

Development of Learning Materials through CTL with Karo Culture Context to Improve Students' Problem Solving Ability and Self-Efficacy

Atania Chrsitianti Ginting¹, Pargaulan Siagian², Edy Surya³

ataniaitink@gmail.com¹, pargaulansiangian@yahoo.com², edy_surya71@yahoo.com³

¹²³Postgraduate Mathematical Education, State University of Medan, Indonesia

Abstract. This study aims to analyze the validity, effectiveness and practicality of learning materials based on the Contextual Teaching and Learning Model with the Karo Culture Context (CTL-KBK) as well as to improve students' mathematical problem solving abilities and self-efficacy. The development model of this research uses 4D (Thiagarajan). The subjects in this study were seventh grade students of SMP Negeri 1 Berastagi. The results showed that: 1) the CTL-KBK-based teaching materials developed had met the criteria of being valid, practical and effective. 2) there is an increase in students problem solving abilities using CTL-KCC based teaching materials, increasing from first trial 0.30 to 0.47 in second trial and the self-efficacy of students using CTL-KCC based teaching materials increased from first trial 0.31 to 0.39 in the second trial.

Keywords: **Keywords:** Thiagarajan 4-D, CTL-KBK, Problem solving ability, self-efficacy

1. Introduction

Mathematics is one of the most important subjects in the world of education in improving human resources. Mathematics helps students to be able to reason systematically and logically. Cornelius (in Abdurrahman, 2012: 204) also reveals 5 reasons for the need to study mathematics, namely (1) means for someone to be able to think clearly and logically, (2) means for someone to be able to solve problems in daily life, (3) a means for someone to understand patterns of relationships and generalization experience, (4) a means for someone to develop self-creativity, and (5) awareness of growing cultural.

Basically, learning mathematics cannot be separated from problems, because the success or failure of a person in mathematics is marked by the ability to solve the problems he faces. According to NCTM (in Juliani and Surya, 2021:42) states The main focus in the mathematics curriculum is to solve problems. However, the facts on the ground show that students' ability to solve problems is still relatively low. As in the observations made at SMP Negeri 1 Berastagi which showed that students' ability to solve problems was still relatively low. From the results of student answers and interviews, it can be that most students mistakes in problem solving are caused by students not understanding the problems they are not used to working on.

In research, Surya, E., Feria (2017:87) mention several reasons that cause problem solving to be classified as low. Students tend to be embarrassed to come to the front of the class to

explain the assignments given. Students also think mathematics is a boring and scary subject. While the teacher does not provide opportunities for students to construct mathematical knowledge that students will have. Based on the results of observations made during the teacher's teaching, it can be seen that they are still using direct learning. Many students still make mistakes such as not understanding the concept and not being able to solve the problem in question. In learning students also look less active. Lack of teacher motivation can also cause students to lack self-confidence. Students' problem-solving abilities in learning mathematics are related to students' self-efficacy.

Several studies also show that when students have high self-efficacy, there is a positive and significant relationship between student self-efficacy and the learning outcomes they get, as research conducted by Jatisunda (2017: 29) from the results of his research stating "there is a significant relationship positive relationship between mathematical problem solving abilities and students' mathematical self-efficacy. therefore, students are expected to be able to improve problem-solving abilities and have high self-efficacy.

To improve the problem-solving ability and self-efficacy of students, it is necessary to have learning innovations. Such as making learning materials that can improve students' problem-solving abilities and self-efficacy. One of them is by developing learning materials based on contextual teaching and learning with the Karo cultural context (CTL-KCC).

According to Sanjaya (Nugroho, 2017: 34) CTL is learning that makes students fully involved in obtaining material through real experience, so as to be able to encourage students to apply it in daily life. Apart from that, the learning materials developed using the CTL model with the Karo Culture context are identical to the environment where the students live. So that it is expected that during the learning process students are more interested and active in participating in the learning process. Dengan demikian penggunaan perangkat pembelajaran berbasis CTL-KBK diharapkan mampu meningkatkan kemampuan pemecahan masalah dan self-efficacy siswa. This is what prompted researchers to conduct research with the title "Development of Learning Materials through CTL with Karo Culture Context to Improve Students' Problem Solving Ability and Self-Efficacy" on rectangular material.

2. Riview Of Literature

2.1 Problem Solving Ability

Dahar (2011: 121) states that basically the main purpose of the learning process is to be able to improve one's problem solving abilities. According to Uno (2009: 134) reveals that problem solving is a skill possessed by someone using a mindset in solving a problem. The process is through 1) gathering the facts of the problem; 2) analyze the information provided; 3) develop alternative solutions to problems; and 4) choosing a way to solve the problem. In this case, if students can solve problems in learning mathematics, students are said to have mathematical problem solving abilities. There are four stages of problem solving according to Polya (in Minarni, Elvis, Delina and Annajmi : 2020), namely 1) understanding problems from information; 2) planning problem solving; 3) solving problem; and 4) reviewing the results obtained.

2.2 Self-Efficacy

Jatisunda states (2017: 28) Self-efficacy is a belief that exists within a person to find, organize, and carry out a task so that the goal can be achieved. Self-confidence is useful in dealing with problems in everyday life. With self-efficacy abilities, students find it easier to solve problems or tasks given and can even improve learning achievement. According to Baron and Byrne (in Ghufron and Rini, 2010:74) defines self-efficacy as a form of a person evaluating his ability or competence to be able to perform tasks, overcome existing obstacles and achieve task accomplishments.

In Bandura (1997:42-46) Self-efficacy is defined as a belief that a person has where he has the thought that the ability for it complete certain tasks successfully and this belief is related to performance and persistence in various endeavors. According to Bandura Self-efficacy has three dimensions, namely magnitude, strength, and generality.

Self-efficacy is the ability to complete and carry out tasks. The effect of the task will guide students to be more confident in solving problems. This will affect the personality of students to be more diligent when facing problems and can be calm in doing difficult tasks.

2.3 Contextual Teaching and Learning with Karo Cultural Context

The fundamental definition of contextual gaining knowledge of in line with Hosnan (2014: 267) is the concept of learning in which the instructor brings the real world into the lecture room and encourages students to make connections among their expertise and its utility in their day by day lives, whilst students advantage information and abilities from the context wherein they're taught. Confined, grade by grade, and from the technique of constructing themselves, as a provision to remedy issues in their lives as members of society. The same component become additionally stated by using Sanjaya (2014:255) that CTL is learning that emphasizes the method of complete scholar involvement a good way to locate the cloth being studied and relate it to actual-life conditions for you to inspire students for you to practice it in their lives.

According to Syaiful Sagala (2013:111) Culture is a concept that generates interest and relates to the way humans live, learn to think, feel, believe, and do what is appropriate according to their culture. The scope of the Karo tribe is never separated from cultural values. There are so many cultural values that should be preserved and inherited, one of which is the Aron and Runggu culture

For the application of Karo culture, CTL steps are used which are modified by incorporating elements of Karo culture which refers to the five main steps of CTL, namely: 1) activating knowledge; 2) acquiring knowledge; 3) understanding knowledge; 4) applying knowledge; 5) reflecting knowledge, where the problems given are problems related to the Karo cultural diversity. In CTL-KBK students play an active role during learning, where learning is carried out in an authentic context so that students have problem-solving skills, students are also given meaningful tasks (Meaningfull Learning), and are able to work in teams or groups by applying the values of Karo Culture.

2.4 Learning Materials

Development is a process, method, act of developing. Learning materials is a learning resource designed to make it easier for students and teachers to do learning in class. Ibrahim (in Trianto, 2013:71) said that learning materials are devices used in learning activities. Learning

materials function to provide direction for the implementation of learning for teachers and students so that the learning carried out becomes focused during the activity

3. Method

The development model of this research uses 4D (Thiagarajan). This research focuses on the development of mathematics learning materials based on the CTL model with the karo cultural context. This research was conducted at SMP Negeri 1 Berastagi. The subjects of the research were in class VII-3 (trial 1) and class VII-1 (trial 2) which amounted to 32 students/class. This research model is classified into four stages, that is: define, design, develop and disseminate

The learning materials developed must meet the criteria of being valid, practical and effective. Learning materials are said to meet valid indicators if the CTL-KCC learning materials developed are at least in the assessment category ($4 \leq V_a \leq 5$). Learning materials are said to meet practical indicators based on the results of observations of the implementation of learning tools in the classroom including in the category of "Well implemented" ($3 \leq O_k < 4$).

The learning materials developed are said to be effective if: (1) the minimum test score for students' problem-solving abilities is 55 (category "medium") and classically at least 85% of students meet the learning mastery; (2) the minimum score of the student self-efficacy questionnaire is in the range of $66 < SSE \leq 84$ (category "medium"); (3) the average student response is in the range of $3 \leq R_s < 4$ (category "positive response");

To analyze the increase in students' mathematical problem solving abilities and self-efficacy, it can be obtained from the normalized N-Gain data, Lestari (2015:235) as follows:

$$N - gain = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}}$$

Table 1. N-Gain Score Criteria

N-Gain Score	Criteria
$g \leq 0,3$	Low
$0,3 < g \leq 0,7$	Medium
$g > 0,7$	High

4. Research result

4.1 Stage 1- Define

At this stage the researcher found several weaknesses in the teaching materials that have been used so far in Berastagi 1 Public Middle School. Such as using the same lesson plan every year that is not in accordance with the current curriculum. There is no use of LKPD. In addition, in learning activities the teacher still teaches conventionally, and the teacher is also not used to establishing self-confidence in students through motivational sentences so that students have high self-efficacy in solving the problems given.

4.2 Stage 2- Design

At the design stage, the design of a learning device called draft I was carried out. The learning device developed was in the form of student books, student worksheets, lesson plans supporting devices for 5 meetings and assessment instruments

4.3 Stage 3- Develop

The developed learning materials (draft I) was validated by experts, so that the average score for content validity was obtained as follows: 1) student book is 4.34; 2) student worksheet is 4.29; 3) lesson plans is 4.41. Problem solving tests and self-efficacy questionnaires as assessment instruments have met valid and reliable criteria. This stage is carried out to find weaknesses in the developed material, so that revisions can be made to obtain more effective devices.

4.3.1 Result of Trial I

In practical terms, it can be seen from the implementation of learning using developed learning materials seen from 3 aspects of observation, namely: a) the implementation of the learning stages, b) the implementation of the social system, and c) the implementation of the management reaction principle with the prepared support system. The results of the Observation of the Implementation of the Learning Device Trial 1 amounted to 2.878 (category "poorly implemented").

Indicators of effectiveness in trial 1 obtained 1) the outcome of classical completeness of students' problem solving abilities in trial 1 are 65.625% (criteria "does not meet classical completeness"); 2) the average score of the self-efficacy questionnaire is 89.94 with the "High" category 3) the average student response is 89% with the "positive response" category

Based on the average gain, it was found that trial 1 had an increase in students' problem solving abilities with the criteria of "medium" with a score of 0.30 ($0.3 < g \leq 0.7$). Based on the average gain, it was found that trial 1 there was an increase in the self-efficacy of students with "medium" criteria with a score of 0.31 ($0.3 < g \leq 0.7$).

Based on the results of data analysis carried out in trial 1, it was found that the learning materials developed did not meet the criteria for effectiveness, some weaknesses were found during the learning process so that revisions were made to the learning materials being developed. Learning materials that have been revised are then tried out again in different classes.

4.3.2 Result of Trial II

The results of the Observation of the Implementation of the Trial 2 Learning Materials are 3.347 (category "well implemented"). Indicators of effectiveness in trial 2 obtained 1) The results of classical completeness of students' problem solving abilities in trial 2 were 87.50% (criteria "has met classical completeness"); 2) a self-efficacy questionnaire score of 91.03 with the "High" category; 3) the average student response is 92% with the category "positive response".

Based on the average gain, it was found that trial 2 had an increase in students' problem solving abilities with the "medium" criteria with a score of 0.47 ($0.3 < g \leq 0.7$). Based on the average gain, it was found that trial 2 there was an outcome in self-efficacy of students with "medium" criteria with a score of 0.39 ($0.3 < g \leq 0.7$).

4.4 Stage 4- disseminate

The development of learning materials has obtained a positive value based on the validation of the device from experts and the testing of the device carried out. Therefore, then the developed learning materials are distributed on a wider scale by deploying devices.

5. Discussion

Based on the results of the validation of learning materials based on the CTL model with the Karo cultural context developed, the results obtained are, the elements contained in the Learning Implementation Plan, Student Books, Student Activity Sheets and valid problem solving ability tests. Therefore, the learning materials developed can already be tested.

Based on the assessments of experts/practitioners regarding the practicality of the first learning materials, it was said that the learning materials developed could be used with little or no improvement. Based on the outcome of the implementation of learning that is applied to learning materials, the learning materials are called practical. Its practicality is shown in the learning implementation observation score for trial 1 with the criteria "Not well implemented", while for trial 2 obtained a score with the criteria "well implemented". Thus the learning materials developed are practical to be used by educators and students. Learning materials will determine the success of learning. In line with Purnama's research, Khairani and Surya (2021:50) mention, as for the importance of gaining knowledge of substances to guide the implementation of effective and efficient getting to know with a view to create an environment that permits students to analyze, to enhance pupil gaining knowledge of consequences, generate pupil hobby in getting to know, offer possibilities for college students to practice, in addition to to help in fixing troubles skilled by way of students and have an attitude of appreciating the usefulness of mathematic in life.

Based on the outcome of trial 1, the learning materials for the CTL model with the Karo cultural context developed have not yet reached an effective level; (1) classical student learning completeness that has not been achieved; (2) the achievement of students' self-efficacy; and (3) students gave a positive response to the elements of the learning material developed. Because it did not meet all the effective indicators, a revision was made to the learning material. Based on the results of trial 2, the learning materials based on the CTL model with the Karo cultural context developed reached an effective level: (1) classical student learning mastery was achieved; (2) the achievement of students' self-efficacy; and (3) students gave a positive response to the elements of the learning material developed.

The learning model used in the CTL-based learning process makes students interested in being actively involved during the learning process thereby increasing student learning completeness (Amalia, et al., 2017). According to Vygotsky, social interaction between teachers and students or students and students can construct new understandings and students' intellectual development (Arends, 2008).

In line with the characteristics and principles of the CTL-KCC model, where the learning carried out require the process of full student complicity to be able to complete meaningful tasks by connecting them with real-life situations so as to encourage students to be able to construct knowledge and apply it in their lives. Apart from that, learning in a cultural context that is identical to the environment in which students live can affect the student's learning process.

According to Jean Piaget (Harahap, 2012:55), Theory of knowledge is basically the beginning of thinking to respond to real situations, such as living things that adapt to their environment. This is in line with the concept of a contextual approach that begins activities with problems that are already known to students through their environment.

Based on the outcome of the analysis of students problem solving ability and self-efficacy tests for trials 1 and 2, it shows that there is an intensify in students self-efficacy problem solving abilities. The increase in problem-solving abilities can be seen from the average problem-solving ability test results obtained by students. The increase in students' self-efficacy is seen from the score of the self-efficacy questionnaire. These results show that the use of learning materials based on the CTL model with the Karo Culture context is able to improve students' problem-solving abilities and self-efficacy.

6. Conclusion

Based on the results of the research, it can be concluded that the learning tools developed based on contextual teaching and learning with the Karo cultural context (CTL-KCC) have met the valid, practical and effective criteria to be used to improve problem solving skills and self-efficacy. Thus the learning device is suitable for use in learning activities

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