

Development of Mandailing Culture-Based Learning Devices with an Open-Ended Approach to Improve Students' Mathematic Connection and Self-Efficiency Abilities SMPN 2 Batangtoru

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Abstract

This study aims to: 1) describe learning tools with an open-ended approach that meets the criteria of being valid, practical, and effective; 2) Describe the improvement of mathematical connection ability using learning tools with the developed open-ended approach; 3) Describe the increase in ability self efficacy by using learning tools with the developed open-ended approach. This research is a development research conducted in two stages. Learning tools produced from this research are: Learning Implementation Plan (RPP), Student Worksheet (LKPD), Student Book (BS), mathematical connection ability test and questionnaire. Self efficacy students. From the results of the first trial and second trial, it was obtained: 1) the learning device with the Open-ended approach developed had been meet the criteria of being valid, practical, and effective in terms of their respective criteria; 2) there was an increase in the students' mathematical connection ability using learning tools with an open-ended approach developed in the first trial, obtaining an average posttest score of 61.76, and an increase in the second trial with an average posttest score of 82.35; 3) there is an increase in ability self efficacy students using learning tools with an open-ended approach developed in the first trial obtained a value of 68.64 and increased in the second trial with a value of 87.52. Based on the results of the study it is suggested that mathematics teachers strive for mathematics learning using an open-ended learning approach and the learning tools developed can improve mathematical connection skills and self efficacy students in mathematics learning.

Keywords

development of learning tools; 4-D model; open-ended; mathematical connection capabilities; self-efficacy students



I. Introduction

Education is an effort made to create an atmosphere of learning and learning so that students actively develop their potential and skills as provisions in social life. As the regulation of the minister of education and culture number 68 of 2013 states that education aims to prepare Indonesian people to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative, and affective and are able to contribute to the life of society, nation and state, and world civilization.

Education is considered to have a very important role in promoting the civilization of a nation. Good quality education can encourage the creation of a quality society, creative and productive until finally able to achieve welfare. Through this national education system, the government should be able to ensure equal distribution of educational

opportunities, as well as the relevance and efficiency of education management to face challenges in line with the changing demands of local, national and global life (Saputra, 2018).

Education is key to the progress of a nation. As Iwantoro has put forward (2014:53) education is a very important issue in the development of this nation and the country. The purpose of Education is to direct the growing potential of learners to be a man of pious care to the One God Almighty, qualified, possessed of sublime pekerti ability and virtuousness. Education has a very strategic role in determining the direction of the forthcoming of the nation's quality of community knowledge. (Musdiani et al, 2019)

Education is one of the efforts to improve the ability of human intelligence, thus he is able to improve the quality of his life. So, to create the highest quality of human resources, education is becoming an important factor to be considered. The importance of education is also reflected at MPR No. II/MPR/1993 which states that the national education aims to improve the quality of Indonesia people that is religious people, and pious to God Almighty, noble character, has high personality, discipline, work hard, responsible, independent, smart, healthy, physically and mentally healthy. (Sugiharto in Harahap, 2020)

As a school subject it has certain characteristics and characteristics. One of the characteristics of mathematics is that its objects are abstract. To understand abstract mathematical objects or concepts, students' activeness is needed in their learning. Matter in mathematics is interrelated with one another, besides that mathematics cannot be separated from other disciplines and problems in everyday life. There are many reasons math lessons should be given to all students. Kemendikbud (2017) said:

Mathematics subjects need to be given to all students starting from elementary school, to equip students with the ability to think logically, analytically, systematically, critically, innovatively and creatively, and the ability to work together. These competencies are needed so that students can have the ability to acquire, manage, and use information to live better in changing, uncertain, and highly competitive conditions. In carrying out mathematics learning, it is expected that students should be able to feel the usefulness of learning mathematics

But in reality, the efforts made by the government in improving the quality and quality of mathematics learning have not been said to be successful. This is evidenced by the low achievement of Indonesian students in mathematics in the world. This can be seen from the results obtained by Indonesia in the 2015 TIMSS Trends in Mathematics and Science Study (TIMSS), which was published in December 2016, showing that the achievements of Indonesian students in mathematics are ranked 45 out of 50 countries with a score of 397 (Balitbang Kemendikbud, 2016). Indonesian students master routine questions, simple computation, and measure knowledge of facts with daily contexts. Therefore, it is necessary to strengthen the ability to integrate information, give conclusions, and generalize knowledge to other matters.

From the explanation above, it is known that the ability to connect is an important ability that is possessed by students so that they are able to connect one material to another. Students can understand. The mathematical concepts they learn because they have mastered the prerequisite materials related to everyday life. In addition, if students are able to relate the material they studied with the previous subject or with other subjects, then learning mathematics becomes more meaningful.

In line with NCTM (in Hasratuddin, 2015) the importance of mathematical connection abilities is:

Mathematics is not a collection of separate strands or standards, even though it is often partitioned and presented in this manner. Rather, mathematics is an integrated field of study. When students connect mathematical ideas, their understanding is deeper and more lasting, and they come to view mathematics as a coherent whole. They see mathematical connections in the rich interplay among mathematical topics, in contexts that relate mathematics to other subjects, and in their own interests and experience. Through instruction that emphasizes the interrelatedness of mathematical ideas, students learn not only mathematics but also about the utility of mathematics.

The quotation above reinforces the importance of a mathematical connection where mathematics is not a set of separate strands or standards, although it is often partitioned and presented in this way. In contrast, mathematics is an integrated field of study. They see mathematical connections in the rich interactions between mathematical topics, in the contexts that link mathematics to other subjects, and in their own interests and experiences. Through instruction that emphasizes the interrelation of mathematical ideas, students learn not only mathematics but also the usefulness of mathematics.

But in fact, in learning, it seems that students still find it difficult to connect the material they are learning with the prerequisite material they have mastered. The concepts that have been learned do not last long in students' memories as a result, their connection ability is not optimal. This can be seen from the results of the researcher's initial research by submitting questions that measure the mathematical connection ability of students in algebra material to students of SMP Negeri 2 Batangtoru, it was found that the students' mathematical connection ability was still low, students had difficulty solving questions in the form of stories, students' answers were less varied, for example, the researcher gave two problems of mathematical connection ability proposed to the students, namely Mr. Siregar celebrating his child's birthday and buying a birthday cake like the following and the cake was cut into 16 equal portions. If the birthday cake will be divided among nine children. Then decide how to divide the cake so that each child gets an equal share!



Figure 1. Birthday Cake

Solution:

Sis: A cake cut into 16 equal pieces, the fraction is $\frac{16}{16}$

Pak Siregar will distribute to 9 children.

Dit: How to divide the cake so that each child gets an equal share

Answer:

$$\text{Every child can} = \frac{16}{16} : 9 = \frac{16}{16} \times \frac{1}{9} = \frac{16}{144} = \frac{1}{9}$$

So every child gets bread $\frac{1}{9}$ part

From the questions above, some of the students' answers can be seen as follows:

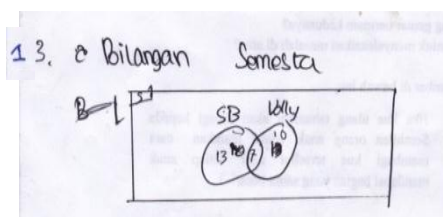


Figure 2. Student Answer Sheet Question No. 1

Based on the answers of these students, it can be seen that students have difficulty understanding the purpose of these questions, formulating what is known and what is asked of the questions, planning the completion of the questions given and students have not been able to connect concepts or topics in the material and answers given by students others are classified as similar to each other.

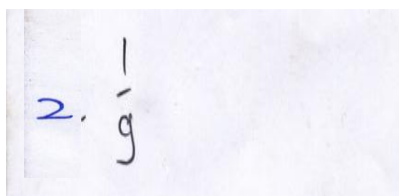


Figure 3. The process of Students' Answers to Question No. 2

From the explanation above, the problems found in learning mathematics are that learning has not been directed to build knowledge in students, students' thinking processes tend to be inactive, students tend to avoid mathematics and students are not interested in answering math problems, students have not been able to choose appropriate strategies and rules to solve problems, make conclusions about the answers to questions and students have not been able to provide arguments to the problems given and the answers given by students are classified as the same. This is also said by Shimada (in Nohda, 2000) "in learning students are not only required to find a solution to a given problem but also provide arguments about the answer and explain how students get to that answer."

The example above is a problem that was tested on 38 students who were present at the time of the test. The number of students who were able to state the given situation correctly was 9 people, while those who could not state the given situation correctly were 24 people. Meanwhile, the number who did not answer at all was 5 people. Thus it is concluded that students have difficulty in solving problems related to mathematical connection skills.

From the findings in the field, the low ability of students' mathematical connections is caused by several factors, including: (1) the learning plan that the teacher has is not in accordance with the criteria for developing good learning tools. The lesson plans that teachers have are general in nature that exist only as a complement to administration, teachers do not develop their own learning plans, (2) teachers do not develop student worksheets (LKPD) so that the ability development process has not been achieved, (3) The problems presented in The learning support books used have not been able to measure the mathematical connection ability of students in accordance with the expected indicators, and (4) the assessment criteria for both cognitive, affective and psychomotor are still very minimal and there is no scoring rubric in assessing student learning outcomes.

In the implementation of learning, learning tools play an important role in the learning process, as suggested by Sanjaya (2010), through a careful and accurate planning process, the teacher is able to predict how much success will be achieved, thus the possibility of failure can be anticipated by each teachers, besides that the learning process will take place in a directed and organized manner, and the teacher can use the time as effectively as possible for the success of the learning process.

One of the lesson plans is compiling learning tools. The learning tools are in the form of Learning Implementation Plans (RPP), Student Books (BS), Student Worksheets (LKPD), evaluation instruments or learning ability tests (TKB) and learning media. The importance of learning tools in teaching and learning activities so that their development is highly demanded by every teacher and prospective teacher.

The lesson plan developed by the teacher must have high validity. The criteria for the high validity of the lesson plan according to the lesson plan assessment guidelines (Akbar, 2013), namely: (1) There is a clear, complete, logically structured learning formula, encouraging students to think at higher levels; (2) The description of the material is clear, in accordance with the learning objectives, student characteristics, and scientific development; (3) The organization of learning materials has clear material coverage, depth and breadth, is systematic, coherent, and in accordance with the allocation of time; (4) Learning resources according to student development, teaching materials, contextual and varied environments with students; (5) There are learning scenarios (beginning, core, end) in detail, complete and the learning steps reflect the learning model used; (6) The learning steps are in accordance with the objectives; (7) explicit learning techniques in learning steps, according to learning objectives, encouraging students to actively participate, motivate, and think actively; (8) Listed is the completeness of the lesson plan in the form of procedures and types of assessment according to learning objectives, there are various assessment instruments (test and non-test), assessment rubrics.

From the results of the researchers' observations on the learning plan implemented by the teacher at SMP Negeri 2 Batangtoru still far from the criteria for developing lesson plans, some of the deficiencies in the lesson plans developed by teachers in junior high schools, including: (1) the teacher does not include the indicators that the students want to achieve (2) the teacher does not make student activities (3) learning still uses the lecture method (4) the teacher does not show mathematics (problems found in LKPD) (5) the lesson plans used are general (5) the lesson plans owned by teachers are only administrative personnel.

In order for the developed textbook to be more attractive to students and teachers, the textbook needs to include core competencies, basic competencies, indicators and learning experiences as well as concept maps related to material, concept discovery activities through authentic problems related to the material, examples of real problems , and problem-solving exercises. The developed textbook needs to be equipped with an activity sheet that contains concept discovery activities related to the material, a discussion column, and a conclusion column.

In addition to textbooks on teaching materials, other tools are also needed to support and assist students in understanding the material provided. (Fannie & Rohati, 2014) said that LKPD is one of the appropriate learning alternatives for students because LKPD helps students to add information about the concepts learned through systematic learning activities.

The important role of LKPD in assisting students in understanding the material has not been utilized in learning at SMP Negeri 2 Batangtoru. This causes students to be less trained in honing mathematical abilities, especially students' mathematical connection

abilities. For this reason, it is hoped that teachers can create and develop LKPD that support learning. The developed LKPD must meet valid, practical, and effective criteria so that the desired learning objectives are achieved.

Based on the explanation above, it can be seen that learning tools are very important in the learning process, because in learning tools there are all learning plans that will be used in the learning process. Learning tools can also make it easier for teachers to anticipate various possibilities occurs in the learning process, where the learning process is a complex process so that various possibilities can occur. In addition, as professional educators, teachers are also required to have the ability to develop learning tools, because developing teacher learning tools can increase creativity in teaching.

One approach that teachers can take in developing mathematical connection skills is the open-ended approach. The open-ended approach is a problem-based approach, where the type of problem used is an open problem. An open problem is one that has more than one correct method of solving or has more than one correct answer. In learning using an open-ended approach, students are not only required to find solutions to the problems given but also provide arguments about the answers and explain how students can arrive at these answers Shimada (in Nohda, 2000).

Learning mathematics through open problems that have the characteristics of a variety of correct solving methods or having more than one correct answer accustoms students to solving problems and providing explanations of proposed answers. So that the open-ended approach can foster and develop students' abilities in mathematical connections.

To develop learning tools that can develop mathematical skills, especially the ability of mathematical connections through learning with an open-ended approach, it will be more effective if the development of learning tools includes elements of local culture. Culture is integrated as a tool for the learning process to motivate students to apply knowledge, work in groups, and perceive the linkages between various subjects. In addition, in learning, culture becomes a method for students to transform their observations into creative forms and principles.

Bishop (in Tandililing, 2013) said that mathematics is a form of culture. Mathematics as a form of culture has actually been integrated in all aspects of people's lives wherever they are. Furthermore, Pinxten (in Tandililing, 2013) states that in essence mathematics is a symbolic technology that grows in cultural skills or environmental activities. Thus a person's mathematics is influenced by their cultural background, because what they do is based on what they see and feel.

With students having high self-efficacy and connecting mathematical problems is a difficult thing to do, the role of self-efficacy can make students more diligent and have high motivation to be able to do it. If a student has good mathematical connection skills, then that student also has good self-efficacy.

From the description of the problems above, it is necessary to conduct research to solve problems related to mathematical connection abilities and student self-efficacy and their relation to the development of mathematics learning tools based on Mandailing culture. The title of the research is Development of Learning Tools Based on Mandailing Culture with an Open-ended Approach to Improve Students' Mathematical Connection Ability and Self Efficacy.SMP Negeri 2 Batangtoru.

II. Research Method

This research includes device development research that refers to the 4-D model Thiagarajan (1974) which consists of four stages, namely the defining stage, the design stage, the development stage, and the dissemination stage. Learning tools are developed using an open-ended approach, namely the Learning Implementation Plan, Student Worksheets, Student Books, and students' abilities to improve mathematical connection skills and Self Efficacy students. Model development in this research is schematic shown in Figure 3.

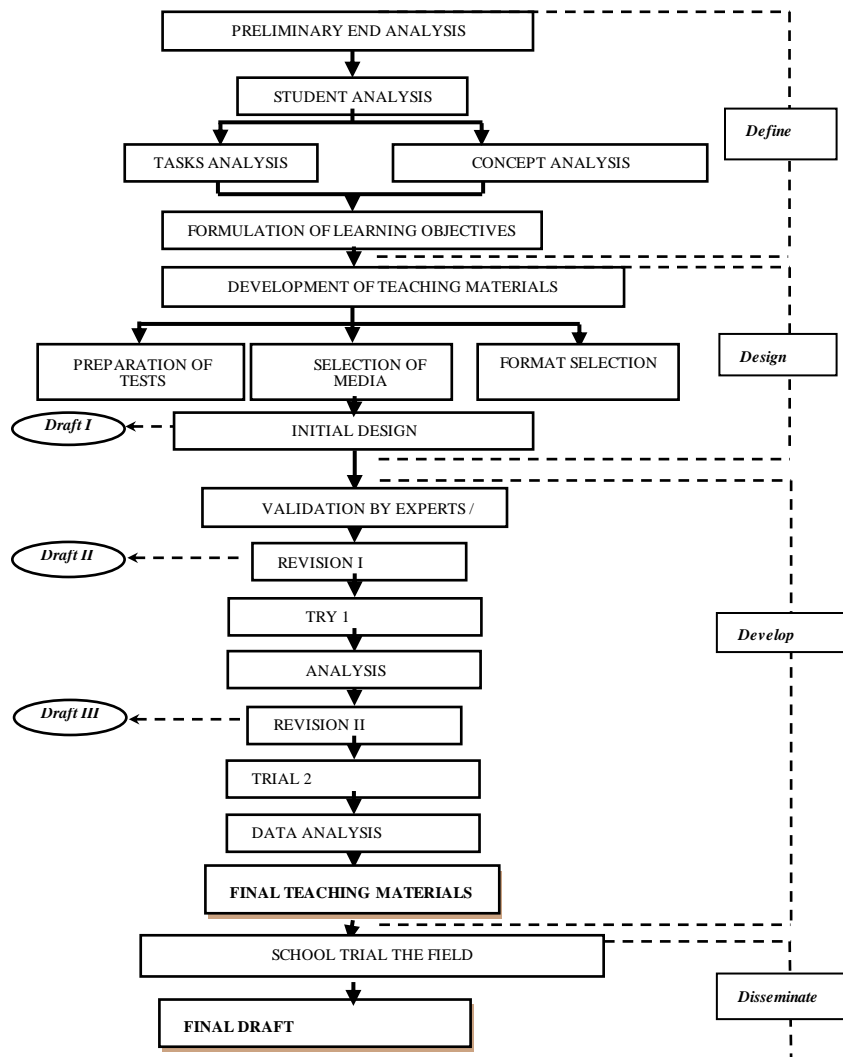


Figure 4. Modification Chart Development of Teaching Materials Thiagarajan Model 4-D (1974)

III. Discussion

Based on the formulation of the problems and research questions posed in the previous section, then based on the data obtained from the results of trials 1 and 2, it will be known whether the formulation of the problems and research questions raised have been answered or not. The results of data analysis obtained from the results of trials 1 and 2 show: (1) the learning device with the open-ended approach developed is valid; (2)

learning tools with a practical open-ended approach; (3) learning tools with an effective open-ended approach; (4) there is an increase in the ability of mathematical connections using learning tools with the developed open-ended approach; (5) there is an increase in student self-efficacy by using learning tools with a developed open-ended approach.

3.1. The Validity of Learning Tools with the Developed Open-Ended Approach

Based on the results of the validation of the learning tools with the open-ended approach developed, it was found that learning tools with an open-ended approach, namely the Learning Implementation Plan (RPP), Student Book (BS), and Student Worksheet (LKPD) were declared valid or had a degree of validity. the good one. Furthermore, the validation results of the mathematical connection ability test and *self-efficacy* students are also valid or have a good degree of validity. This shows the learning tools through an open-ended approach that is developed both RPP, BS, LKPD, tests of mathematical connection skills and *self-efficacy* students have met the validity criteria.

The validity criteria are obtained through expert assessment of learning tools with the developed open-ended approach. Obtaining valid learning tools is caused by several factors, including: first, the learning tools with the open-ended approach developed have met the content validity. This means that the development of learning tools with an open-ended approach is in accordance with the demands of the existing curriculum. The demands of this curriculum are related to core competencies (KI) and basic competencies (KD) that students must achieve in learning activities that are tailored to the material or content of the lessons provided and adapted to the steps of learning tools with an open-ended approach. The above is in line with the opinion Grondlund (Ibrahim & Wahyuni, 2012) states that content validity is the accuracy of a measuring instrument in terms of the content of the measuring instrument. A measuring instrument is said to have content validity if the content or material or measuring instrument material is truly representative of the learning material provided. That is, the content of measuring instruments is estimated according to what has been taught based on the curriculum.

Based on the results of the research and opinion above, and supported by development research conducted by Rusman (2012), which is based on the results of the development of learning tools that have met the valid criteria. Valid is illustrated by the results of the validator's assessment that all validators state both based on content (according to the curriculum), construct (according to the characteristics / learning principles) and language (according to the prevailing language rules, namely enhanced spelling).

3.2. Practicality of Learning Tools with the Developed Open-Ended Approach

The results of the assessment of the practicality of learning devices are obtained from expert / practitioner assessments which state that the learning tools developed can be used with little or no revision. Based on the results of expert assessments, the components of learning tools developed in the form of Learning Implementation Plans (RPP), Student Books (BS), Student Worksheets (LKPD), mathematical connection ability tests and student self-efficacy questionnaires are practical / can be used with minor revisions.

Practicality is that learning devices are arranged considering convenience. Ease in the sense that the learning tools that are arranged are easy to understand and also easy to implement or use. (Nieveen, N. 2007: 127-128).

For the practical assessment, then it is reviewed from the results of observations of the implementation of learning devices in the class, which is in the high category) or very high and the instrument is said to be good if it has a reliability coefficient.

$(3 \leq \bar{P} < 4)$ ($4 \leq \bar{P} \leq 5$) ≥ 0.75 or $\geq 75\%$. This second aspect of the practicality assessment is described as follows.

The criteria for practicality in terms of the feasibility of the learning tools in this study have also met the practical criteria. In the first trial and second trial, the implementation of the learning device has met the specified criteria, which has reached the very high category ($4 \leq \bar{P} \leq 5$), and for the reliability of learning instruments with an open-ended approach. In the first trial and second trial it had also reached the specified category, namely the instrument can be said to be good because it has reached reliability coefficient ≥ 0.75 or $\geq 75\%$. Indeed, in the first trial, some students were still not familiar with the use of learning tools with an open-ended approach which demands student activity, but in subsequent trials students become more accustomed and happy.

Based on the description above, it can be concluded that the learning tools were developed with an open-ended approach has fulfilled the practicality as expected. Thus the learning device through with an open-ended approach which is developed easily and can be implemented by teachers and students.

3.3. The Effectiveness of Learning Tools with the Developed Open-Ended Approach

Based on the results of trial I and trial II, the device with the open-ended approach developed has met the effective category in terms of: (1) classical student learning completeness; (2) students give a positive response to the components of the learning device with an open-ended approach that was developed and 3) the teacher's ability to manage learning in a good category. The aspects of each effective category above are described as follows.

The aspects of each effective category above are described as follows:

a. Classical Student Learning Completeness

Based on the results of the posttest analysis of trial I and trial II, it was found that the students' mathematical connection ability had met the classical completeness criteria, where there was an increase in classical learning completeness on the mathematical connection ability of 20.59%. This is because the material and problems that exist in student books and student worksheets are developed in accordance with the conditions of the student's learning environment and refer to learning tools through an open-ended approach. By applying learning tools through an open-ended approach, students will be actively involved in the problem solving process. Students analyze and evaluate their own thinking processes and make conclusions from the knowledge that has been found with the guidance and guidance from teachers or friends in the form of leading questions. This is reinforced by the views of Eryza, Suhartati and Mukhlis (2016), namely,

Based on the results of research and the support of previous research above, it appears that the learning device with an open-ended approach that was developed to help students achieve classical learning completeness. Thus it can be concluded that, the use of learning tools with the open-ended approach developed has met the criteria for being effective.

b. Student Response

Based on the results of the data analysis of the results of trial I and trial II, it was found that the average percentage of student responses in each trial was positive. This means that students give a positive response to the components of the learning device with the developed open-ended approach. Student responses given in each trial have reached the predetermined criteria category, namely $\geq 80\%$. This shows that, a learning device with an

open-ended approach developed has met the criteria for being effective in terms of student responses.

According to Daryanto (2010: 2) learning is a process of change, namely a business process carried out by a person to obtain a whole new change in behavior as a result of interaction with the environment. This is because the learning process is complex, where students determine whether they will learn or not.

Accordingly, Actions/responses made by students to stimuli in the form of teaching as an activity can be categorized into two things, namely positive responses to learning (listening, reading, writing, discussing / asking) or negative responses (other irrelevant actions). A positive response indicates that students are willing to take part in the learning process.

Furthermore, the positive response given by students was generated because the teacher had provided a stimulus in the form of feedback and reinforcement in accordance with the characteristics of students after studying the classroom conditions. In other words, the teacher is a very determining component in the implementation of a learning strategy. So a teacher must prepare a thorough and accurate learning planning process because with learning planning the teacher will be able to predict how much success will be achieved.

Based on the explanation of research results and supporting research, it can be concluded that the components of the learning device with an open-ended approach which is developed to contribute positively to student responses in learning.

c. Teacher Ability to Manage Learning

The last effectiveness criterion in terms of the teacher's ability to manage learning has met the criteria for being effective. In the first trial and second trial, the teacher's ability to manage learning had met the good category ($3.50 \leq KG \leq 4.50$).

Based on the results of data analysis, the results of the first trial showed that the average value of the teacher's ability to manage learning was 3.95 in the good category and the second trial obtained an average value of 4.106 where the criteria the teacher's ability to manage learning which has been determined in Chapter III, then the average value is in the good category ($3.50 \leq KG \leq 4.50$).

From Amalia, Surya and Syahputra's research (2017) which shows that "*A teacher's attitude and the teaching strategies he / she uses significantly influence educational outcomes. Observations from schools suggest that pupils as well as teachers prefer problems in whose case the algorithm suitable for their solution is apparent, in whose case there are no doubts about the choice of the suitable algorithm.*" which has the meaning of a teacher and the teaching strategies used will significantly affect student performance outcomes. Observations from the school show that students and teachers prefer learning that begins with a problem in the learning process for a solution.

3.4. Increasing the Ability of Mathematical Connection Using Learning Tools with a developed Open-ended Approach

One of the objectives obtained from the development of learning tools with an open-ended approach in this study is to improve students' mathematical connection skills. Self-study of students that use an open-ended approach is better than students who use conventional learning (Alpha: 2018) which is meaningful. The achievement and improvement of students' mathematical connection abilities using the open-ended approach are better than students who use conventional learning, so that students are able to understand what for and why they should study. The learning process uses an Open-ended approach which has a positive impact on developing mathematical connection skills

and helps students develop intellectual discipline and skills needs to arouse curiosity and seek answers to their curiosity. Research from Abu, Elis, and Wiwi, (2018) shows that to improve students' mathematical connection skills, it can be done using several learning approaches, one of the learning approaches that can be applied is through an open-ended approach. Based on the results of the analysis of the increase in students' mathematical connection ability in classical completeness, the mathematical connection ability increased by 20.59%. Then if it is seen based on the calculation of classical completeness of student learning to see an increase in the ability of students 'mathematical connections has increased where in test 1 students' classical completeness was 61.76% and in trial II students classical completeness was 82.35%. An increase in each indicator of the mathematical connection capability with an open-ended approach which has been developed has increased from trial I to trial II.

From the achievement of the results of student scores, it was seen that the students' mathematical connection abilities were seen as seen in the students' acquisition of students' posttest scores where almost 80% experienced a simultaneous increase in the sense that the scores obtained were not too far away.

Based on the explanation and data analysis of the students' mathematical connection ability above, it is known that the development of learning tools with an open-ended approach encourage students to be able to understand the problems that have been studied and what is in their thinking to build on the knowledge gained.

IV. Conclusion

Based on the results of the analysis and discussion in this study, it can be concluded as follows:

1. The validity of the learning tools developed was included in the valid category with an average value of the total validity of the RPP of 4.32, student books of 4.42, LKPD of 4.38, test items of mathematical connection ability and self-efficacy questionnaire statements. students have also been in the valid category.
2. The learning tools developed through the open-ended approach of the Mandailing cultural context have met practical criteria in terms of: (1) expert / practitioner assessments state that the learning tools through the open-ended approach based on the Mandailing culture developed can be used with minor revisions; and (2) the implementation of learning tools has reached the high category, namely in the first trial of 3.74 and in the second trial of 4.09.
3. The learning tools developed with an open-end approach based on the Mandailing culture have met the criteria of being effective. Effective criteria in terms of: (1) completeness of classical student learning has reached 82.35% on trial II; (2) the teacher's ability to manage chasing increased from the first trial of 3.95 to 4.106 in the second trial in the good category; and (3) positive student responses to the components of the learning tools and learning activities developed.
4. The improvement of students' mathematical connection ability using learning tools through an open-ended approach based on the Mandailing cultural context on the quadratic equation material was 20.59%, in the posttest first trial classical completeness was 61.76% and the second trial was 82.35%.
5. Enhancement and *self-efficacy* Students use learning tools through an open-ended approach based on the Mandailing cultural context on the quadratic equation material is the average achievement and *self-efficacy* students in the first trial were 68.64 in the low category and increased to 87.52 in the second trial with the high category.

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