Development of Problem Based Learning Model Based On Batak Culture to Increase Problem Solving Skills and Students' Adversity Quotient

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Abstract: *This study aims to describe the validity, practicality and effectiveness of problem based learning model based on Batak culture and to know the improvement of problem solving skills of physics and students' adversity quotient by applying problem based learning model based on Batak culture. This research is Research and Development (R & D) by using 4-D model include define, design, develop, and disseminate stages proposed by Thiagarajan. Learning tools developed to support PBL model include RPP (Planning Learning), LKS, Teacher Books and Student Books and student physics problem solving skills on measurement materials. Subjects in this study were students of class X MIA-1 SMA Negeri 3 Padangsidimpuan. The results obtained that the learning tool through learning-based model of learning based on Batak culture developed has met the valid, practical and effective criteria and there is an improvement of problem solving skills of physics and students' fighting power by applying learning tools through learning-based problem model of learning based on Batak culture.*

Keywords: *Model of problem based learning, Batak Culture, Problem Solving Skill, Adversity quotient.*

I. Introduction

Education can be regarded as a process in certain ways so that a person acquires the knowledge, understanding and appropriate behavior. Sanjaya [1] said that education is a conscious and planned effort to create an atmosphere of learning and learning process so that learners actively develop their potential to have spiritual spiritual strength, self-control, personality, intelligence, noble character, and skills needed him, society, nation and state. Efforts by the government to improve the quality of education is to apply the curriculum 2013. In the 2013 curriculum, education and character become an important part in learning, where culture is expected to form the character of students into one component that can be developed from elementary school to high school on. Because culture as an activity inherent in a particular society, greatly affect the mindset of children as students.

Cultural-based learning is based on the recognition of culture as a fundamental (fundamental and important) part of education as an expression and communication of ideas and the development of knowledge, especially in the subject of physics. Physics as one of science subjects can develop the ability to think inductive and deductive analysis in solving problems related to natural events surrounding both quantitative and qualitative with the help of physics, and can develop knowledge, skills and confidence. So that physics learning is very necessary to be given a charge or bridge between physics with the everyday world based on local culture in the student environment.

Batak culture can be an option to be developed as a supporter of physics learning process in North Sumatera area so that it can grow student's fighting power in physics learning. The goal of creating physics learning based on the cultural context of batak is to help students become aware of how students will think in physics in everyday life according to their culture and traditions. However, in reality according to Mulyasa [2], the process of physics learning in schools until now stuck in routines, such as giving formulas, examples of problems and exercises that are done seswa so that students feel bored because it is oriented to the aspect of the results or values achieved without considering the process that students experience until they fully understand it. This is in line with Brok et al [3] states that the lack of problem solving skills of students because teachers do

not train the ability to solve student problems that resulted in students less skilled and even students do not have problem-solving skills.

The reality in the field shows that the process of physics learning is still conventional. Where learning is more centered on the teacher, the lack of involvement of students in the learning process so that students get the material passively. This is based on observations in SMA Negeri 3 Padangsidimpuan, where the learning activities are still dominated by teachers using lecture methods and rarely do practicum. So students can not take advantage of what they have learned to solve problems in their daily lives. Initial observations made by researchers at SMA Negeri 3 Padangsidimpuan show the average score for physics lessons is still low. Based on the results of interviews with teachers in the field of physics studies in schools the average value of physics for class X is ≤ 60, with Minimum Exhaustiveness Criteria (KKM) in the school is 65, while the value obtained by students there is an additional value of the teacher is the teacher's assessment of the task personal/ groups, student attendance, and student discipline.

Based on the analysis conducted by researchers on the physics learning process used in SMA Negeri 3 Padangsidimpuan, there are some deficiencies that need to be improved. The first weakness is in the description of learning activities. In preliminary activities, teachers should convey the benefits of material learned in daily life, scope and assessment techniques to be used. However, in the existing RPP, the teacher did not deliver the three things because the learning model used conventionally. The activities listed are also not specified in detail. The details of the existing activities also do not match the syntax of the learning model used. Efforts to overcome the problem is by applying a constructivism model of learning by integrating culture into it so as to train students' fighting power to solve problems in physics learning. For according to Vygotsky [4] states that higher mental functions (individuals are unique) contain social (cultural-influenced) and false-social elements are natural. Higher mental functions can be achieved through social interactions involving facts and symbols. Facts and symbols of the cultural environment affect the development of individual understanding. Based on this explanation, it is found that incorporating aspects of culture in the learning of physics can make the mental function of students more increased, so that PBL which is a constructivist based learning model can be done with a cultural approach derived from environmental facts. The concept of physics learning can be found through problem solving derived from cultural facts around the students. One model of learning that adheres to constructivism whose emphasis enables students to solve problems and may raise issues and local cultural values is a problem-based learning model. According to Arends [5] the problem-based learning model is a learning model that organizes learning around questions and problems, through the submission of authentic and meaningful real life situations that encourage students to investigate and inkuri, avoiding simple answers , and allow for a variety of solutions to the situation.

The development of problem-based learning model by integrating Batak culture in learning becomes a new solution for students in solving physics problem to train students' struggle in physics learning when solving physics problem. Because the ability of students in solving physics problems and their applications in everyday life serve as a picture of whether or not the quality of education. Viewed from the context, physics problems can be distinguished on academic problems (standard academic problems problems) and real world problems (real problems/context rich problems). Academic problems point to problems in textbooks that contain objects and events identified that have no relevance to the reality of students [6]. Realistic problem/ konstektual is a problem consisting of objects or events that are familiar with students, in this case can be associated with the cultural environment of students that is Batak culture.

In solving the problem of physics occurs the process of thinking in the minds of students so that students can find answers to the problems of physics. To arrive at the success of finding answers, students will experience various problems as obstacles in solving problems. So that every student has different ability in facing problem. From here Adversity Quotient (AQ) is considered to have a role in the process of thinking students on learning physics. Stoltz [7] states that successful people in learning in addition to intellectual intelligence and emotional intelligence, another determining factor is adversity quotient. Adversity quotient is defined as individual intelligence in overcoming any problems that arise. From the description it appears that the implementation of physics lessons in high school not only pay attention to the product alone, but the process must also be considered Previous research that has done some researchers related to learning that integrates the Batak culture as a supporter in the learning process that is the findings Sinaga [8] by applying a model of learning through problem solving that comes from the facts and cultural environment of Batak, by applying the pattern of social interaction Dalihan Na Tolu as a learning strategy can improve student learning outcomes. And Hutagalung [9] also conducted a study that the ability to understand the concept and mathematical disposition of students can be improved by developing a learning tool model of guided discovery based on Batak Toba culture. Coupled with Susanti [10] also states that the Toba Batak cultural values can be used as a learning resource for social studies development of nationalism. And Wahyudi [11] who studies the cultural aspects of science learning and provides a conclusion that the cultural background of students have an influence on the learning process students in school. In addition Suastra et al [12] also stated that the basic competence of

science and the value of local wisdom of students increased by applying local science-based science learning model.

Based on the above description of the background, this study aims to: (1) create a learning planner developed through a model of learning based on Batak culture-based problems by composing learning tools. The learning tools are Learning Implementation Plan (RPP), Student Book (BS), Student Worksheet (LKS), and valid, effective and effective physics problem solving test; (2) to analyze the improvement of problem solving skills of physics and students' fighting spirit by applying the model based learning based on Batak culture.

II. Literature

Problem Solving Skills

In general, a problem occurs when a person realizes there is a gap between hope and reality and there is a desire to resolve but not knowing what action to take. On the other hand the problem is defined as the difference between the results to be achieved with the existing reality. This explains that the problem is something new to him even if the process or knowledge he has had can be used as an experience to solve it. In more detail, a problem is defined as a situation, in which a person solves a problem that has not been worked out yet and does not understand how to solve it [13].

One's skills solve a problem in this case the problem related to the subject of physics is determined by his understanding of the problem first. As Anderson [14] adds if problems are known then problem solving is a sequence of cognitive processes directed to finding the right solution. The solving skill indicators used are the troubleshooting steps proposed by Heller, et al [15] namely, (1) Visualization of the problem; (2) Describe the problem in terms of physics; (3) Planning solutions; (4) Implement the solution plan and (5) Evaluate the solution

Adversity Quotient

According to Adz-zakiey [16], "Adversity Quotient is one's intelligence in overcoming adversity and survival". Simply Adversity Quotient can be defined as the intelligence of the individual in the face of adversity and endure the difficulty. If a person is faced with life's difficulties, then the intelligence used is Adversity Quotient. So it can be concluded that adversity quotient (AQ) is the ability of a person in dealing with a problem that he deems difficult but he will survive and try to thoroughly resolve to be a good quality individual, this can be formed if there is an individual accompanying dimensions such as having confidence and confidence in performing tasks as easy or as difficult as anything, responsible and focused in completing the task given and have a creative soul in the completion of the task, so as not monotonous and boring.

Problem Based Learning Model Based on Batak Culture.

Model problem based learning based on batak culture is a learning model which in its learning process apply the steps of PBL model by incorporating Batak culture aspect into learning, Batak culture facts in problem solved in learning and incorporating pattern of social interaction of Batak culture in learning process. The pattern of student interaction through discussion group learning Dalihan Na Tolu integrated with Batak culture values in solving problems related to learning in the classroom.

The pattern of social interaction Dalihan Na Tolu used and applied as a pattern of educational interaction with the strategy of enabling students in the application of model based learning based on Batak culture that regulates collaborative activities among students and friends; students and teachers; students, problems and teachers. In its application students are divided into several heterogeneous groups equally distributed in terms of ability (smart, moderate, weak). Where in each group there are subgroups of Kahanggi, Anak Boru, and Mora which is lifted from the batak culture system namely Dalihan Na Tolu. In principle each subgroup has the same chance of being a subgroup of *Kahanggi* (source of the problem), *Anak Boru, and Mora*.

III. Research Methodology

The research method used is Reseach and Development (R & D) with 4-D model developed by Thiagarajan et al [17] consisting of four stages: define, design, develop, and disseminate. Subjects in this study are class X SMA Negeri 3 Padangsidimpuan academic year 2017/2018, and object of this research is model of learning problem based learning based Batak culture through learning device on measurement material, skill of physics problem solving and student fighting ability. Trial of product usage is done twice that is trial I in class XI MIA-I and II trial in class X MIA-I. The instrument of data collection in the research is validation sheet, observation sheet, test and questionnaire. The validation sheet is used to collect the review result data from the validator. Observation sheets are used to determine the implementation of learning, assess attitude, competence and activity. Test to find out the students' physics problem solving abilities. Filling the questionnaire to obtain student's student power analysis data. Improved problem-solving and fighting skills were analyzed with N-Gain by Hake [18] .

IV. Results And Discussion

The result of the research is the product of learning model based learning model based on batak culture. Learning tools in question are RPP, LKS, Student Book and Teacher Book. The results of research and discussion as follows:

4.1 Definition stage

The define stage is performed to define and define requirements requirements in the learning process. This stage consists of the beginning-end analysis, student analysis, concept analysis, task analysis, and specification of learning objectives. The results of the final analysis concluded that the required learning tool that refers to the problem-based learning model by integrating the four aspects of Batak culture in the development of learning tools. The result of student's analysis obtained that the student's academic ability is still low as well as the background of the dominant tribe of students Batak make learning based learning tool based on Batak culture can be applied. The result of task analysis obtained refers to concept analysis and learning objectives based on Core Competence (KI) and Basic Competence (KD) which has been established in accordance with the 2013 curriculum.

4.2 Tahap Desain

Stage design or design through the preparation of tests and non-tests, format selection, media selection and initial design of learning tools. The results of the tests compiled in this study is a test of problem solving skills physics and non-test compiled is a questionnaire that shows student's fighting power in learning. The results of the format selection in this study are adjusted to the curriculum 2013. Results of media selection or learning aids used visual media in the form of images of physical culture Batak culture and measurement kits. The results of initial design in the form of RPP, Textbook, Student Book and LKS for 3 meetings and test of problem solving skills and questionnaire student's fighting power. All these devices are called draft I.

4.3 Development Stage

Stage Develop aims to modify and develop learning tools that have been made in the previous stage of define and design. After the device is designed in the form of draft I, then at this stage tested the validity by expert validator and field trials. Test of learning device validation through model based learning based on Batak culture in the form of RPP, LKS, Master Book, and Student Book is done by expert of validator.

Tabel 1. Validation Results by Expert

Learning Devices	Average of Value	Category
RPP	4,22	Good
LKS	4,25	Good
Student's Book	4,31	Good
Teacher's Book	4,29	Good

Table 1 gives the conclusion that the learning tools in draft I with various revisions have been used for trial. In addition, the problem solving skills and power questionnaire tests have been validated by an expert and declared valid with various revisions. The design of learning tools in the revised draft I is called draft II. This learning tool is ready to be tested in the field. Field trials were conducted twice, namely trial I and trial II. This trial was conducted to determine the practicality and effectiveness of learning tools developed. Learning devices are said to be practical if there is an expert statement that the device is worthy of use and the value of the implementation of learning using the device is good or very good [18]. While the effectiveness of learning tools seen from the students' learning completeness in the classical, student activities and responses given to the learning device students.

Testing I learning device through model based learning based on Batak culture based on 12 students of class XI MIA 2 SMAN 3 Padangsidimpuan. This experiment was conducted by the researcher as a teacher and two observers to observe the implementation of learning and student activities. Researchers have obtained approval from experts to use the use of learning tools in the draft II, then the implementation of learning on trial I to get an average of 2.98 and it is still in the category enough $(2 < \overline{P} \leq 3)$.

Student learning completeness classically in the first test is equal to 58%, where the limit of effective criterion fulfillment is 75% of students complete [19]. Student activity increases at each meeting.
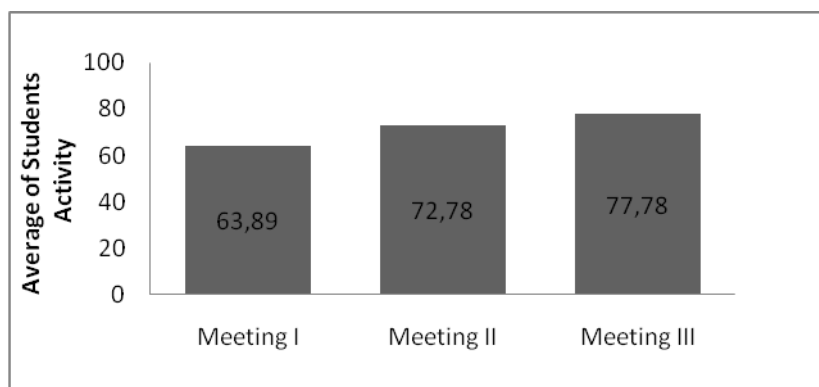
Figure 1. Student Activity Trial I

Figure 1 gives the conclusion that on average the overall activity of the students is still in the sufficient category. Positive student response to learning device in trial I was 92.52% where the effectiveness limit of 80% of students gave a positive response. Based on the description, it can be concluded that the device in draft II is not practical yet effective so it needs revision based on analysis from trial I. The revised learning device is called draft III. Draft III is the final draft that will be in trial II.

Trial II was conducted in class X MIA-1 SMAN 3 Padangsidimpuan with the number of 30 students. Trial II was conducted to measure draft III as a learning tool through a model based learning based on Batak culture that fulfilled all the established and practical criteria. Result of trial II that have been done can be concluded that learning device through model problem based learning based on Batak culture developed has fulfilled all the criteria of practical and effective that set. The practicality of instructional devices as measured by the validity and implementation of teaching tools II is better than I.

Tabel 2. Value of Implementation of Learning Trial Tool II

Average Meet			Every Total Average	Category
1	2	3		
4,07	4,35	4,52	4,31	Very High

The overall learning tool implementation in trial II is 4.31, which if referenced to the learning device implementation criteria that have been set, then the average value of 4.31 has been in very high category ($4 < \bar{P} \leq 5$).

The effectiveness of instructional tools through the model based learning based on Batak culture developed has fulfilled all the criteria set and can be said to be effective.

Table 3. Students' Completed Learning Level by Classical Trial II

Category	Problem Solving Skills	
	The Number of Student	**Percentage**
Complete	26	87%
Not Complete	4	13%
Amount	30	100%

If it is referenced in classical student completeness criterion, that is at least 80%, it can be concluded that the result of postes of problem solving skills in trial II has fulfilled the effective criteria that is 87.5% of students have been completed on the completion of the classical completeness. And the students' response gives the average of the total positive responses of the students in the second trial that is 94.94%. If the results of this analysis are referred to the established criteria, it is concluded that the students' responses to the components and learning activities are positive. Furthermore, student activity during learning process through model based learning based on Batak culture is done by observation.
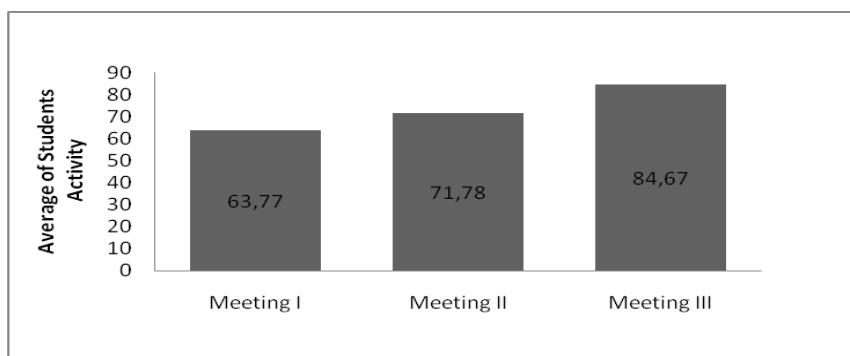
Figure 2. Student Activity Trial II

Overall the average student activity has increased. Thus it can be concluded learning device through model problem based learning based on Batak culture developed effectively in terms of student activity that has achieved improvement. Based on the results of analysis of trial II data, it is known that the learning device through the model based learning based on Batak culture developed has fulfilled all valid, practical and effective criteria. So there is no revision of draft III on instructional device developed through model problem based learning based on Batak culture on measurement material after trial II.

The disseminate stage is the final stage in the 4-D development model. At this stage, the learning tools that have been tested in the research class will be re-tested by comparing the learning tools developed with the tools used by physics subject teachers in SMA Negeri 3 Padangsidimpuan. However, this stage is not carried out by researchers, due to time, cost and energy constraints so that this stage is not discussed in depth. The solving skill indicators used are the troubleshooting steps proposed by Heller, et al namely, (1) Visualization of the problem; (2) Describe the problem in terms of physics; (3) Planning solutions; (4) Implement the solution plan and (5) Evaluate the solution. Data obtained from posttest result of problem solving skill of student on trial II was analyzed to know the improvement of problem solving skill of student by comparing mean score of student obtained from posttest result of problem solving skill of student each meeting on trial II.

Tabel 4. N-gain Student Problem Solving Skill

Meet	N-gain	Category
I	0,29	Low
II	0,42	Medium
III	0,62	Medium

Based on Table 4, the problem solving skills of students at each meeting has increased so that it can be concluded the application of learning tools using the model based learning based on Batak culture can improve students' physics problem solving skills.

Furthermore, student's student's morale improvement is measured by indicator that is, (1) Self-control; (2) Origin and recognition; (3) Reach and (4) Endurance. The students' struggling data was obtained based on the improvement of student's fighting power on posstest and pretest which was assessed based on the student's student's strength indicator.

Tabel 7. Improvement Student's Adversity Quotient Every Indicators

No	Indicators	Pretest	Postest
1	Self-control	3,21	4,01
2	Origin and recognition	3,31	3,77
3	Reach	3,17	3,71
4	Endurance	3,08	3,99

Based on Table 5 above, it can be concluded that the average student's questionnaire results increased from the results of pretest to posttest on trial II. Increased student's fighting ability on every aspect of the indicators after the treatment of learning tools through the model based learning based on Batak culture.

V. Conclusion And Suggestion

Based on the results of the analysis and discussion in this study, it can be concluded that: 1) Validity of learning devices through problem based learning model based on Batak culture has valid for use with average total validity RPP = 4,22, Student's Book = 4,31, Teacher's Books = 4.29, LKS = 4.25, as well as test-solving skills and adversity quotient questionnaire devices have also been valid based on the assessment by expert

validators; 2) The practicality of learning tools through model based learning based on Batak culture in improving the ability of problem solving physics and fighting power has been easy to use in learning. This is based on the assessment of experts and observation of the implementation of learning with good category; 3) The effectiveness of learning devices using problem based learning model based on Batak culture has been said to be effective for use in learning. This is based on the completeness of learning has classically exceeded the minimum limit of 87% and student response has also been positive with a percentage of 94.94%. 4) There is improvement of students' physics problem solving skills after applying learning device using Batak culture based model of learning on the measurement materials; And 5) There is an increase of students' adversity quotient by applying learning devices using problem based learning model based on Batak culture that is 0.38 with medium category.

Based on the conclusions of this study, it is suggested that Learning tools through the problem based learning model based on Batak culture that has been developed has met the aspects of prevalence, practicality and effectiveness, it is advisable for teachers to be able to use this learning tool in growing the problem-solving skills and student's fadversity quotient.

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