

DEVELOPMENT OF STUDENT WORKSHEET BASED ON DISCOVERY LEARNING ON TRIGONOMETRIC MATERIALS FOR SENIOR HIGH SCHOOL AT LUBUKLINGGAU CITY

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Abstract: This study aims to (1) Produce Discovery Learning Mathematics Student Worksheets in Trigonometry Material for high school students who are valid and practical; (2) Knowing students' responses to Discovery Learning Mathematics Student Worksheets in Trigonometry Material for Lubuklinggau City High School Students. This type of research is development research with the development of the Tessmer model. The results of the study indicate that: (1) The quality of the LKS produced is valid and practical. Valid is drawn from the results of the analysis after being validated by experts based on content, constructs, and languages with an average score of 4.2 with very valid categories. The practicality of worksheets addresses practical criteria with an average score of 3.6 obtained from the analysis of student practicality questionnaire sheets and 4.6 in very practical criteria obtained from the teacher's response questionnaire analysis. (2) Based on the analysis of the results of student responses to the developed worksheet, a positive response was obtained.

Key Words: Worksheet; discovery learning; Trigonometry

Introduction

The achievement of the goals and success of the curriculum plan 13 in the mathematics learning process in schools is held interactively, inspiring, fun, challenging, motivating students to actively participate in finding and solving problems. Umbarwati (2016) explains that the implementation of the 2013 Curriculum must be supported by various learning tools that can actively develop students. This means that teachers only act as mentors, facilitators, and organizers who provide opportunities for students to learn actively to improve learning outcomes and achieve the desired educational goals. One way that can be done to improve the quality of learning in order to increase success in learning mathematics is to use teaching materials that are able to make students active, able to find concepts, able to solve problems in their lives by using the concepts of knowledge they have learned, able to understand lessons well, and organize their own knowledge.

Based on the observations made by the author in several it was found that books are the main source in the learning process. Hersandi et al. (2017) books do not necessarily become the most preferred teaching materials for students because books tend to have too much material and presentation of images that make students less interested in reading. In addition to books, student worksheets also use worksheets, but the worksheets used today

have not guided students to find their own concepts from the material they are studying, in the sense that the worksheets used are still conventional. Whereas worksheets are teaching materials that greatly affect learning outcomes, with teaching materials you can learn independently (Qomario, 2018). Seeing this, it means that teaching materials are very important to use in order to improve student learning outcomes. So that without the use of teaching materials, it has an impact on the lack of activeness of students in thinking in order to organize their own knowledge, and learning mathematics does not achieve maximum learning outcomes.

One of the teaching materials that can be used to guide students to construct their own knowledge is teaching materials in the form of worksheets. The problems given are presented in the form of worksheets which are guided, found, and explored so that thinking activities occur and students can construct their own knowledge. LKS can be used as a guide for teachers and students in carrying out the teaching and learning process because LKS makes it easier for teachers to manage the teaching and learning process and makes it easier for teachers to monitor student success in achieving learning goals (Prianto and Harnoko (Widodo, 2013)).

Therefore, there is a need for an update in the world of education, especially in the use of student worksheets. According to Wulandari & Susanti (2019) that the student activity sheet was chosen because it is able to present the subject matter that will be delivered by the teacher and is accompanied by practice questions. Worksheets that are able to guide children to find their own concepts from what they learn and are able to construct their own knowledge so that it will create meaningful learning and can increase the success of curriculum development and mathematics learning objectives.

One of them is developing discovery learning-based worksheets. Discovery learning is a method of finding concepts through a series of data or information provided through observations and experiments (Ridwan, 2014). Discovery learning-based learning prioritizes finding concepts in mathematics that are always related to concepts and concept discovery. This is in accordance with Bruner's opinion as quoted by Tran (2014), that discovery learning occurs when an individual carries out a thought process to find the meaning of something independently. Likewise, what was conveyed by Sani (2014) that discovery learning is a cognitive learning method that requires teachers to be more creative can make students learn actively to find their own knowledge. Discovery learning-based worksheets want active and creative learning conditions (Development Team, 2014). Ningsih & Miaz (2019), the discovery learning model is very suitable for use in integrated thematic learning. One of the thematic learnings is on Trigonometry material. Trigonometry material is given in High School. The purpose of this research is to produce LKS Based on Discovery Learning on Trigonometry Material.

Method

This type of research is research and development. This development procedure refers to the Tessmer development model which consists of two stages, namely the preliminary and formative evaluation stages, Zulkardi (Charmila., et al, 2016). The research procedure for developing discovery learning-based worksheets can be seen in Figure 1 below.

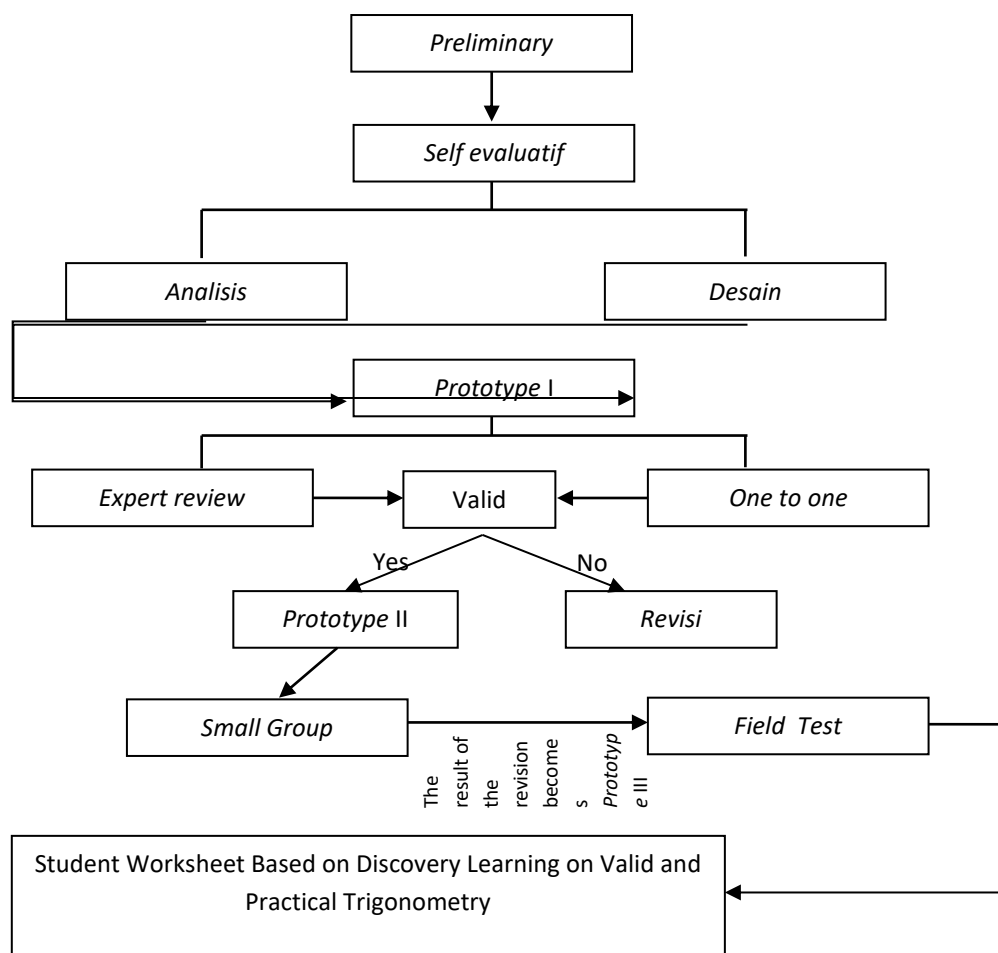


Figure 1. Procedure for developing student worksheets based on Discovery Learning

The instruments in this study are as follows.

Discovery Learning-Based Student Worksheet Validation

This instrument is used to see whether the developed student worksheets are included in the valid category or not. This student worksheet validation sheet consists of three validation sheets, namely a media expert validation sheet, a linguist validation sheet and a media expert validation sheet.

Practicality Sheet Student Worksheet Based on Discovery Learning

This instrument is in the form of a questionnaire given to teachers and students as users of the product developed in the form of student worksheets based on discovery learning. This questionnaire is given in order to know the practicality of valid student worksheets.

Discovery Learning-Based Student Worksheet Response Questionnaire

This response questionnaire is given to real users, the results of this analysis are used to see the responses of users of discovery learning-based student worksheets that have been developed based on students' needs and criteria.

Results and Discussion

The product developed in this research is a Student Worksheet based on discovery learning on Trigonometry material for class XI SMA students which is carried out according to the Tessmer development stage which consists of two stages, namely the preliminary and formative evaluation stages. The results of the study are as follows:

Validity

The results of the validity test of 3 validators which are media, material and language validators. The results of the analysis of the assessment of the language validator consisting of questions and have been developed according to the characteristics of the students obtained with an average score of 4 which is included in the "valid" category.

The results of the media expert assessors from all aspects that have been developed obtained an average score of 4.23 in the "very valid" category. While the results of the material expert validity test involving the trigonometry material obtained an average score of 4.33 which is included in the "very valid" category. The validation results of the three validators are presented in table 1 below:

Table 1. The results of the analysis of the validity of the three experts

Validation Results	Average Score
Material Expert	4,33
Media Expert	4,23
Language Expert	4
Average	4,2

Based on the validation results from the three validators, namely the material, language and media validators who obtained an overall average score of 4.2 which is included in the "very valid" category, so it can be concluded that discovery learning-based student worksheets are feasible and can be continued to the next stage. Next is the practicality test.

Practicality Test

This practicality test was conducted to see whether the discovery learning-based student worksheets developed were practical and easy to use by users, namely students and teachers. This practicality test was given to 6 students and 1 teacher, where the results of the students' practicality questionnaire analysis obtained an average score of 3.6 which was included in the practical category. While the results of the teacher's practicality questionnaire analysis obtained an average of 4.6 which is included in the "practical" category. So that overall an average score of 4.1 is obtained which is included in the "very practical" category. Hasi penelitian ini relevan dengan penelitian yang telah dilakukan Anggela, & Satria (2021) Discovery Learning is very appropriate to use based on the validity results which show the

validity number is categorized as quite high, and the small group practicality test and the practicality test of the teacher's response are categorized as "very practical". From the results of the analysis that has been carried out, it can be concluded that the parts of the developed student worksheets can be used properly so that they can be used in the actual learning process. This is in line with Nurhikmayati & Jatisunda (2019) When students' assessment of the teaching materials developed is good enough, the teaching materials can be used in the learning process in the classroom.

Student Response

Student responses can be seen from the results of the field test implementation. At this stage of the field test, 32 students are in class X MIA 3 Junior high school. Learning is carried out using learning implementation plans and student worksheets based on discovery learning on trigonometry material. In this case students are divided into 7 groups consisting of 4-5 students in each group. Then students are faced with problems in the LKS and solved by discussion according to their respective groups. The researcher gave the opportunity for each group to ask questions if there were difficulties in solving the problems in the LKS. After finishing learning up to 2 meetings, then students were given a student response questionnaire to see how students responded to the worksheets they had done.

The results of the student response questionnaire analysis can be seen in table 2 below:

Table 2. Student Response Questionnaire Results

Rated Indicators	Percentage On Indicator (%)	Category
Appearance	82,6	Very good
Material Presentation	77,0	Good
benefit	70,42	Good

From the table, it can be seen that students stated 82.6% (percent) in the very good category towards the appearance of discovery learning-based student worksheets on trigonometric material that had been developed, 77.0% (percent) in the good category towards the presentation of material on student worksheets. discovery learning based on trigonometry material that has been developed and 70.42% (percent) in the good category regarding the benefits obtained from student worksheets based on discovery learning on trigonometric material that has been developed.

The analysis of the three indicators above concludes that the student worksheets developed are in the very good category, meaning that students give a positive response to student worksheets based on discovery learning on trigonometry material. This is in line with Purwasih & Fitriana (2020) if the results of the analysis of student responses are in the good category, so it can be concluded that the developed student worksheets have a positive response. Seeing this, it means that discover learning-based worksheets can make it easier for students to get good learning outcomes. This is evidenced by the results of research conducted by Nurusalfa, Kadaritna & Tania (2015), which states that student worksheets

using the discovery learning model can help students master materials and concepts and provide good learning outcomes that can be seen from classical completeness. by 91.67%.

Conclusion

Based on the results of the research and discussion that have been described, it can be concluded:

1. This research has produced discovery learning-based worksheets on valid and practical trigonometric material using the Formative Evaluation flow. Validity is illustrated from the results of the analysis after being validated by experts based on media, material and language with an average score of 4.2 with the "very valid" category. Practicality Student worksheets show practical criteria with an average score of 3.6 obtained from the results of the analysis of student practicality questionnaires and teacher practicality questionnaire analysis obtained an average of 4.6 which is included in the "practical" category. So that the developed student worksheets can be classified as very valid and very practical.
2. Based on the analysis of the results of student responses to student worksheets developed for display indicators on student worksheets, 82.6% of students stated strongly agree, material indicators 77.0% students agreed and indicators in terms of benefits 70.42% of students agreed. So that it can be interpreted that the response given by students to student worksheets based on discovery learning on trigonometry material is a positive response.

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