

Improved Student's Generic Science Skills With The Application of Cooperative Learning Models Based on Batak Culture

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Abstract - This study aims to describe the validity, practicality and effectiveness through Batak culture based cooperative learning models and to know the improvement of generic science skills and student's teamwork by applying learning tools through Batak culture based cooperative learning models. This research is a Research and Development (R & D) using the 4-D model that includes define, design, develop, and disseminate. This research was conducted at the school of SMA Negeri 1 Tambangan with a population of 21 students in class X MIA I. Instruments and techniques of data collection using learning device validation sheets, namely validation sheets of lesson plan (RPP), validation sheets for student worksheets (LKS), validation sheets for generic science skills instruments and student's teamwork, sheets of learning practicality assessment, learning effectiveness sheets, learning activity instruments, instruments generic science skills and student's teamwork questionnaires. Improved generic science skills using analysis with N-gain test. The results showed that the learning materials through Batak culture based cooperative learning models had met the criteria of valid, practical and effective. Students generic science skills increase to the medium category.

Keywords - *Lesson Plan; Cooperative based on Batak Culture; Generic science skills; Teamwork.*

I. INTRODUCTION

The Indonesian nation is a nation that is rich in various cultures and religions so that this nation has the slogan of Unity in Diversity which means different, but still one too. The diversity of national cultures and traditions requires the government to be more sensitive to the psychology of society in producing policies, including education policy.

Education is a changing process of human being behavior to maturity. One of indicator of a mature human being is to have a superior and strong culture. That is, besides having knowledge and skills also have superior values and norms in their lives. Through education, humans

can know what good, bad and culture are. Education cannot be separated from culture. This is because between education and culture there is a very close relationship with regard to the same thing, namely values [11].

According to Budiyo & Astuti which states that the values contained in culture can also be linked in carrying out the learning process. Learning that involves cultural elements is very rarely done even almost never except learning kesenian and culture [3]. This is certainly a big challenge for the world of education, especially for teachers to do learning innovations that not only deliver material, but also can lift the potential and culture that exists in each region of their work area.

In relation to this, the teacher's efforts can be done to improve students' understanding. This is in line with the opinion of Minstrell stating that teachers must be able to associate students' daily experiences or concepts that have been in the minds of students with the learning content to be discussed [2].

According to Broto Siswoyo states that Physics is a work discipline that can produce a number of generic skills. In the process of learning physics itself there are characters that can be instilled in students so that after the learning students not only have generic skills but the formation of cooperation [6]. According to Maasawet argues that cooperation is mutual influence as group members [7].

This is proved by the results of the initial observations of researchers at Senior High School 1 Tambangan, it was found that teacher had not used a relevant learning materials with the characteristics and culture of students during physics learning process at school. Teachers as educators only utilize a handbook and lesson plan by the teacher, without using relevant approaches to the learning material that will be presented in the classroom. So, the teacher tends to apply conventional learning which results teacher-centered teaching during teaching and learning process. The current learning materials have not linked to the oriented culture learning

material to explain the natural phenomena around students, the lack of teachers provides examples and problems that contain culture to be integrated in the learning tools in high school so that learning is meaningless and impact to low learning outcomes achievement.

One of efforts that can be implemented to overcome the above problems is by developing a learning model that is able to improve the students' scientific generic skills of and students' cooperation with physics material. The proper learning model is used as an alternative solution to these problems through a Batak culture based cooperative model which means physics learning can be supported by experiments conducted by students and associated with cultural facts that exist around students' environment.

This study aims:(1) to produce a valid, practical and effective physics learning device with a Batak culture based cooperative learning model; (2) to analyze the improvement of students generic science skills and cooperation by applying physics learning device with Batak culture based cooperative learning model.

Based on the background above, it is necessary to do research with the title "Improved student's generic science skills with the application of cooperative learning models based on Batak culture".

II. RESEARCH METHODOLOGY

This research was the development by using 4-D model of development Thiagarajan, Semmel, and Semmel (1974) which consists of four stages, namely stage define, design, develop and disseminate.

Subjects of the study were students of class X SMA Negeri 1 Tambangan academic year 2017/2018. The object of the study is a physics learning device with Batak culture Cooperative based learning model on static fluid material, orgasm and impulses, sounds and open and closed pipes, generic science skills instruments. The first trial was conducted in X MIA-1 class and second is conducted in XI MIA-1 class.

Data collection instruments in this study were validation sheets, observation sheets, generic science skills instruments. Validation sheets are used to collect data from the review of the validator. Observation sheets are used to determine the implementation of learning, assess competencies in attitudes, skills and activities. Generic science skills instruments are used to see the results of the value of generic science skills every meeting. Improved generic science skills using N-Gain [4].

III. RESULTS AND DISCUSSION

The results of the study in physics learning device with Batak culture based cooperative learning models of static fluid material, momentum and impulse, open and closed sounds and pipes. The results of the research and discussion such as:

At the defining stage is carried out with the purpose to define and explain the requirements for the needs in the

learning process. The defining stage consists of initial analysis, student analysis, concept analysis, concept analysis, task analysis and specification of learning objectives.

At the design stage is carried out through test and non-test preparation, format selection, media selection and initial design of learning devices. The compiled test is a generic science skills test and non-test which compiled is a questionnaire that shows student's teamwork in learning. The results of the format selection in this study are adapted to the 2013 curriculum. The results of the selection of the media used are visual media in the form of physical images of Batak culture such as mangupa, marcungkil, gordangsambilan and sarune, student books and student worksheets (LKS). The initial design results are the form of learning implementation plan (RPP), student worksheets (LKS) for four meetings, generic science skills test instruments, collaborative questionnaire sheets, scoring guidelines, and answers key contained in the teacher's book. All these devices are called as as draft I.

At the development stage aims to modify and develop learning tools that have been made in the previous defining stage and design. After the device was designed in the form of draft I, then at this stage the validity test was carried out by the expert validator and field trials. Validation test of learning devices with cooperative learning models based on Batak culture in the form of learning implementation plan (RPP), student worksheets (LKS), was carried out by the validator.

TABLE 1. Validation Result by Expert of Validator

Learning Devices	Average of Value	Category
RPP	4,36	Good
LKS	4,46	Good
Generic Science Skills	4,33	Good

Table 1 gives the conclusion that the learning tools in draft I with various revisions have been used for trial. In addition, the generic science skills instruments and the student's teamwork questionnaire have been validated by the 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. The trials are conducted to determine the practicality and effectiveness of the 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 [1;5;8]. 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 [5;9;10;13]

Trial I of learning device through cooperative learning model based culture of Batak done on 10 students of class X MIA I SMAN 1 Tambangan. This experiment was conducted by the researcher as a teacher and two observers

to observe the implementation of learning and student activities. The researcher has obtained the authorized consent from the expert to use the learning tool in the second draft, then the learning implementation in the first test obtained an average of 3,46 and it is still in high category ($3 \leq \bar{P} \leq 4$).

TABLE 2. Score of Implementation of Learning Devices Trail I

Average Every Meet				Total Average	Category
1	2	3	4		
3,00	3,25	3,75	4,00	3,46	High

Student's learning completeness in class I tested at 50%, where the limit of effective criterion fulfillment is 75% of students complete (Herman, 2012) Student activity increases at each meeting.

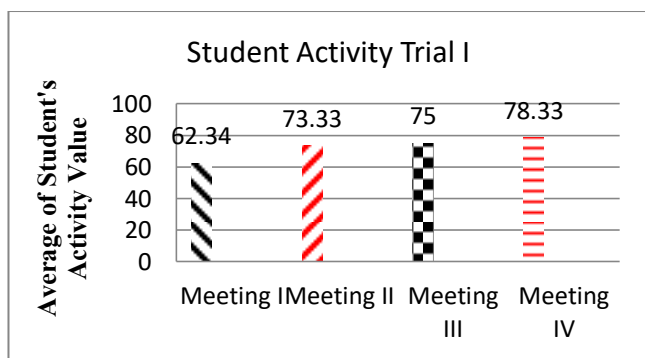


Fig 1. Student's Activity Trial I

Figure 1 gives the conclusion that on average the overall activity of the student is still in active category. Positive student response to learning device in trial I was 91,36% where the effectiveness limit of 80% of students gave a positive response. Based on the above description it can be concluded that the device in draft II is not practical yet and has not been effective. So, it needs a 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 XI MIA-1 SMAN 1 Tambangan with total of 26 students. Trial II was conducted to measure draft III as a learning tool through with Batak culture based cooperative learning models that meets all the established and practical criteria. Result of trial II which have been done can be concluded that learning device through with Batak culture based cooperative learning models developed has fulfilled all the practical and effective criteria specified. The practicality of instructional tools as measured by the validity and implementation of learning devices has been better than I trial.

TABLE 3. Score of Implementation of Learning Devices Trail II

Average Every Meet				Total Average	Category
1	2	3	4		
4,00	4,00	4,00	4,00	4,00	Very High

The overall learning tool implementation in trial II is 4,00, which, when referenced to the predefined learning device learning criteria, then the average value of 4,00 is in very high category ($4 < P \leq 5$).

The effectiveness of learning tools through Batak culture based cooperative learning models developed has fulfilled all criteria and can be said to be effective.

If it is referenced in classical student completeness criterion, that is minimum 80%, hence can be concluded that postes result of generic science skills ability in trial II have fulfilled effective criteria that is 100% student have finished in pursuit of completeness in classical. And the student's response gives the average of the total positive response of the students in the second trial that is equal to 97,71%. If the results of this analysis are referred to the defined criteria then it is concluded that the student's response to the components and learning activities is positive. Furthermore, student activity during the learning process through Batak culture based cooperative learning models is done by observation.

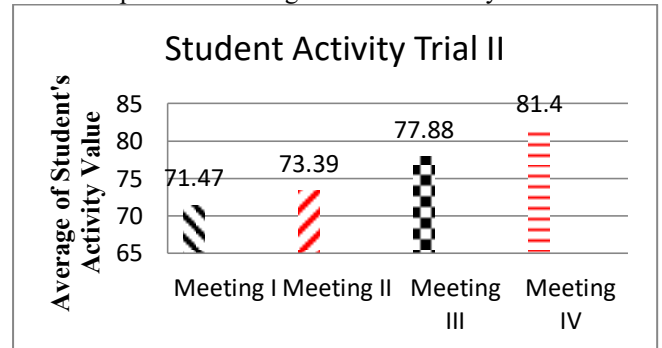


Fig 2. Student's Activity Trial II

Overall the average student activity has been increased. Thus it can be concluded that the learning device through Batak culture based cooperative learning models developed effectively in terms of student activity that has achieved improvement. Based on the analysis of trial II data, it is known that learning device through Batak culture based cooperative learning models developed has fulfilled all valid, practical and effective criteria. So there is no revision of draft III on instructional device developed through Batak culture based cooperative learning models on static fluid material instruments, momentum and impulses, open and closed sounds and pipes after trial II. completeness of the classical value of generic science skills in trial I

TABLE 4. Level of Student's Complete Learning by Classical Trail I

Category Generic Science Skills		
	The Number	Percentage of Student
Complete	5	50%
Not Complete	5	50%
Amount	10	100%

Based on Table 4 it can be seen that the classical student learning completeness of the generic science skills test in the first trial namely students who are complete are 5 students out of 10 students (50%) and the number of students who are incomplete are 5 students or (50%) of 10 students who took generic science skills tests. So it can be concluded that the results of the value of generic science skills in trial I have not met the criteria for effective achievement of classical mastery. There are still improvements that must be made to the learning device so that students understand the subject matter so that generic science skills also increase. completeness of the classical value of generic science skills in trial II

TABLE 5. Level of Student's Complete Learning by Classical Trail II

Category Generic Science Skills		
	The Number	Percentage of Student
Complete	26	100%
Not Complete	0	0%
Amount	0	100%

Based on Table 5 it can be seen that the classical student learning completeness of the generic science skills test in trial II is that students who are complete are 26 students from 26 students (100%) and the number of students who are not complete is 0 students or (0%) of 26 students who took generic science skills tests. If referenced to the classical student completeness criteria, which is at least 85% of students who take learning can achieve a score of ≥ 75 , it can be concluded that the results of the value of generic science skills in trial II have met the criteria of effectiveness in achieving classical completeness.

Disseminate stage is the final stage in the 4-D development model. At this stage, learning tools that have been piloted in the research class will be re-tested by comparing the developed learning devices (experimental class) with the device used by physics subject teachers in SMAN 1 Tambangan (control class). 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.

Indicators of generic science skills: (1) compliance; (2) indirect observation; (3) scale awareness; (4) symbolic language; (5) logical frames; (6) logical consistency; (7) the law of cause and effect; (8) modeling; (9) logic inference; (10) abstraction. Data obtained from posttest result of generic science skillsability of student on trial II was analyzed to know the improvement of student generic science skills by comparing mean score of student obtained from result of posttest generic science skillsof student each meeting on trial II.

TABLE 6. N-Gain of Scientific Generic Skills

Meet	N-gain	Category
I and II	0,28	Low
II and III	0,43	Medium
III and IV	0,53	Medium

Based on Table 6, the generic science skills of students at each meeting has increased so that it can be concluded that the application of learning devices through Batak culture based cooperative learning models can improve student's generic science skills.

In test I that the highest indicators that students can master are direct observation, indirect observation, awareness about scale, symbolic language, logical frame, logical consistency, causal law, modeling and logical inference. This gives an illustration that by applying learning tools using cooperative learning models based on Batak culture can improve the attitude of generic science skills. The lowest indicator is to carry out abstraction. This gives an idea that students already understand solutions that can be used in solving problems but students are still not good at implementing them.

In trial II that the highest indicators that students can master are direct observation, indirect observation, awareness about scale, symbolic language, logical frame, logical consistency, causal law, modeling and logical inference. This gives an illustration that by applying learning tools using cooperative learning models based on Batak culture can improve the attitude of generic science skills. The lowest indicator is to carry out abstraction. This gives an idea that students already understand solutions that can be used in solving problems but students are still not good at implementing them.

IV. CONCLUSION AND SUGGESTION

Conclusion

Based on the results of the analysis and discussion it can be concluded that the device of learning physics with Batak culture based cooperative learning models was developed:

1. The validity of learning devices is valid for use with an average total validity RPP = 4,36, LKS = 4,46, generic science skills instruments and student's teamwork questionnaires have also been valid based on assessment by expert validators.

2. Practicality of learning devices has fulfilled the practicality criteria in terms of: (1) expert assessment / practitioners of developed learning tools can be used with little revision; (2) in terms of the total component of teaching materials is 4,00 that is very high category.
3. The effectiveness of learning devices has met the effective criteria in terms of: (1) classical student learning completeness has exceeded the minimum limit of 100%; (2) student activities in each learning meeting; (3) the positive response of students reached 97,71%.
4. There is improvement of generic science skills after applying learning device using Batak culture based model of learning on the static fluid material instruments, momentum and impulses, open and closed sounds and pipes.

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Suggestion

The researcher suggests that the next researcher when developing the physics learning device first conditions the classroom atmosphere, is able to divide the time of learning implementation, and can be developed again with other materials in physics so that the implementation of device development can be done well.

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