

THE FEASIBILITY OF PBL-REATHNOMATH MODEL TO TRAIN HOTS OF ELEMENTARY SCHOOL STUDENTS

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ABSTRACT. This research aims to design a learning model that can train Higher Order Thinking Skills (HOTS) and foster a sense of nationalism in students by using a problem based learning (PBL) model based on realistic mathematics education (RME) and ethnomatics. This learning model is named PBL-Reathnomath which will be tested for its feasibility through the content validation and limited trials. This study used the Plomp development design with the following steps, 1) initial investigation, 2) design, 3) realization / construction, 4) testing, evaluation, revision, and 5) implementation. The research subjects were elementary school students of VI Class in West Aceh and the opinion of elementary school teachers in implementing the model. The learning tools used were learning model guides, lesson plans, student worksheets, and modules. In addition, the preparation of assessment instruments consisting of HOTS tests, questionnaires, syntax feasibility assessments, questionnaires user response, and preparation of validation sheets. The results of the research can be concluded that the PBL-Reathnomath learning model is feasible to be applied to students and educators candidate in developing learning models. Based on the assessment of the validator, the learning model has met the content validity with a Vaiken value ≥ 0.76 , and the teacher and student assessments are in the "Good" category. Learning uses the PBL-Reathnomath model is feasible to be tested to assist in training students' HOTS.

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1. INTRODUCTION

The success of education, whose main goal is to improve human resources, is effected by various factors. One of the factors that influence this success is the ability of the teachers to make learning innovations [1–3]. This ability is necessary to improve or enhance the learning process that has been carried out by the teacher. In this regard, the government has provided guidelines, namely by issuing the Minister of Education Regulation Number 16 of 2007 concerning Academic Qualification Standards and Subject Teacher Competencies which state that subject teacher competence includes developing teaching and learning strategies [4, 5]. Teachers are demanded to be able to improve students' higher order thinking skills from an early age [6, 7].

Enhancing higher order thinking skills has become one of the priorities in mathematics. Elementary school level students must begin to be trained in higher order thinking according to their age, mathematics subjects are given to all students to equip them with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability of collaboration [8, 9]. It is associated with Permendikbud Number 81a of 2013 concerning Curriculum Implementation in appendix I of the Guidelines for Preparation and Management of the Education Unit Level Curriculum which asserts that the required student abilities include the ability to communicate, think critically and creatively. In addition, the results of the 2013 National Examination Convention held by KEMDIKBUD decided that in determining graduation to increase the credibility and reliability of the National Examination, so that the further National Examination measures the higher cognitive domain. Training students to be skilled can be undertaken by teachers by practicing questions with HOTS characteristics [10].

To support this, teachers must have the appropriate strategy in training students' HOTS abilities. The problem faced by teachers is the lack of teacher's ability in developing the learning models that can train HOTS [11, 12], besides, there is no assessment instrument specifically designed to train HOTS or students' higher order thinking skills [13].

Students need to be given problems that can stimulate thinking critically and analytically so that they can solve them in various ways and different reasons to solve the same problem [14]. This is in accordance with the type of problem

in mathematical investigations, namely problems that can be solved in various ways to get the same results, problems that contain elements of mathematical investigation do not mean that the problem must be long and difficult to work on for students [15]. Students must be able to find themselves, carry out their own investigations, prove a presumption they make themselves, and find out answers to existing questions.

In connection with those demands, the learning process has also undergone changes, namely from students being told to become students who find out. Therefore, the suitable learning model to be used in the 2013 curriculum is a learning model that can support students to actively find out the concepts that are the learning objectives. Students are directed to think analytically to formulate problems and solve them rather than merely thinking mechanically to solve problems. One of the suitable learning models to be applied currently is problem based learning [16, 17].

PBL is a learning model that will guide the Learning community in groups to solve problems given by the teacher. The problems used are problems that are based on the daily life problems of students. PBL is an instructional method that is based on real life problems to be used by the teacher as a means of motivating students to identify and find out the concepts contained in the problem. This problem is used to link curiosity and students' analytical skills and initiative on subject matter. The success of the learning process in schools is inseparable from the ability of teacher to apply learning models that are oriented towards increasing student involvement effectively in the learning process. The development of an appropriate learning model basically aims to create learning conditions that enable the students to be able to learn actively and pleasantly so that students can achieve maximum learning outcomes and achievements [18, 19]. Therefore, it is necessary to conduct research dealing with the development of PBL learning models that can increase student HOTS and other affective domains. Thus, the researcher attempts to modify the PBL model using RME characteristics that use contextual problems, using a problem-solving model designed by students, the interaction and contribution of students, and using the linkages between the concepts that have been learned and just learned, the researcher also combines PBL learning styles with RME principles through guided reinvention, didactical phenomenology and self develop model, student-centered learning is designed to train students' HOTS through discovery activities, collaboration,

problem solving strategies, alternative solutions and discussion of learning outcomes. The questions presented are in the form of a context on cultural local wisdom of Aceh called ethnomatematics, this is carried in order to train creativity and foster a sense of nationalism for students to know mathematics through culture, students will be trained to explore mathematical concepts that exist in Aceh culture then given contextual problems that train their abilities HOTS. The development of a model based on RME and Ethnomatematics is named PBL-Reathnomath.

Research Aim and Research Questions

The purpose of the present research was to investigate the higher order thinking skills in classrooms where the students were introduced to learn with PBL-Reathnomath Model. The research questions:

1. How is the validity of the PBL-Reathnomath model to expert judgment ?
2. How is the feasibility of PBL-Reathnomath model to training student's Higher Order Thinking Skill based on teacher and student responses ?

2. RESEARCH METHODOLOGY

General Background

This research used the Research and Development method with reference to the development model of Plomp [20] with the following steps, 1) initial investigation, 2) design, 3) realization / construction, 4) test, evaluation, revision, and 5) implementation.

Sample

The RME and Ethnomatic based on PBL model was tested for its feasibility of use in all public elementary schools in West Aceh and involved class teachers in each school, especially class of VI to find out the final prototype that could train student HOTS, the validity of the learning model guide, lesson plans, student activity sheets, modules, assessment instruments and model syntax implementation.

Procedure

1. The Initial investigation Phase

It was conducted at SDN in West Aceh regency by collecting information on learning problems of mathematics and formulating rational thinking about the importance of developing models, identifying and examining theories that underlie the development of learning models which include theories that underlie learning models relevant to Mathematics learning, and theories about development of learning models.

2. The Design phase

Activities carried out by selecting a model to be developed and designing a learning syntax with a philosophical foundation on constructivism, the steps developed were related to increasing student HOTS and fostering a sense of nationalism through ethnomatematics. The social system developed by looking at the interaction between students and students, students and teachers and students with their environment. The principle of reaction by developing to consider the role of the teacher in designing learning to meet with the expected goals. Designing a support system in the form of instructional impact by considering the use of facilities, tools and materials including the preparation of

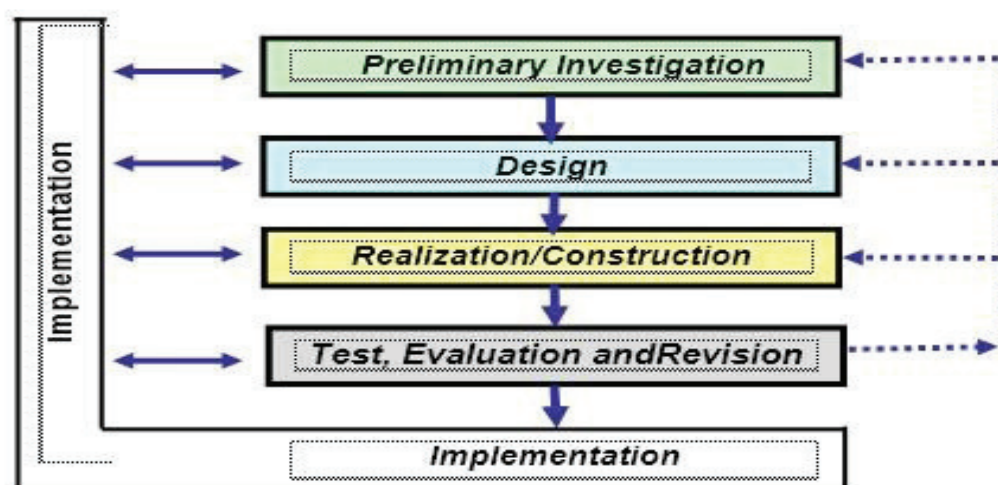


FIGURE 1. Plomp Development Model

learning tools and evaluation instruments used, and the accompanying impact in the form of changes in student behavior after learning.

3. The Realization / construction phase

At this stage, prototype 1 (initial) was produced as a realization of the results of model design, the activities were 1) compiling the learning syntax, 2) establishing a social system, 3) developing the principle of reaction, which is to provide a description for the teacher in responding to every behavior shown by students during learning, and 4) determining the support system, namely the conditions provided so that the learning model can be implemented, for example class arrangements, learning tools, learning facilities, and the media needed in learning, and including compiling the impact of learning outcomes.

4. The test, evaluation and revision phase

In the form of validation activities, namely by asking for expert consideration about the feasibility of the learning model (prototype 1) that had been realized and conducting an analysis of the validation results from experts with aspects of assessment consisting of a) learning syntax, b) Social Systems, c) Reaction Principles, d) Systems Supporters, e) Instructional Impact and the following impact. The results of the expert assessment were analyzed descriptively to find out whether the model developed had met the valid category, so that if it did not meet these criteria, revisions were made based on the non-valid aspects. The expert team consisted of three people with professors qualifications from different agencies.

5. The Implementation Phase

It was undertaken until the limited trial stage to determine the feasibility of using the PBL-Reathnomath model in field trials.

3. RESEARCH RESULTS

The results of development are obtained through the phases which are described as follows.

1. The Initial Investigation Phase

The initial investigation stage covers the activities of field study and literature study, observation activities related to classroom learning conditions and interviews with teachers, students and public figures related to local wisdom in Aceh. Based on the results of observation, learning activities in the classroom were generally good, using learning strategies that actively involved students, such as cooperative learning, inquiry, problem based learning and so on. However, the learning activities that have been carried out so far have not provided students with learning experiences to express themselves in higher-level thinking activities, discovery activities and involvement of local wisdom in the area.

Besides observing classroom learning activities, interviews with public figures were also conducted to find out more about local wisdom in Aceh. The results of the interview explained that there were many cultural elements that could be implemented in Mathematics learning, especially in material of Plane Figure (geometry) such as RumohKrong Aceh, Aceh Door, Aceh Batik, Teuku Umar Hat and several royal heritage inscriptions in Aceh

2. The Design Phase

The activities carried out in the Design Phase are selecting the format for learning models based on RME and Ethnomatematics, developing learning tools such as the guidance of learning model, Lesson Plans, Student Worksheets, and Modules. In addition, an assessment instrument is prepared consisting of test assessments, questionnaires, syntax implementation assessments, user response questionnaires, and preparation of validation sheets.

At this stage, the PBL-Reathnomath model is also formulated, which contains a rational model, a theoretical basis, establishes an outline of the description

and components of the model, and plans to implement the learning model. The components of the learning model developed obtained the results:

a) Syntax of PBL-Reathnomath

First Phase is Presenting contextual problems, which is providing activities to students to observe phenomena / demonstrations or visiting certain locations based on the linkages of learning material provided through contextual problems, in this case, the teacher intertwines contextual problems with ethnomatematics, students are motivated to be involved in problem solving activities, the teacher also prepares the logistics needed in starting the learning process, in connection with the results of this activity, the students are expected to have additional knowledge that students previously had prior knowledge. According to Piaget, this stage is knowledge is built in the child's mind through assimilation, which is the absorption of new information in the mind. According to Bahriah [21] that presenting contextual problems can stimulate the creativity of students to find out concepts and solve problems in everyday life.

Second Phase is implementing Guided Reinvention activities. In this phase, the teacher has a role as a facilitator in guided discovery activities by using student contributions in the learning process, providing stimuli and responses in the form of ethnomatic-based contextual problems through student worksheets group members will break down problems into components, discuss implications, proposing various explanations or solutions, and developing working hypotheses. This activity is like a "brainstorming" phase with evaluation; an explanation or solution is noted. The group needs to formulate learning objectives, determine the information needed, and how this information is obtained. According to Dewey, education should include the role of students in teaching and learning activities as a process for sequencing experiences. Such activities help students to develop thinking skills which are believed to play an important role in various types of cognitive activities. This activity is an activity that can empower students' skills in designing their own learning models and applying them to a problem. This learning activity is carried out in groups. PBL is a learning strategy that involves students in solving problems by integrating various concepts and skills from various disciplines. This strategy includes gathering and combining information that has been obtained with new information, and

presenting it. In Piage's theory known as accommodation, it means rearranging the structure of the mind due to the new information.

The third phase is implementing Community Learning Activities, this stage directs students to actively participate in the learning process, students are taught to collaborate among teams, share, and apply peer tutoring in fostering understanding, students are invited to reconstruct their initial knowledge independently or in groups through student self-develop models in accordance to the characteristics of RME, activities in this phase help students who have feelings of fear or are unwilling to the teacher, it strengthens the concepts being discussed, strengthens relationship between fellow students so that they have thick social feelings, tutorial using students as tutors are often successful in completing teaching, increasing achievement, and creating a delighting for learning at school [?]. It is supported by the opinion of Sinambela [24] who stated that in learning it is necessary to pay attention to how students are involved in problem solving activities. The more active the students are, the greater the learning completeness achievement, thus, the learning will be more effective.

The fourth phase is Finding Alternative Problem Solving, at this stage, creativity, problem-related knowledge, mental learning, and students' concentration are needed to determine various ways of solving problems, students must be directed to reconstruct and reflect on every problem-solving process that has been carried out. There are five ways that can be used in finding ways to solve the problem, namely 1) guess and check, 2) look for pattern, 3) make a systematic list, 4) make and use a drawing or model, and 5) eliminate possibilities, this stage To train students' creativity in understanding the concept of problems, aims to familiarize students with HOTS questions, as stated by Rudyanto [25] that many correct answers to the problems given can provide students with experience in finding something new in the learning process. Through this activity, it is also expected that students can answer problems in many ways, thus inviting intellectual potential and student experience in the process of finding something new.

The fifth phase is analyzing the problem solving process carried out in this activity, there are two, namely it is done in the form of a presentation to the class. Each group presents the results of their discussion in the form of mind mapping in front of the class and confirmed by other groups and teachers. Then by looking at the student's knowledge that is undertaken by making notes on

the comparison of changes in student knowledge and writing the application activities on the learning notes. These changes notes help students to evaluate changes in their knowledge. The use of learning notes can help students become more focused and specific about something. Learning statements can also be used by students to find out creative ideas and write down things that are more specific than they think about. Every time the information is recorded in study notes and becomes a separate assessment for self-assessment. Teachers can create information to respond to responses and problems faced by students in learning. If information is to be retained in other people's memories, it must be involved in cognitive arrangement or elaboration of the material. For example, writing a summary or summary of the lesson presented, because a summary or summary requires students to rearrange the material and select the important parts of the lesson. Students always develop their knowledge through Restructuring and Confirmation activities which are carried out in groups which indirectly teach each other. This assumption is supported by Esminarto et al [26] that team appreciation and individual responsibility are important elements for achieving learning outcomes.

b) Social System

The social system, which applied in the PBL-Reathnomath learning model, is to construct students' knowledge from the experiences that they find either directly or from the information provided by the teacher, and the existence of a cooperative nature and the teacher remains as the facilitator and supervisor in learning activities. According to Dewey, students learn by interacting with their environment and they learn how to learn well. Vygotsky stated that the basic concept of constructivism is scaffolding and cooperation, the formation of small groups in learning allows students to interact with others, exchange experiences and help check understanding of previously owned concepts.

c) The principle of reaction

In this case it is the role of the teacher in processing learning by emphasizing the initial framework of student knowledge which is arranged in the form of mind mapping and from the results of discussions between groups or what happens in front of the class. A constructivist view of teaching means participation

with students in shaping knowledge, creating meaning, questioning clarity, being critical, and providing justification, so that teaching is a form of self-learning. The learning process is constructive, seeing the role of the teacher who must provide the widest possible opportunity for a dialogical process between students and between students and teachers, so that all parties feel responsible that the formation of knowledge is a shared responsibility.

d) Support System

The support system for the PBL-Reathnomath learning model is in the form of a learning model guide, Lesson Plans, Student Worksheets, and Modules. In addition, an assessment instrument is compiled consisting of test assessments, questionnaire assessments, syntax compliance assessments, user response questionnaires, and preparation validation sheet.

e) Instructional Impact and Accompanying Impact

Instructional impact is learning outcomes that are achieved directly by directing students to the goals that are expected to train students in forming concepts and shaping students' attention to focus on learning. For example, students are consciously accustomed to empowering HOTS abilities so that it has an impact on improving student learning outcomes. The accompanying impact is from other learning outcomes produced by a learning process and without direction from the teacher. For example, creating cooperation between teachers and students and between students and other students so as to increase relationships and trust in learning, students are dare to express opinions in public, students learn to accept other people's opinions and students get to know local wisdom through ethnomatematics. The impact of the implementation of PBL-Reathnomath learning is to improve students' HOTS abilities, invite students to become independent learners, and invite students to always construct knowledge through cooperative activities and create a sense of nationalism by getting to know their culture.

3. Realization / Construction Phase

The results obtained from this activity are in the form of PBL-Reathnomath learning syntax, which can be seen in Table 1 below.

TABLE 1. PBL which is modified according to the principles and characteristics of RME and Ethnomatematics

PBL-REATHNOMATH MODEL (PROBLEM BASED LEARNING BASED ON RME AND ETHNOMATHEMATICS)		
	Teacher	Students
Phase 1. Presenting Contextual Problem	1. The teacher groups the students into small groups 2. The teacher presents the phenomenon/demonstration related to the contextual problem 3. The teacher combines (intertwining) the contextual problem with Ethnomatematics 4. The teacher motivates the students to get involved in the problem solving 5. The teacher creates opportunity/condition that makes students actively mathematical 6. The teacher applies didactical phenomenology principle in running the learning process	1. The students sit in the group determined by the teacher. The students pay attention on the phenomenon/demonstration displayed by the teacher 2. The students proposed some questions related to the phenomenon/demonstration around the contextual problem ethnomatematics based
Phase 2. Applying Guided Reinvention Activity	1. The teacher acts as the facilitator. 2. The teacher involves the students/students' contribution in the guided inquiry activity 3. The teacher gives stimulation in the form of contextual problem Ethnomatematics based in the form of job sheet 4. The teacher designs the learning by combining the concepts learned with the new concept found by students. 5. The teacher directs students to plan the problem solving	1. The students do experiment in the class or outside the class related to the solution of the problem presented The students use creative ideas outside 2. the concept or through the existing concepts to solve the problem. 3. The students choose the concept and the concept truth that will be used. 4. The students work together designing the problem solving
Phase 3. Applying Learning Community Activity	1. The teacher directs the students to interact with the group learning through observation, analysis, sharing, and peer tutoring. 2. The teacher gives stimulus to students to present students self develop models. The teacher directs the students to solve the problem by adjusting the old concept and the new concept learned by students 3. by adjusting the old concept and the new concept learned by students	1. The students identify the process of problem solving by pouring the ideas that can be integrated into the learning materials. The students conduct observation, analysis, sharing information, and giving explanation to each other related to the problem presented. 2.
Phase 4. Finding the Alternative of Problem Solving	1. The teacher directs the students to do reconstruction and reflection of the learning activities. 2. The teacher directs the students to find out the completion solution through different ways	1. The students do check and recheck on the problems done 2. The students look for other solution from the problem solving presented
Phase 5. Analyzing The Process of Problem Solving	1. The teacher directs the students to present the work result in front of the class 2. The teacher asks the students to discuss and question and answer to each other with other group 3. The teacher directs the students to take conclusion together 4. The teacher conducts the learning nfote to evaluate the students' development in the learning	1. The students present the result worked together in the team The students conduct question and answer, discussion and debate with other group related to the presented solution 2. 3. Siswa menarik kesimpulan

4) Test, evaluation, revision.

At this stage, the PBL-Reathnomath model design contained in the learning model guide was validated by 3 validators to find out the content validity of the five basic elements of the learning model. In addition to the design of the

learning model, all learning tools and assessment instruments used as a support system in this development research were validated by a validator.

a. Learning Model Guide

The PBL-Reathnomath model design which was validated by 3 validators obtained an average value validity index of Aiken was ≥ 0.76 , it means that the learning model developed fulfills the content validity, so it is feasible to be used with some improvements. The results of the validator's assessment can be seen in the table below.

TABLE 2. The results of the learning model guide assessment

No	The Assessment Aspect	Index of Aiken'V	Category
1	Syntax	0,90	Valid
2	Social System	0,87	Valid
3	Reaction Principle	0,85	Valid
4	Supporting System	0,81	Valid
5	Instructional Impact and Companion Impact	0,77	Valid

b. Lesson plan (RPP)

The results of the validator's assessment of the RPP are as follows:

TABLE 3. Results of the learning implementation plan assessment

No	The Assessment Aspect	Index of Aiken'V	Category
1	Format Suitability	0,80	Valid
2	The formulation of the learning purpose	0,81	Valid
3	Model selection	0,95	Valid
4	The design of learning activities	0,83	Valid
5	The assessment design	0,76	Valid

The Aiken validity index obtained from the three validators' assessment of the lesson plans compiled was ≥ 0.76 which means that the lesson plan as a learning support system for PBL-Reathnomath meets the content validity, so it is feasible to be used with some minor improvements

c. Student Activity Sheet

The results of the assessment by the validator on the student activity sheet can be seen in the following table;

TABLE 4. The results of the Student Activity Sheet assessment

No	The Assessment Aspect	Index of Aiken'V	Category
1	The material content	0,80	Valid
2	Presentation	0,76	Valid
3	Language	0,96	Valid

The Aiken validity index obtained from the three validators' assessment of the student activity sheets compiled was ≥ 0.76 which means that the student activity sheet as a learning support system for PBL-Reathnomath meets the content validity, so it is feasible to use it with some minor improvements.

d. Teaching Materials Module

The results of the validator's assessment of the teaching material module can be seen in the following table;

TABLE 5. Results of the Teaching Material Module assessment

No	The Assessment Aspect	Index of Aiken'V	Category
1	The material content	0,85	Valid
2	Presentation	0,83	Valid
3	Language	0,94	Valid

The Aiken validity index obtained from the three validators' assessment of the compiled teaching material modules is ≥ 0.83 , which means that the teaching material module as a learning support system for PBL-Reathnomath meets the content validity, so it is feasible to use it with some minor improvements.

e. Assessment Instruments

The assessment instruments that were tested for validity included tests and questionnaires. The results of the validator's assessment of the PBL-Reathnomath learning instrument assessment instrument are shown in the following table.

TABLE 6. Results of the Assessment Instrument Assessment

No	The Assessment Aspect	Index of Aiken'V	Category
1	Test	0,81	Valid
2	Questionnaire	0,82	Valid

The Aiken validity index obtained from the three validators' assessment of the assessment instruments compiled was ≥ 0.81 , it means that the PBL-Reathnomath learning assessment instrument fulfills the content validity, so it is feasible to be used at the trial stage. In addition to the test and questionnaire assessment instruments, the supporting assessment instruments were also validated by the validator who concluded that the assessment instruments prepared met this validity with the Aiken validation index was ≥ 0.76 .

TABLE 7. The results of the syntax implementing assessment

No	The Assessment Aspect	Index of Aiken'V	Category
1	The Syntax Compliance	0,82	Valid
2	The Users' Response Questionnaires	0,84	Valid

5) The Implementation Phase

Limited Trial

The limited trial phase is a small-scale trial stage. The number of research subjects at this stage was 3 students. Giving a trial questionnaire using the model to assess the feasibility of the PBL-Reathnomath learning model that developed. Assessment aspects given regarding student responses about the Sheet Student activities and teaching materials as a support system for the PBL-Reathnomath learning model. Each of them consisted of 7 questions and 5 questions with a 1-4 rating scale. The questions given were 9 questions with a 1-4 rating scale. students and teachers can be seen in the following table.

TABLE 8. Results of the model feasibility assessment

No	The Assessment Aspect	Students		Teacher	
		%	Category	%	Category
1	Work Sheet, Teaching Material, and Model	72,6	Good	70	Good

The student assessment results data, it was obtained an average score percentage of 72.6% with the “Good” category. While, the data from the lecturers’ assessment, it was obtained an average score percentage of 70% with the “Good” category. According to Riduwan (2008), the percentage score $\geq 61\%$ is in the “Good” category, which means that the model and model support system developed is feasible to be used.

4. DISCUSSION

High-order thinking skills are skills that are needed by mathematicians in solving mathematical problems. This skill must be trained since childhood to become accustomed to thinking. Training students to think critically, creatively, collaborating with fellow friends through the presentation of contextual problems combined with local cultural ethno-mathematics needs to be conducted in the basic class, so that they are accustomed to dealing with HOTS and improve the quality of thinking. The implementation of ethnomatematics as a study of contextual problems is carried out as an effort to instill a sense of nationalism in students of their love for regional culture. It is like one hit gets two advantages.

However, a common problem in mathematics learning in Indonesia is the teacher’s strategy in presenting mathematics to the students, the teacher emphasizes on memorizing concepts and assigning assignments through routine questions, students are not involved in classroom activities or guided discoveries, students are not used to facing questions that require high-level thinking skills so that learning is meaningless and easily forgets the material that is studied.

This study attempts to design a learning model that is able to train students’ HOTS. The Problem Based Learning (PBL) model is the choice as a basis for model development due to this model is a learning based on problems that require students to gain important knowledge, which makes them adept at solving problems, and has their own learning strategies and the ability to participate in

the team. The learning process in the PBL model uses a more systematic approach in solving a problem and facing challenges that are likely to confront in everyday life. In this way, students are expected to be ready and trained to face problems in everyday life in their environment. To strengthen the feasibility of the PBL model in training students' HOTS, this model combines the characteristics and principles of RME and makes ethnomatematics a contextual problem.

RME is an approach that prioritizes student activeness in collaborating to solve a problem using a learning model designed by students, the teacher becomes a facilitator and at the same time a moderator in guiding a problem-solving process, RME has the principle that mathematics is a human activity. Students must be active both mentally and physically in learning mathematics. Students are not passive people who accept what the teacher says, but are active both physically, especially mentally processing and analyzing information, constructing mathematical knowledge, RME also has the principle that learning is started with realistic problems for students, which can be imagined by students. Realistic problems are more attractive to students than formal mathematical problems without meaning. If learning begins with problems that are meaningful to them, students will be interested in learning, students are then guided to formal mathematical problems.

RME suggests there is not only one way of solving problems. There are many ways, it really depends on the cognitive structure of students (experience). Teachers do not need to teach students how to solve problems. They have to practice finding their own way to solve it. The questions given to students, it should not be far from the schemes they already have in mind. In certain circumstances, the teacher can assist students by providing a little information as directions that students can choose to go through. It can be done by asking questions or giving comments. As well as possible if all students have no idea how to solve a problem. If one student has an idea, it is better the teacher to encourage the student to share the idea with its friends (interaction). The questions given to students are open questions or questions that are not solely solved.

The RME and Ethnomatic approaches are incorporated into PBL so as to generate a syntax that directs students to high-level thinking, this model is called PBL-Reathnomath which is based on five learning phases modified from the PBL model. Starting from the phase of presenting contextual problems, implementing Guided Reinvention activities, Implementing Learning Community activities,

finding alternative problem solving and analyzing the solving process. The process at each successive phase that leads to the problem solving process, begins with the formation of small groups, the teacher presents various phenomena related to ethnomatematic-based contextual problems, the teacher creates an active learning atmosphere that is mathematical in accordance with the principle of didactical phenomenology.

The PBL-Reathnomath learning process requires learning by collaboration (synergy) to be more effective than learning individually according to the second and third phases. It must be admitted that there are many types of learning: some prefer to study individually, some prefer to study in groups; some tend to be visual, some are auditive, some are kinesthetic. The exchange of information is important to understand something. Information that is contrast (cognitive conflict) with that of someone can make that the individual's understanding toward the problem is better. New information can cause old information to be transformed (strengthened / improved or weakened / exacerbated or changed form or pattern). The teacher's task is to assist the students so that new information can strengthen or improve knowledge. Thus the interaction and negotiation are essential in learning mathematics.

In addition, interaction and negotiation between students and students or students and teachers is a good and effective way of gaining knowledge. Students are more open and have more courage to discuss with others than with people who are more mature than them. Thus, the teacher's task is to create learning conditions that provide good learning experiences for students to be creative so that interactions and negotiations between students and students, between students and teachers it can happen. It requires patience, mastery of emotions, and self-confidence. One form of interaction is students are asked to tell their experiences in front of their friends in class or students explain how they solve problems. For this reason the teacher needs to make observations / observations or approaches to students to find out strategies or ways of students solving problems. Students who use different strategies are selected to advance to explain their ideas to their friends. Students need time to reflect. So, teachers need to give students time and encourage students to do so. The ability to listen to people, talk to others emphatically does not appear by itself but needs to be trained and developed. It is expected that teachers will be able to do this from an early age according to the level of cognitive development of students.

Teachers don't be a priori. Teachers need to cultivate an attitude that everyone is basically good.

Learning does not have to be carried out in class, sometimes boredom reduces interest in listening or doing something, including thinking. People need variety to stimulate the body's organs to function properly. This variation can also create a pleasant atmosphere in learning. The same seating arrangement over and over, the same atmosphere in the room over and over again, the same way of learning in the classroom continuously and the appearance of the same teacher continuously causes boredom in students. It needs to be a planning done by the teacher, it is also necessary by asking for suggestions and suggestions from students. Teachers need to instill in themselves a positive attitude towards change, towards variation. Start by training yourself to say (to yourself) "this is the time for me to change" and do it. Teaching is learning. We must continually learn from our way of teaching. Never be "good but need not be fixed again", however be "good but can still be improved".

Punishment only has a negative effect on students, however motivation, especially internal motivation and positive student attitudes can help students learn effectively. Feelings of pleasure in doing something make the brain work optimally to fulfill students' desire. Feelings of pleasure clearly cannot be developed through threats or punishment, but it can be through empathy, appreciation or praise. This is the basis of the PBL-Reathnomath learning process, each step is carried out with pleasure, without pressure and without punishment, this leads to the students' thinking process and students' interest in learning a material to be optimal.

5. CONCLUSION

Based on the results of the research and discussion of the feasibility of the PBL-Reathnomath model for training student HOTS, several conclusions can be drawn. Based on experts, model users, and student opinions through the validity of the PBL-Reathnomath model to enhance the HOTS of Elementary School students, several components will be assessed, 1) The Learning Model Guide is validated by 3 expert validators, obtains an average rating of the Aiken syntax validity index (0, 90), social system (0.87), reaction principle (0.85), support system (0.81) and instructional and accompaniment impact (0.77), in other

words, the entire average of each assessment aspect is $\geq 0,76$ which means that all aspects of the learning model guide are declared valid. 2) the lesson plan with the research aspect conformity of the format (0.80), the formulation of learning objectives (0.81), the selection of the model (0.95), the design of learning activities (0,83) and assessment design (0.76). All aspects were declared valid because ≥ 0.76 . 3) student activity sheets were assessed based on aspects of the material content (0.80), presentation (0.76) and language (0.96), all aspects were declared valid because ≥ 0.76 . 4) the teaching material module is assessed based on aspects of the material content (0.85), presentation (0.83) and language (0.94) All aspects are declared valid because ≥ 0.76 . 5) the validity of the assessment instrument will be tested including tests and questionnaires, respectively - The results of the aiken validation index are 0.81 and 0.82, which means that the test and questionnaire is declared valid because ≥ 0.76 , then 6) syntax implementation and user response graduates get aiken validation index score of 0.82 and 0.84. valid because ≥ 0.76 .

After the validation stage is carried out, then the limited trial stage is carried out where the subject is taken from 3 students from moderate, high and low ability levels, this assessment aims to see the feasibility of the PBL-Reathnomath learning model developed. Assessment aspects are given regarding student responses about Student Activity Sheets and teaching materials as a support system for the PBL-Reathnomath learning model. Each consists of 7 questions and 5 questions with a 1-4 rating scale. The questions given are 9 questions with rating scale 1-4. The results of the assessment of student and teacher responses regarding the feasibility of the respective models are 72.6

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