any constraints. Practicality of learning devices is obtained from the results of the questionnaire provided by the teacher and students after each learning process is carried out in small group evaluations and tests field.

Based on a questionnaire on a small group of teacher responses obtained by the teacher the practicality of learning tools is 80% with very practical criteria. The practicality of the learning kit by the teacher evaluates four aspects namely the attractiveness aspect gets a value of 84% with very practical criteria, the aspect of the use process gets a score of 82% with a practical criterion, the ease of use aspect gets a value of 86% with a very practical criterion and the time aspect gets a value of 80% with practical criteria.

Based on a questionnaire on a small group of student responses obtained the value of the practicality of learning tools by students is 87% with very practical criteria. The practicality of the learning kit by the teacher evaluates four aspects namely the attractiveness aspect gets a score of 86% with very
practical criteria, the readability aspect and clarity gets 88% with a very practical criterion, the aspect of the use process gets 88% score with the practical criteria, the ease of use aspect gets a value 88% with very practical criteria and time aspects scored 86% with very practical criteria.

Based on the questionnaire in the field test from the teacher's response, the practicality of the learning tools obtained by the teacher was 85% with very practical criteria. The practicality of the learning kit by the teacher assesses four aspects, namely the aspect of attractiveness gets a value of 84% with very practical criteria, aspects of the use process gets a value of 83% with practical criteria, the aspect of ease of use gets a value of 87% with very practical criteria and the aspect of time gets a value of 86% with practical criteria. Based on a questionnaire in the field test of student responses, the practicality of learning tools obtained by students was 88% with very practical criteria.

The practicality of the learning kit by the teacher assesses four aspects namely the attractiveness aspect gets a score of 89% with very practical criteria, the readability aspect and clarity gets 88% with a very practical criterion, the aspect of the use process gets 88% score with the practical criteria, the ease of use aspect gets a value 88% with very practical criteria and time aspects scored 87% with very practical criteria.

The effectiveness of the learning device seen the extent to which the learning device can help the achievement of learning objectives. The learning device is said to be effective if the inquiry-based mathematics learning device gives a good impact on the mathematics learning of Grade VII students of junior high schools.

Based on the results of the effectiveness that has been done on small groups and field tests can be seen from the number and percentage of students who are complete. In the small group the percentage of students completeness was 82.33% while in the field test the percentage of students who completed was 78%. Both of the percentage values above have met the effective criteria. From the description above it can be concluded that the Inquiry-based learning device has met the effective criteria.

4. Conclusion

Based on research that has been done, several conclusions can be drawn, such as following:

The research of the development of learning tools based on guided inquiry material cube and beam class VIII SMP second semester in the form of student worksheets developed with a plomp model consisting of 3 phases namely the initial phase, the development phase and the assessment phase and from the results of the validation the development of the student worksheet is valid effective and efficient. Said to be valid, effective and efficient here because the contents of student worksheets have made children better understand the material. This is because through guided inquiry the child is required to find concepts through a teacher's instructions in the form of guiding questions.

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