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DEVELOPMENT OF MATHEMATICS STUDENT WORKSHEET WITH THINK TALK AND WRITE (TTW) APPROACH TO INCREASE STUDENT MATHEMATICAL COMMUNICATION SKILLS IN SMK NEGERI 14 MEDAN

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ABSTRACT

The mathematical communication skills of students at SMK Negeri 14 Medan are quite low and this can be seen from the results of observations made by researchers on students. Therefore this research was conducted to develop a student worksheet that can be used by students and teachers in the learning process. This student worksheet uses the Think Talk and Write approach and is considered capable of being valid, practical, and effective in helping students learn and improving students' mathematical communication skills. research is a type of research and development research using the ADDIE model. the ADDIE model consists of the Analysis, Design, Develop, Implementation, and Evaluation stages. from the results obtained it was found that the student worksheet was valid with a score of 88%. then this student worksheet is also practical to use as seen from the results of the student questionnaire and teacher questionnaire. then the effectiveness of student worksheets is also classified as medium in improving students' mathematical communication skills seen from the N-Gain obtained by students is 5.8

Keywords **:** *Student Worksheet; Think Talk and Write Approach; Mathematical Communication Skills.*

INTRODUCTION

According to Sundayana (2016) mathematics is one component of a series of subjects that have an important role in education. Mathematics is one of the fields of study that supports the development of science and technology. It causes mathematics to be always studied by students regardless of their majors. So that to be able to keep up with technological developments, students must have sufficient mathematical abilities.

According to Ansari, (2016), in communication science, there are three forms of communication, namely linear communication or often called one-way communication, relational and interactive communication, and the third is convergent communication or communication characterized by multi-directional. Linear communication occurs when the recipient of the message only hears the message from the sender. While relational communication, occurs depending on the experience between the recipient and the sender of the message. Experience will determine the message received by the recipient of the message in accordance with the intent of the sender of the message. If the understanding experience of the recipient of the message is not able to reach the content of the message, it will affect the results of the message desired by the sender of the message

However, recently Indonesian students' mathematical abilities have been very low. According to Tohir (2019), in the Program for International Student Assessment (PISA), there was a decline in the mathematics scores of Indonesian students from 2015 to 2018. In 2015, Indonesian students' mathematical abilities reached 386 scores, while in 2018, it fell to 379. This resulted in the category Of mathematics, Indonesia being ranked 73rd or 7th from the bottom. The decline in students' mathematical abilities also means a decline in students' mathematical communication skills.

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The decline in students' mathematical abilities also means a decline in students' mathematical communication skills. Based on research conducted by Wijayanto (2018) found that the mathematical ability of one junior high school in the city of Cimahi is low. Of the 5 items given, the results of mathematical communication skills obtained are below 33%. In addition, students also find it difficult to solve problems related to some of the indicators seen. In addition, according to Khadijah et al., (2018), who examined 22 grade VIII SMP students in Cidaun, the mathematical communication skills produced were not good enough. Of the five indicators given, only 1 indicator is fulfilled properly.

Mathematical communication skills have several indicators as a benchmark for someone to have good communication skills or not. The indicators, according to Ansari, (2018), include: 1) Expressing mathematical ideas by speaking, writing, demonstrating, and describing them in visual form. 2) Understand, interpret, and evaluate mathematical ideas presented in written, oral or visual form. 3) Using vocabulary/language, notation, and mathematical structure to express ideas, describe relationships, and build models.

The low mathematical communication ability is caused by less than optimal teacher teaching. Many teachers do not pay attention to the learning process and only prioritize student results. Ruhiyat (in Khadijah et al., (2018) said that many teachers still use conventional learning. Conventional learning patterns with the lecture method will make students less motivated to communicate during the teaching and learning process.

According to Hamzah & Muhlisrarini (2014), learning must be arranged from top to bottom, starting with placing abilities, and prerequisite abilities that must master first to master the abilities or skills above. Often teachers do not take this prerequisite ability and mostly teach directly with example questions and formulas. As a result, students can only copy the steps and formulas given by the teacher without knowing further.

The COVID-19 pandemic has also worsened students' mathematical communication skills. Some many problems and challenges occur in education. In line with what Syah (2020) stated, schools need to force themselves to use online media.

For that we need a student worksheet that can be used to catch up, especially in students' mathematical communication skills, such as using learning media with the Think Talk and Write (TTW) approach. Isrok'atun & Rosmala (2019) explained that the TTW learning model is a constructivist learning design through self-communication activities between students and teachers that encourage students to think, speak, express opinions, and write down the results. In this case, students express mathematical ideas using their own language. Furthermore, writing skills are applied by directing students to pour the mathematical ideas they have obtained into mathematical language, namely symbols, or mathematical concepts and rules.

RESEARCH METHODOLOGY

Research Instrument

1. Instrument fot Measuring Validity

To measure the validity on this media, the author use Student Worksheet Validation Sheet. Validation was carried out by expert lectures and Mathematics subject teacher at SMK Negeri 14 Medan. The assessment criteria to be carried out to state that the developed worksheets are valid is to use Likert Scale, consisting of 5 rating scales, namely very poor (score 1), poor (score 2), enough (score 3), good (score 4), and very good (score 5).

2. Instrument fot Measuring Practicality

To measure the practicality of this media, the author use Teacher and Student Responses Questionnaire sheets, Learning Observation Sheets and Validity observation sheet. The Teacher and Student

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Questionnaire observation sheet is used to know the responses of teacher in using the Student Worksheet in mathematics learning and to know the responses of student as a user of this Student Worksheet. Then the validation sheet is used to see the advice of validator about the practicality of this Student Worksheet.

3. Instrument fot Measuring Effectiveness

To measure the Effectivity, the author use the pre-test and post test. Then the author also use the learning observation sheet to see the effectivity of this workheet. The learning observation sheet can record all of the important thing in field research such as, the time of learning, student activity and attitude, and many more.

Research Procedure

1. Analysis

This stage is the stage where the researcher analyzes the need for development and analyzes the feasibility and development requirements. The stages of analysis carried out by researchers include three things, namely needs analysis, curriculum analysis, and student analysis.

2. Design

At this stage, the researcher designs the Student Worksheet which will be developed according to the results of the analysis in the previous stage. Researchers also collect references that will be used in the Statistic material in developing this Student Worksheet teaching material. The instrument is prepared by taking into account the aspects of the Student Worksheet assessment, namely content feasibility, language feasibility, presentation service, and the appropriateness of the approach used, namely the Think Talk and Write approach.

3. Develop

At this stage the researcher develops the Student Worksheet product according to the design made in the previous stage. At this stage, researchers prepare Student Worksheet and other things that support it. Other things that support are Student Worksheet validation sheets, alternative answers, scoring guidelines, pretest questions and post-test questions. After that, this Student Worksheet will be validated by expert lecturers and teachers.

4. Implementation

The fourth stage is the implementation stage. Implementation is a field trial stage (real class). At this stage the Student Worksheet developed will be tested at SMK N 14 Medan to see how effective this Student Worksheet is in the learning that is carried out. The results of this trial will be the basis for the improvement of the final Student Worksheet. The effectiveness of Student Worksheet can be seen from several things which include: (1) completeness of student learning, (2) achievement of learning objectives, (3) positive student responses, (4) learning time.

5. Evaluation

At this stage, the researcher made a final revision of the developed Student Worksheet. Researchers made revisions based on student response questionnaires and also notes on the observation sheet. It is intended that the Student Worksheet developed is truly appropriate and can be used in SMK N 14 Medan.

RESULT AND DISCUSSION

1. Analyze

From the results of observations made by researchers it was found that in the learning process, the teacher delivered material using conventional methods. The teacher explains the subject matter on the whiteboard and the students listen carefully to the teacher's explanation.

From the results of discussions with the teacher concerned, information was obtained that the teacher concerned preferred teaching using the lecture method and writing on the blackboard. This is because the teacher comes from a non-educational mathematics background and he is used to teaching in conventional style tutoring. Another result

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was found that the students did not have printed books to study.

After discussing with the teacher, it was felt that the Student Worksheet would be very helpful in the teaching and learning process in class. In discussions with the teacher, it will also be easier to use the printed version of the Student Worksheet and not use the Student Worksheet with digital media due to limited equipment, internet, difficulties in handling students when opening gadgets. So that in this study students need worksheets that can accumulate all learning material and are designed to make students more active in learning.

2. Design

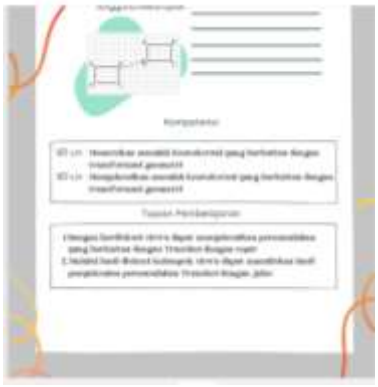
The next stage is design. The design stage aims to get an initial picture or initial draft of the developed student worksheets. As for the design stage, this is divided into two stages, namely the preparation of instruments and the design of student worksheets.

a. Preparing The Instrument

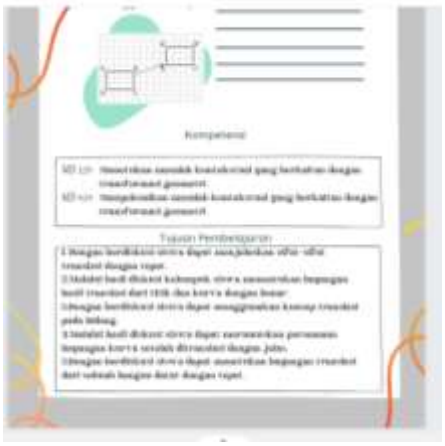
The results of this research instrument are validation questionnaires, questionnaires for pre-test respondents and post-test questions. Validation questionnaires will be given to lecturers and teachers to assess the level of feasibility and validity of the developed worksheets. Student response questionnaires and teacher response questionnaires were given to determine the level of practicality and effectiveness of the LKPD to be developed. Pre-test and post-test questions will be given to students to see how students' mathematical communication skills are and how the effectiveness of student worksheets that have been developed.

b. Designing of Student Worksheet

At this stage the researcher designed student worksheets in accordance with the results of the analysis that had been obtained. First, the researcher designs learning objectives, indicators, and basic competencies that will be used as a benchmark in developing student worksheets. After designing indicators, competencies, and learning objectives, the researcher then designed student worksheets.



Picture 1. Before Revision



Picture 2. After Revision

Before There are only 2 learning objectives, and after revision, the learning objectives are adjusted to the design of the learning plan. There are 5 learning objectives in accordance with the competency achievement indicators that have been prepared.

3. Develop

In the development stage, the researcher began to develop student worksheets following the prepared conceptual design. After being developed through previous design, the material and media of students' worksheets validated by the experts.

a. Validation Result

Validation was carried out by two experts and a practitioner to assess the suitability of students' worksheets using the Think Tak

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and Write approach to improve students' mathematical communication skills. Apart from providing an assessment of the suitability of the experts and practitioners who are validators, they also provide comments and suggestions for improving the quality of the student worksheets being developed.

Based on the table above, the results obtained from the validity obtained an overall percentage of 88.9%, where this percentage is included in the valid category. so that it can be concluded that student worksheets with the Think Talk and Write approach are valid to be used to improve students' mathematical communication abilities. Not only evaluating the validity of this worksheet, the validator also provides comments and suggestions so that it can be used more properly.

Apart from this, the student worksheet also received responses, namely several revisions from the validators so that the student worksheet could be even better.

4. Implementation

At this implementation stage, the product will be tested in the classroom to determine the response of students and mathematics subject teachers regarding the Student Worksheet that has been developed. This implementation stage is carried out by implementing or applying Student Worksheet that has been developed into the class. Student response tests were carried out by 36 students who were in class XII Hospitality at SMK Negeri 14 Medan and for the test Try the subject teacher's response by a mathematics subject teacher at SMK Negeri 14 Medan. The implementation stage was carried out to test the developed student worksheet and assessment instruments.

a. Implementation of Student Worksheet

The implementation stage of the interactive learning LKPD was carried out for class To make it easier for students to understand and understand the learning media being developed, at the implementation stage the researcher will first provide an explanation about the LKPD and how to use the LKPD that has been developed.

Based on the data, it can be seen that the LKPD shows a score for the student response questionnaire of 87.2% and a score for the teacher response questionnaire of 96.6% when viewed from the percentage of the overall score. Based on the percentage above, categories can be determined to determine whether the LKPD is practical or not. So based on the percentage above, the LKPD can be categorized as very practical because the overall percentage of the questionnaire is in the range of 81%-100% for the very practical category. So, the implementation of the LKPD has fulfilled the very practical category.

b. Implementation of Pre Test and Post Test

The implementation stage of the pretest & posttest assessment instruments was carried out to see the level of mathematical communication skills of class XII students at SMK Negeri 14 Medan. At this implementation stage, the effectiveness of using the Student Worksheets that have been developed will also be seen. Pretest questions are given at the initial meeting, to see the level of students' mathematical communication skills before being given the Student Worksheet. After the Student Worksheet has been given, at the end of the meeting the researcher will give students posttest questions to see the improvement in students' mathematical communication skills after being given the Student Worksheet.

Tabel 1. Student Test Result

No.	Student Code	Skor Pretest	Skor posttest
1	S1	30	75
2	S2	70	75
3	S3	50	65

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No.	Student Code	Skor Pretest	Skor posttest
4	S4	30	65
5	S5	35	65
6	S6	30	60
7	S7	50	85
8	S8	70	80
9	S9	50	80
10	S10	30	73
11	S11	25	75
12	S12	20	80
13	S13	30	73
14	S14	55	85
15	S15	50	75
16	S16	75	85
17	S17	55	80
18	S18	30	80
19	S19	55	75
20	S20	80	85
21	S21	40	70
22	S22	55	80
23	S23	25	60
24	S24	55	60
25	S25	50	50
26	S26	30	60
27	S27	30	50
28	S28	10	50
29	S29	60	65
30	S30	10	30
31	S31	30	60
32	S32	30	60
33	S33	75	85
34	S34	80	85
35	S35	55	60
36	S36	55	60

5. Evaluation

The last stage of the ADDIE development model is the evaluation stage. The evaluation stage is an important stage in product improvement and development. After the development stage is complete, it will continue with the evaluation stage where this evaluation takes the form of revisions to the student worksheet media, including comments, suggestions and criticism from the validator lecturer on the validation sheet. After that the evaluation stage was also carried out after field trials obtained from the results of the student response questionnaire in the form of comments and suggestions. The evaluation stage aims to evaluate student worksheets so that they can be improved so as to produce valid, practical and effective media.

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of research and discussion regarding the development of

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student worksheets using the Think Talk and Write approach to improve students' mathematical communication skills, several conclusions were obtained, namely:

1. Student worksheets using the Think Talk and Write approach to improve Mathematical communication skills were declared valid because they received an average score of 88.9% from validators
2. Student worksheets using the Think Talk and Write approach to improve Mathematical communication skills were declared practice because they received an average score of 87.2% student respons quistionaire and 96.6% of teacher response questionnaire.
3. Student worksheets using the Think Talk and Write approach to improve Mathematical communication skills were declared effective because based on student sheet tests it was found that the average student was in a state of completion. Then the average positive response from students is above 80%, namely 87%. Then there was an increase in mathematical communication skills for all students with an average of 0.53, which is categorized as a medium value.

Suggestion

Based on the research results and conclusions, the researchers provide suggestions including:

1. This student worksheet can be used with material from other mathematics topics with the same approach, namely Think Talk and Write. So teachers are expected to be able to prepare student worksheets so that later in the learning process students are ready to learn together with their group
2. This student worksheet can be used with material from other mathematics topics with the same approach, namely Think Talk and Write. So teachers are expected to be able to prepare student worksheets so that later in the learning process students are ready to learn together with their group

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