The Effectiveness of Realistic Mathematics Education by using the Context of Toba Batak Culture

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Abstract: Facts and research results show that the 2013 curriculum implementation has not been effective. The contributing factors are teachers and students. The teacher is not able to manage student-centered learning because it is used to teacher-centered learning. Students are not able to follow the learning because they are familiar with teacher-dominated learning. Consequently, learning becomes ineffective. The alternative solution to the problem is learning realistic mathematics education using context that is close to students. The context applied is the context of the student's culture, namely the Toba Batak culture. The results of the study show that students meet the minimum completeness criteria that have been set by the government, the teacher is able to manage learning well, students gived positive responses to the learning carried out. In accordance with the indicators of learning effectiveness, it can be concluded that the learning of realistic mathematics education using the context of the Toba Batak culture is effective.

1 INTRODUCTION

The government has continuously carried out some socialization and training on the implementation of the 2013 curriculum. However, in reality there are still many educators and students who feel confused about implementing it in the learning process. Thus, the implementation of the 2013 curriculum in schools has become less effective. This is proven through several research results that refer to the evaluation of the effectiveness of the 2013 curriculum implementation.

The studies conducted on the measurement of the effectiveness of the implementation of the 2013 Curriculum generally reveal that the implementation of the 2013 curriculum is less effective. Riptiani Manik, et al who conducted the research in 2015 revealed that the implementation of 2013 curriculum was less effective in terms of input aspects, the implementation of 2013 curriculum was less effective in terms of product aspects and concluded that public elementary schools in rural areas of Badung regency were less effective in implementing 2013 curriculum. Next, research conducted by Ni Luh Karnita Dewi, et al in 2015 reported that the

implementation of the 2013 Curriculum on state elementary schools in the outskirts of Badung Regency was less effective.

Basically, the lack of effectiveness of the implementation of the 2013 curriculum began with educators. This is in line with the results of research revealed by I Nyoman Ruja and Sukamto in 2015 which revealed that teachers experienced problems in implementing the 2013 Curriculum. The problem faced by teachers in the implementation of the 2013 National Curriculum was that teachers in the field were not ready and teachers were still having difficulties in making lesson plans despite the teacher's syllabus and books.

The same research on the difficulties of teachers in implementing the 2013 Curriculum was also revealed by research carried out by Ayuk Kusumastuti, Sudiyanto and Dini Octoria in 2016. The study revealed that teachers experienced several obstacles in implementing the 2013 Curriculum. The results showed that teachers had difficulties in three aspects of learning. These three aspects are learning planning, learning implementation, and learning assessment.

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Other studies revealed that there were some obstacles experienced by teachers in the implementation of the 2013 Curriculum. The research was research conducted by Heri Retnawati in 2015. The study produced 4 research results. The results of the first study revealed that training and socialization had not been able to provide a good and thorough understanding of the 2013 Curriculum. The results of the second study revealed that teachers had difficulty managing time in planning learning, planning learning, planning attitude assessments, and sorting knowledge and skills in the preparation of assessment instruments. The results of the third study revealed that time in the implementation of learning, difficulties related to learning devices, and difficulty activating students. The results of the latest research revealed that the assessment system in 2013 Curriculum was complicated and needed a long time to compile reports.

The difficulties faced by teachers in implementing the 2013 curriculum have a significant impact on students. As a result of the teacher's inability, students become difficult to learn. Students are as if placed on a ship without a skipper. Students become confused and student learning activities become passive.

Based on the problems that arise in the implementation of the 2013 Curriculum, researchers are interested in developing effective learning in accordance with the demands of the 2013 curriculum. The development of learning carried out will be a solution or answer to the confusion of educators in designing learning in accordance with the demands of the 2013 Curriculum. The development of learning in accordance with the demands of the 2013 Curriculum. The development of learning produced is also expected to be a model or reference for educators in designing learning through the context that is close to the student's self. Thus, the learning process that provokes students to be active in learning does not become a difficult job because students are brought to a real and contextual learning environment.

The development of learning that will be used to produce effective learning in accordance with the demands of the 2013 Curriculum is, the development of realistic mathematical approaches using the cultural context of the Toba Batak tribe. This learning approach was chosen because it has characteristics that are in accordance with the scientific learning approach suggested by the 2013 curriculum. One of the main characteristics of the scientific approach is based on facts or phenomena and is not imaginary which is a characteristic of a realistic mathematical approach. In addition, in realistic mathematical approaches students are facilitated to construct their own knowledge so that students appear to be new inventors in accordance with the philosophical basis of the 2013 Curriculum. The next reason for the selection of the development of realistic mathematical approaches is because realistic mathematics contains steps the learning set out in the 2013 curriculum is 5M activities which include observing, asking, reasoning, trying and building networks.

The context used in the development of this learning is the cultural context of the Toba Batak tribe which consists of cultural forms owned by the Toba Batak tribe. Involving the cultural context in the development of this learning approach is based on the philosophy of developing the 2013 curriculum which reveals that education is rooted in national culture and is a process of national cultural inheritance. In the end, through this analysis the context of the Toba Batak ethnic culture was applied in the development of this learning.

As an illustration, here is an example of how the development of learning a realistic mathematical approach by using the cultural context of the Toba Batak tribe to be designed. In the algebraic addition material, the teacher usually gives an example "2x + 3y + 5x + 2y = 7x + 5y". With the development of learning to be carried out, the material will be given the cultural context of the Toba Batak tribe. So that the example would be "Togap, Bonar, Poltak, Maruhum each assigned to the teacher to bring 2 ulos sadum, 3 ulos ragihotang, 5 ulos sadum and 2 ulos ragihotang for the teacher's day program. What are the ulos sadum and ulos ragihotang they bring? "The answers that will be obtained are 7 ulos sadum and 5 ulos ragihotang.

2 THEORICAL FRAMEWORK

2.1 Definition of Learning and Mathematics Learning

Learning activities must be done by all humans. Humans have been learning since their wombs. Learning can be interpreted as an effort made by someone to make changes in behavior, attitudes, habits, knowledge, skills and so forth. So that in learning happens a change from not knowing to know, from not being skilled to being skilled and from not being able to do something to be able to do something (Khairani, 2013).

The word "learning" has an understanding of doing learning activities. So the word "learning" contains the process or events of the learning verb. In other words, the term learning is a process related to learning.

Mathematics can be interpreted as a branch of science in which there is a logical thinking process in accordance with certain principles, properties, postulates and theorems. By connecting this understanding to the notion of learning, mathematics learning can be interpreted as the process of learning about the development of logical thinking in accordance with certain principles, properties, postulates and theorems.

2.2 Batak Tribe Culture

Understanding culture can be defined descriptively, historically, normatively, psychologically, structurally and genetically. However, in general the definition has the same meaning. Based on these definitions, it can be summarized that culture is the totality of inheritance that is passed down from generation to generation in regulating behavioral patterns and actions that must be maintained, so that the community within them can meet their material and emotional needs.

Every culture has a form of cultural results. This form of culture consists of cultural systems, social systems and physical culture. The form of culture in the cultural system are ideas, ideas, values and norms that bind the supporting community. The form of culture in the social system is the overall activities and actions of people who are patterned in the supporting community. Whereas the form of culture in the form of physical culture is the concrete objects produced by the culture that can be seen and can be touched.

The form of culture in the form of a cultural system in the Toba Batak tribe are 7 living philosophies inherited by ancestors. The seven philosophy of life as outlined by Tinambunan are mardebata (having God), marpinompar (having children), martutur (having kinship), maradat (having customs), marpangkirom (having hope for hasangapon / being respected in society, hagabeon / glory, hamoraon / wealth), marpatik (has rules and laws) and maruhum (has law).

The form of culture in the social system of the Toba Batak tribe is the result of cultural activities. The results of these cultural activities are (genealogy), Toba Batak language, marsiadapari (mutual cooperation), Toba Batak dance (Tortor), partuturon (kinship), writing Batak Toba, national anthem batak (O Tano Batak), umpasa (quote) and umpama (idiom).

The form of culture in the form of physical culture in the Toba Batak tribe is the result of unique

and valuable works. The form of physical culture is ruma sopo (traditional house), mats of pandan leaves as a place to sit, gondang sabangunan (a set of drums), monuments, sigale-gale (wayang) and ulos (woven cloth).

2.3 Realistic Mathematic Education

The RME approach has special characteristics that are different from other learning approaches. This particular characteristic lies in the aspects that are owned by PMR. De lange (in Sutarto Hadi, 2017: 38) states that mathematics learning with the RME approach includes the aspects : (1) start a lesson by asking "real" problems for students in accordance with their level of experience, so that students immediately engage in meaningful learning, (2) problems given must be directed in accordance with the objectives to be achieved in the lesson, (3) students develop or create symbolic models informally of the problems raised, (4) teaching takes place interactively which means that students explain and give reasons for the answers given, understand the answers of their friends, agree to the answers of their friends, express disapproval, seek alternative solutions and reflect on every step taken or the results of the lesson .

Each learning model or approach has the syntax or steps in its implementation in the learning process. The steps of the mathematics learning process with RME are as follows: (1) understanding contextual problems, (2) resolve contextual problems, (3) compare and discuss answers, and (4) attract conclusions.

2.4 Learning Effectiveness

Effective learning that actually has a meaning that is far more important than just the achievement of learning goals. According to Chris (2007: 96),

"Learning is an activity of construction, handled with (or in the context of) others, driven by learner's agency. Effective learning is the best of their best plus the monitoring and context. Effective learning can be seen as a virtuous cycle of effective learning advances, effective learning processes, distinctions between process and outcome decrease. Outcomes include knowledge (of things, people, actions), skills (with things, ideas, people), actions, feelings and emotions, success, satisfaction, ideas and strategies about learning, affiliation to learning, a sense of oneself, including self as a learner, a sense of others and interacting with them, a sense of membership of a community".

Based on the quotations that have been described, it can be concluded that there are at least

4 things that must be possessed by a learning process so that it is said to be effective. The four things that are meant are learning is the formation of student activities so that in effective learning students must be active, learning is controlled and directed by a facilitator so that in effective learning the teacher must be able to manage the learning process, learning activities require supervision and evaluation so that effective learning is needed observation of the learning process and learning outcomes.

The effectiveness of learning in this study will be directed according to the theory expressed by Chris. Referring to Chris's statement, the effectiveness of learning will be reviewed from 4 aspects:

- 1. The achievement of expected learning objectives that meet the Minimum Completeness Criteria. Indicators of achievement of learning objectives in accordance with indicators set by the Department of Education and Culture of Indonesia. Each student is said to have finished his study (individual completeness) if the proportion of students' correct answers is \geq 65%, and a class is said to have completed their learning (classical completeness) if there are \geq 85% of students who have completed their study (Depdikbud in Trianto, 2010: 241).
- 2. The activeness of students in listening to the teacher / friend's explanation, writing (making notes on solving problems, making summaries), discussing / asking questions with friends / teachers, organizing and finding relationships from the information provided.
- 3. The ability of teachers to manage the learning in an effort to find out student learning readiness, provide explanations / provide information, observe and motivate students to do learning tasks, provide assistance and guide student work.
- 4. Students' responses in terms of interest and interest in learning components and activities.

3 RESEARCH METHODS

This type of research is development research. The study was conducted at SMP Budhi Dharma Balige Jl. Ki Hajar Dewantara Soposurung Balige which is located in Toba Samosir Regency. The subjects of this study were students at Secondary School Budhi Dharma Balige 8th class on 2017/2018 academic year. The object of this research is the effectiveness

of learning realistic mathematics education with the context of Toba Batak culture.

The variables involved in this study are learning effectiveness, student learning outcomes, student activities, the ability of teachers to manage learning and the student response. Learning outcomes are scores obtained by students from the test of learning outcomes that are measured using the test instruments that have been compiled. Student activity is an activity carried out by students during the teaching and learning process. Student activities will be observed using observation sheets of student activities. The ability of teachers to manage the learning is the score obtained by the teacher when carrying out the activities of the teaching and learning process. The ability of teachers to manage the learning is measured using teacher observation sheets. Student responses are students' responses to learning that has been carried out. Student responses will be measured using a questionnaire.

The instruments used in this study were learning observation sheets outcomes tests. and questionnaires. The observation sheets provided are activity observation sheets for students, activity observation sheets for teachers and learning management observation sheets. Students' Questionnaire responses to the components and activities of learning about the subject matter, student activity sheets, student books, ways of learning, and the way the teacher teaches.

The results obtained were analyzed to check whether the development of learning using a realistic mathematics learning approach that has an effective cultural context of the Batak Toba tribe in accordance with the indicators that have been set. These indicators include the validity of learning devices and learning instruments as well as the effectiveness of learning developed. Furthermore, effectiveness is measured through indicators of learning completeness, student activity, teacher's ability to manage student learning and response.

The learning developed is said to be valid if the level of validity produced is valid. If the level of validity of the developed learning is lower than valid, then a revision needs to be made to obtain a valid level of validation.

Learning that is developed is said to be effective if the level of effectiveness produced is high. If the level of effectiveness of the developed learning is lower than high, it is necessary to revise it to obtain a high level of effectiveness.

The teacher is stated to be able to manage the learning well if the score obtained by the teacher is in a pretty good category. If the categories obtained below are good enough, the learning and tools are re-reviewed for revision and the teacher is briefed to improve the quality before a retest.

Student and teacher responses are measured by the number of responses that are positive or negative based on each questionnaire category that has been provided. A positive response means expressing happy, new, interested and interested and interested in developing learning activities in realistic mathematical approaches using the context of the Toba Batak culture. Conversely a negative response means stating the opposite condition of a positive response. If a positive student response is greater than or equal to 80%, then the achievement of learning goals is stated to be achieved.

4 ANALYSIS

4.1 The Value of Learning Outcomes

The subject learned in realistic mathematics education that uses the culture of the Batak Toba culture in this study is the number pattern. This material is taught as many as seven meetings. The material discussed is special number pattern, arithmetic sequence, geometry sequence, arithmetic series and arithmetic series.

The learning procees ends with a test to measure students' abilities and to analyze student achievement. The test consists of 3 questions. Question number one consists of 3 problems. Question number two consists of 4 problems and question number 3 consists of 3 problems. The indicator of question number one determines the type of number sequence, determine the general formula for the sequence of numbers and determine the pattern of convergencies sequences. The indicator of question number two determines the arithmetic sequence, determine the first term of the arithmetic sequence, determine the arithmetic series and calculate the number of n first arithmetic series. The indicator of question number three is determining the geometry sequence, determining the first n term of the geometry sequence and determining the number of the first n terms of the geometry series.

The number of students that follow the exam is 40 students. The results of the test can be seen in the following table:

Table 1: Summary of Student Exam Results

| | Value | |
|------------------------|-------|--|
| The number of students | 40 | |

| Lowest score | 40 |
|-------------------------|------|
| Highest score | 100 |
| Mean | 80.7 |
| Standard Deviation | 15.9 |
| Number of students who | 35 |
| has score same or lower | |
| than 65 | |

From the table above obtained information that the lowest value obtained by students is 40. the highest value obtained by students is 100. the average class of students is 80.7. large distribution of student value data is 15.9. the number of students who have a value equal to or greater than 65 there are 35 students. percentage of students who have a value equal to or greater than 65 is 87.5%.

4.2 The Observation Sheet of Teacher Ability to Manage Learning

Learning process of number pattern is carried out in 7 meetings. At each meeting, an observer observes the activities carried out by the teacher. The activities observed are preliminary activities, main activities, closing activities and time management. In the preliminary activity, the observer observes the teacher's activities in opening learning which consists of 4 activities. In the main activities, observers observe the activities carried out by the teacher in delivering learning material consisting of 15 activities. In the closing activity, the observer observes the activities carried out by the teacher when closing learning which consists of 2 activities. In time management, observers observe how teachers use learning time well.

Observations of the teacher's ability to manage the learning can be seen in the following table:

| rable 2. The Monity of Tedener | | | |
|--------------------------------|-------------|--|--|
| Торіс | Category | | |
| Odd Number | 4.00 (Good) | | |
| Even and Square Number | 4.09 (Good) | | |
| Rectangle and Triangle Number | 4.00 (Good) | | |
| Pascal Triangle | 4.00 (Good) | | |
| Arithmetic Sequence and Series | 4.04 (Good) | | |
| Geometry Sequence | 4.18 (Good) | | |
| Geometry Series | 4.13 (Good) | | |
| Average | 4.04 (Good) | | |

Table 2: The Ability of Teacher

From the table above, it can be seen that the teacher's ability to manage the learning is in a good category with an average of 4.04.

4.3 The Observation Sheet of Student Activity

Student activities observed by observers were 7 meetings. The activities observed are activities in the

preliminary stage, the stage of the main activities, the closing stage and time management. Activity was observed in the preliminary stage is how student feedback to the teacher in starting learning which consists of 4 activities. In the main activity stage, what is observed is student feedback on the learning activities presented by the teacher. Student activities observed at the core activities consist of 15 activities. In the closing activity stage, what is observed is student feedback to the teacher when closing learning activities. In the time management phase, the activity observed is how students use the available learning time well.

The following is the result of observing student activities observed by observers:

| Торіс | Category |
|--------------------------------|---------------|
| Odd Number | 3.95 (Enough) |
| Even and Square Number | 3.95 (Enough) |
| Rectangle and Triangle Number | 3.95 (Enough) |
| Pascal Triangle | 4.04 (Good) |
| Arithmetic Sequence and Series | 4.22 (Good) |
| Geometry Sequence | 4.27 (Good) |
| Geometry Series | 3.95 (Enough) |
| Average | 4.04 (Good) |

Table 3: The Activity of Student

From the table above, it can be seen that the student's activity is in a good category with an average of 4.04.

4.4 The Student Response

Student responses were measured using a questionnaire. The questionnaire used consists of two choices, namely "yes" or "no". The questionnaire contains 4 aspects namely feeling of pleasure, novelty, feeling of interest and desire. Aspects of pleasure and novelty contain 4 indicators namely subject matter, student activity sheet, the way of learning and the way the teacher teaches. Interested aspects of learning consist of indicators interested in participating in further learning activities with realistic mathematics education activities using the context of Toba Batak culture. Aspects of desire consist of desire in language, the appearance of the writing, illustration of the teacher and the location of the image contained in the student activity sheet.

The following is a summary of the results of the student response questionnaire on learning realistic mathematics using the context of the Toba Batak culture that has been implemented.

| TT 1 1 4 | D 1. | C C . 1 | D | o |
|----------|---------|------------|----------|---------------|
| Table 4 | Results | of Student | Resnonse | Questionnaire |
| ruore r. | results | or brudent | response | Questionnune |

| Indicator | | Category | | |
|-----------------------------------|-----------------------------|----------|-------|--|
| Нарру | Not Happy | Yes | No | |
| | Lesson | 97.5% | 2.5% | |
| | Worksheet | 97.5% | 2.5% | |
| | How to Study | | 5% | |
| | How Teacher to Teach | 100% | 0% | |
| | Average | 97.5% | 2.5% | |
| New | Not New | | | |
| | Lesson | 97.5% | 2.5% | |
| | Worksheet | 100% | 0% | |
| | How to Study | 82.5% | 17,5% | |
| | How Teacher to Teach | 97.5% | 2.5% | |
| | Average | 94.4 | 5.6 | |
| Interested in participating in | | 97.5% | 2.5% | |
| further l | earning activities with the | | | |
| learning | mathematics education | | | |
| activitie | s using the context of | | | |
| | atak culture. | | | |
| Desire in the language, writing | | 100% | 0% | |
| | nce, teacher illustration | | | |
| and the | location of the picture | | | |
| contained in the student activity | | | | |
| sheet. | | | | |
| | | | | |

The percentage of students who were happy with realistic mathematics education with the context of Toba Batak culture as much as 97.5% and students who were not happy with realistic mathematics education with the context of Toba Batak culture as much as 2.5%. Based on these results, in accordance with the indicators that have been determined, it can be said that students have a positive response to the learning carried out. In this case, the percentage of students' positive response is 97.5% > 80%. Thus, it is concluded that students feel happy with learning realistic mathematics education using the context of Toba Batak culture.

The percentage of students who stated realistic mathematics education with the context of the new Toba Batak culture for these students was as much as 94.38% and students who did not feel new with learning realistic mathematics education using the context of Toba Batak culture as much as 5.62%. So the responses of student to the learning are positive. In this case, the average percentage of students' positive response is 94.38% > 80%. Thus, it is concluded that realistic mathematics learning with the context of Toba Batak culture is new to students.

The percentage of students who are interested in participating in further learning activities with realistic mathematics education activities using the context of Toba Batak culture is as much as 97.5% and students who are not interested in learning realistic mathematics education using the context of the Toba Batak culture for the next lesson are 2.5%.

So it can be said that students have a positive response to learning that is carried out with a percentage of students' positive response of 97.5% > 80%. Thus, students are interested in participating in further learning activities with realistic mathematics learning activities using the context of Toba Batak culture.

The percentage of students who are interested in language, writing appearance, teacher illustration and the location of the picture contained in the worksheet is as much as 100%. Thus, it can be said that students have a positive response to learning carried out with a percentage of students' positive response of 100% > 80%. Thus students are interested in language, writing appearance, teacher illustration and the location of images contained in worksheet learning realistic mathematics education using the context of Toba Batak culture.

5 RESULT AND DISCUSSIONS

Effective learning indicators in this study are reviewed from 4 indicators in accordance with what was revealed by to Chris (2007: 96). These indicators are students' completeness in learning, the ability of teachers to manage learning, student activities and student responses.

Sum of students who have scores equal to or greater than 65 from the results of the study is 35 people. If presented in percent, the percentage value is 87.5%. Minimum individual completion and completeness of the drinking class according to the Ministry of National Education are 65 and 85%. Based on these indicators, the individual completeness and class of students in this study meet the stipulated conditions.

The ability of teachers to manage the learning in this study obtained an average score of 4.04. The value if presented in quality, then the ability of teachers to manage the learning is in a good category.

Good learning is learning that is able to activate student activities. Based on observations obtained information that the average value of student activity is 4.04. This value in the form of quality means good. So, the activities of students in realistic mathematics education using the context of the Toba Batak culture are good. In other words students are actively participating in learning activities.

The results of the analysis for student response aspects which consist of happy or not happy, new or not new, interested or not interested and having the desire or not having desire all show positive results. Students enjoy learning realistic mathematics education with the context of Toba Batak culture. Learning realistic mathematics with the context of Toba Batak culture is new learning for students. Students are interested in participating in further learning activities with realistic mathematics learning activities using the context of Toba Batak culture. Students are also having a desire in language, writing appearance, teacher illustration and the location of the images contained in the student activity sheet used. From the achievement of these four aspects it was concluded that students had a positive response to realistic mathematics learning using the context of Toba Batak culture.

6 CONCLUSIONS

The results of the study show that students meet the minimum completeness criteria that have been set by the government, the teacher is able to manage learning well, students actively follow learning and positive student responses to the learning carried out. based on these four results, it can be concluded that learning realistic mathematics using the context of Toba Batak culture is effective.

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