Jurnal Pendidikan Fisika
p-ISSN 2252-732X
e-ISSN 2301-7651

ETHNOPHYSICALINTEGRATION IN COOPERATIVE LEARNING BASED ON JAVANESE CULTURE TO IMPROVE GENERIC SCIENCE SKILLS AND STUDENT *SELF-EFFICACY*

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Abstract. Research this aiming to improve generic science skills and student self-efficacy through a Javanese culture-based cooperative learning model with the Culturally Responsive Teaching approach. Research this do in MAS UIN Laboratory Medan SU TP 2018/2019. This type of research is a quasi-experimental exercise using two groups of pretest-posttest design. The research sample is class X MIA 1 as the experimental class and class X MIA 2 as the control class. The instrument used was a generic science skill test instrument and student self-efficacy questionnaire. The data in this study were analyzed using the t-test and gain test. The results of the study showed that the generic science skills and self-efficacy of students who were taught by cooperative learning models based on Javanese culture were better than students who were taught with conventional models. Results research to show learning physics through approach Culturally Responsive Teaching is integrated ethnophysics could develop KGS on direct observation skills, logic inference, and abstraction while student self-efficacy increases aspects of achievement and self-motivation, as well as self-discipline.

Keywords: *Cooperative Learning Model based on Javanese culture, Culturally Responsive Teaching, Science Skill, Self-efficacy*

INTRODUCTION

The Cooperative learning model able to educate the open mind and ability to strengthen opinions and balance alternatives. Therefore this model can also form a spirit of cooperation and the ability to cooperate with others. In this case, it is by the pattern of Javanese community interaction that emphasizes the enthusiasm and ability to cooperate in solving a problem faced by the community. It is also by the Javanese philosophy in the following life: Holopis Kuntul Baris (in human life that interacts with each other, which each individual has their desires which are certainly not always in harmony, then cooperation is an effective way to re-harmonize the desire in a large group and of course in the right case, all that is done sincerely without strings attached (Tino, 2010).

Culturally Responsive Teaching as a way of using the diverse cultural knowledge, prior experience, and student performance styles to be able to create meaningful learning experiences. The originator of the concept of culturally responsive/relevant pedagogy, in the book Culturally Responsive Teaching: Theory, Research, and Practice, reveals the basic principle of Culturally Responsive Teaching is the realization of partnerships between educators and students to achieve better learning (Gay, 2000).

The Culturally Responsive Teaching approach on the principle of learning is carried out in 5 stages: Self-Identification, Cultural Understanding, Collaboration, Critical Reflections, Transformative Construction (Rahmawati & Suprihatiningrum, 2014). The connection between the concepts of physics and Javanese culture can be seen in behaviors and objects that are real. Examples of the problems are Irus, Pawon, Klepon, and Batik. (Rosidah et al., 2107) states that generic skills are employability skills used to apply knowledge. Thus, generic skills are also skills needed for various fields of work and life.

The role of generic science skills in practicum implementation is very important in supporting learning, especially in physics learning because it can emphasize aspects of the process. This is based on the purpose of learning physics as a process of improving students' thinking skills, so that students are not only capable and skilled in the psychomotor field, but also able to think systematically, objectively, and creatively (Gunawan, 2012).

(Gunawan, 2012) suggests that to give greater emphasis to aspects of the process, students need to be given skills such as observing, classifying, measuring, communicating, interpreting data, and experimenting in stages according to the level of students' thinking abilities and lecture material by the curriculum.

According to (Hamdani, 2011), the generic ability of science in science learning can be categorized into nine indicators, namely: (1) direct observation; (2) indirect observation; (3) awareness of scale: (4) symbolic language; (5) the principle of obedience logic; (6) logic

Jurnal Pendidikan Fisika
p-ISSN 2252-732X
e-ISSN 2301-7651

interference; (7) the law of cause and effect; (8) mathematical modeling; (9) building concepts.

Self-efficacy is a positive indicator of core self-evaluation to conduct a self-evaluation that is useful for understanding yourself. Self-efficacy is one aspect of knowledge about self or the most influential self-knowledge in everyday life because self-efficacy that is owned influences the individual in determining the actions that will be taken to achieve a goal, including estimates of the challenges to be faced (Ghufron, 2012).

RESEARCH METHODS

The research was carried out at the MAS Laboratory of UIN SU Medan. The study population was all students of class X MIA. The sample consisted of two classes namely the experimental class and the control class taken by cluster random sampling technique with the design of Two groups Pretest-Postest Design. This study design can be seen in the following Table 1:

Table 1. Two Group Pretest – Posttest Design

Class	Pretest	Treatment	Posttest
Experiment	T_1	X	T_2
Control	T_1	Y	T_2

with :

T_1 = The pretest was given to the experimental class and the control class before treatment

T_2 = Posttest were given after treatment in the experimental class and the control class

X = Teaching by applying cooperative learning models based on Javanese culture

Y = Teaching by applying conventional learning models

T_1 = T_2

This study involved two classes that were given different treatments. One class is used as the experimental class and the other class is used as the control class. To find generic science skills of students is done by giving the instrument generic science skills. In the experimental class, generic science skill instruments were given before, during, and after being given treatment. In the control class, generic science skill instruments were given before being given treatment. This study analyzed with a t-test and gain with SPSS 21 at the significant level α = 0.05. Results of pretest-posttest skills generic physics science students are then analyzed using again test to determine the increase. The following formula for calculating the gain value of students' generic science skills:

$$g = \frac{post.test\ score - pre.test\ score}{Max\ Score - pre.test\ score}$$

with :

$g < 0,3$	low category
$0,3 \leq g \leq 0,7$	medium category
$g > 0,7$	high category

(Hake, 2007)

From the results of the pretest and posttest data, the calculation is done using the formula g factor (*normalized gain score*) so that the gain of students' generic science skills gain scores

RESULT AND DISCUSSIONS

The experimental class applied the Cooperative-Based Javanese Culture learning model and the control class applied to conventional learning. The research took place for four meetings both in the experimental class and in the control class based on four Learning Implementation Plans (RPP). Implementation of the first RPP with material Conductivity, second RPP with Heat Transfer material, third RPP with Substance Expansion Material, while the fourth RPP with the material of Fluid Capillary, each RPP is in appendix 1. Each student meeting is given a Student Activity Sheet (LKS) which has been prepared based on the KGS indicator. Posttest given after the treatment for four meetings were completed to see the improvement of students' abilities in the experimental class and the control class. The significance value obtained by Table 1 with the t-test is 0,000.

Significance value is smaller than 0.05 then rejected and accepted or gain students generic science skills taught with Javanese culture-based cooperative learning models are better than students' KGS taught with conventional learning models.

The Gain test results for the control class and experimental class for each student are presented in each of Table 2 and Table 3.

Table 2. Gain KGS Control Class

Group	N Gain	Category
1	0,25	Low
2	0,26	Low
3	0,23	Low
4	0,27	Low
5	0,20	Low
Average	**0,242**	**Low**

Table 3. Gain KGS Experiment Class

Group	N Gain	Category
1	0,66	Medium
2	0,69	Medium
3	0,59	Medium
4	0,58	Medium
5	0,63	Medium
Average	**0,63**	**Medium**

Jurnal Pendidikan Fisika
p-ISSN 2252-732X
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Based on the results obtained in the control class, the gain of each student in the low to the moderate category was obtained with the average gain in the Low category. While the results obtained in the experimental class gained gain for each student in the Medium to High category with a gain average in the Medium category. This shows that it happened improvement of student learning after the implementation of the Javanese Culture-Based Cooperative Learning Model with the results of the same initial student abilities. To gain students' self-efficacy can be seen in Table 4 and Table 5

Table 4. Gain *self-efficacy* Experiment Class

Group	Gain Average	Category
1	0,743	High
2	0,817	High
3	0,775	High
4	0,742	High
5	0,710	High
Average	**0,757**	**High**

Table 5. Gain *self-efficacy* Control Class

Group	Gain Average	Category
1	0,665	Medium
2	0,717	High
3	0,683	Medium
4	0,658	Medium
5	0,660	Medium
Average	**0,677**	**Medium**

Based on the results obtained in the control class, the gain of each student in the medium to the high category was obtained with a gain average in the medium category. While the results obtained in the experimental class gained gain for each student in the Medium to High category with a gain average in the High category. This shows that there is an increase in student learning after the implementation of the Javanese Culture-Based Cooperative Learning Model when compared to the control class through the two-party t-test with the results of the same initial student abilities.

The average test results of the experimental class KGS instruments before treatment were 31,867 while the control class was 32,733. Different treatments were given to both classes so that the value of the KGS instrument test results in the experimental class was 75.233 while the control class was 49.433. The difference in the results of the KGS instrument test before and after treatment in the experimental class and control can be seen through Figure 1

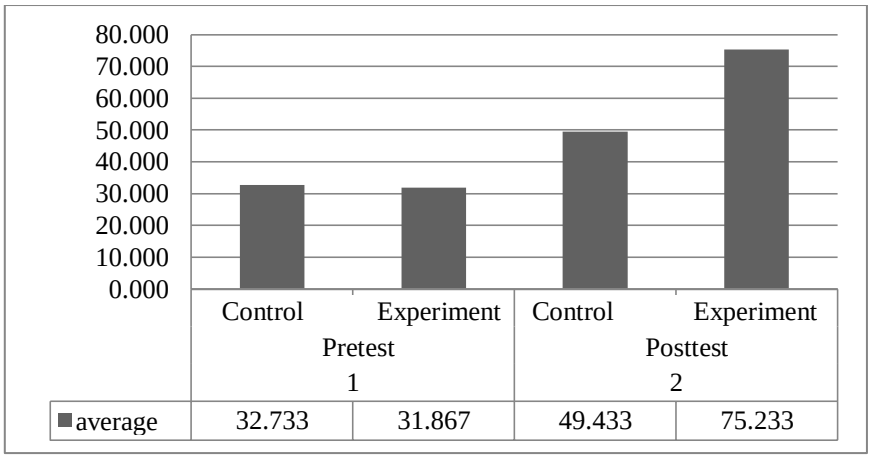

Figure 1. Instrument KGS Test Result

The data in Figure 1 shows that there is an increase in the KGS Instrument Test results of students before and after treatment. The KGS Instrument Test results in the experimental class can increase if the Javanese Culture-based cooperative learning model is applied because according to Hamdani's statement it has examined, generic-oriented science learning with the development of learning centers on student activity and the use of computer excellence (Hamdani, 2011). The results show that the application of generic skills-oriented learning models can improve students' mastery of concepts up to the "moderate" category. Harahap's research also states that the Culture-based cooperative learning model to improve KGS provides students with increased knowledge and skills by offering students the opportunity to have their culture-based learning and demonstrating students' knowledge and understanding with KGS instruments so that the material learned can reach higher increase compared to conventional classes (Harahap & Turnip, 2014). The experimental class which was treated with the Javanese Culture-based cooperative learning model made students more active because the steps in the learning process made students find their concepts on material that was taught with little guidance from the teacher.

The teacher analyzes the characteristics of students (general information, learning styles, and cultural backgrounds of students so that the teacher can make learning that further enhances student motivation and can build linkages between learning physics with everyday life. This is integrated with physics articles that are associated with tradition or daily life of students Physics used include: " Irus, Pawon, Klepon, and making Batik". The learning process using ethnophysics articles invites students to tell about the origin and culture of their respective regions. Thus, students feel comfortable sharing stories with the teacher. Students' responses are quite diverse, such as linking the tradition with their daily lives as follows:

"Mom, I'm also confused why my mother at home cooks more cooking utensils than wood, but the reason is there is a diffusion yes ma'am " (Student interview).

"I am an Acehnese ma'am, in Aceh, there are also some houses where the kitchen is also equipped with cooking utensils hung on the sides of the walls, it turns out there is also a physics concept, ma'am (Student interview).

" Mom, I'm Javanese, at home a lot batik, but I have never seen the manufacturing process " (Student interview).

"I prefer to study physics with practicum especially by integrating physics with our culture compared to just explaining and working on the questions" (Student interviews).

The use of learning methods such as this makes students curious and become more enthusiastic in carrying out learning. The application of the Javanese Culture-Based Cooperative Learning Model resulted in several increases in KGS in the High category, namely On the Aspects of Direct Observation, Logic Inference, and Abstract

Questionnaire self-efficacy was also tested for improvement (Gain) on the pretest and posttest in the control class and the experimental class. The Self-Efficacy gain for the control class and experimental class is shown in Figure 2:

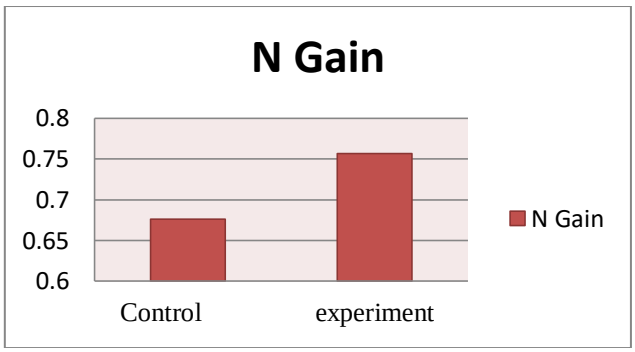

Figure 2. Gain *Self-Efficacy*

The Self-Efficacy Questionnaire Gain is shown in Figure 2 which shows that the Self-Efficacy Questionnaire Gain in the control class is in the medium category. While the Self-Efficacy Questionnaire Gain in the experimental class included in the High category. The results of the discussion are then reported in the form of worksheets that have been provided so that students can understand the concepts that have been discussed in the group to shape students' confidence.

> *"I like to study in groups, ma'am. Because when I don't understand something, my other friends can explain it to me so that I understood "* (Journal reflective, January 25, 2017)

KGS affects students' self- confidence or is called self-efficacy. The self-efficacy of initially low students starts to increase because of heterogeneous group formation with high student self-efficacy. So that in collecting research data, it was seen that low self-efficacy students began to move to conduct investigations. According to (Yoannita, 2016), there is a positive and significant relationship between Self Efficacy and student learning outcomes. This means that for students with low self-efficacy, the increase in learning outcomes achieved is also low but for students with high self-efficacy, the increase in learning outcomes achieved is also high.

According to (Somakim, 2010), Self-efficacy is the core of humans who have a strong desire to develop their potential. The learning process requires high self-efficacy to be able to understand the concepts of physics well. Through routine training to solve physics, problems can provide positive student self-efficacy on cognitive abilities, skills, and good behavior

CONCLUSION

Gain generic skills and self-efficacy of science students taught by cooperative learning model based on Javanese culture by 0.63 and 0.757 with medium and high category, while the generic science students gain skills that are taught by the conventional of 0,242 with low category, so generic science skills of students taught by cooperative learning model based on Javanese culture

is better than the gain of generic science skills of students taught by the conventional models.

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