The effectiveness of Multicultural Education through traditional games-based inquiry toward improving the ability of critical thinking

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Abstract. The aim of this research is to know the effectiveness of multicultural education through traditional games in science learning based on inquiry learning model for developing the critical thinking ability in Junior High School Students. The research design used in this study was quasi-experimental design with non-equivalent control group design. Data were collected by using purposive sampling method of data collection. It was found that N-gain of experimental class has a higher value than the control class in the fifth aspect of critical thinking. The significance of critical thinking skills of the experimental class gained t_count = 18.712 and t_table = 2.030, while the control class is obtained t_count = 14.355 and t_table = 2.030. t_count > t_table then H₀ rejected and H₁ accepted. Differences in students' critical thinking results showed that the average grade in the experiment class higher than the control class with t-test of 5.707 to 1.9944 t_table (df = 70, α = 5%). Traditional game based on multicultural learning is able to encourage a critical attitude because it makes students more flexibility in thinking. It could be concluded that traditional games based on multicultural education can improve critical thinking in the student in all aspects.

1. Introduction

Learning process in Indonesian Curriculum 2013 (K-13) is implemented based on scientific inquiry approach. The process of learning science should be taken of scientific inquiry to cultivate the ability to think, work and behave and scientific communication based on Indonesian Ministry of Education and Cultural. Critical thinking skills is one of the learning skills that must be mastered by students. Study results [1] showed that critical thinking skills can be enhanced through inquiry learning.

Inquiry learning model provides the opportunity for students to use all its capabilities to search and investigate in a systematic, critical, logical, analytical and able to formulate their own inventions [2]. Such learning process is expected to print a creative learners, productive, innovative and characterized by strengthening the attitudes, skills and knowledge are integrated.

Creativity and the development of scientific character of learners can be fostered through the use of educational media. Learning media is needed to make learning process becomes more realistic and fun [3]. According [4], media education can be used to facilitate the character improvement of students based on the noble values of Pancasila into the soul of learners. This is in line with the principles of
multicultural education based learning, integrating the cultural strengthening elements into the learning activities. One effort that can be used is by including traditional games in the learning activities as a medium of learning. Nur [5] stated that the meaning of traditional game give positive influence on the development of children's character. It is also stated by [6] that traditional games give opportunities for children to develop their motoric skills.

Based on observation of the process and the results of science teaching in junior high school, found that students critical thinking skills are on average 23%. It can be seen from the ability of students that actively respond to the questions and answer the questions with different content with more friends. This data was obtained from the science teacher that observed learning process and gain data from students learning outcomes. Based on these data, indicate students critical thinking ability is not significant in the category of high-level critical thinking.

In additional critical thinking data, through observation, both directly and interviews found that the scientific character of junior high school students fall into the category of moderate to good. This is because during science learning process is already integrating scientific character in accordance with the mandate the curriculum in 2013 is implementing. Nevertheless, learning process in some school in Central Java are delivered by conventional methods [7]. Dewi et al,[8] stated that teacher-centered learning process are still used for learning activity in some schools makes students become passive in class because students only listen teacher. Based on this phenomenon, strengthening students' critical thinking skills can be done through appropriate learning.

Learning activity can be deliver using the design of the multicultural-based science learning. Nevertheless, multicultural learning in science should combine with learning activity that supports science learning activity therefore it used in teaching in junior high school [9]. One of the learning activity that can be used to enhance critical thinking skills for students is inquiry. Based on [10] study, independent practicum worksheet based inquiry influence students’ critical thinking and conservation characters. Furthermore, [11] found the effect of inquiry-based independent worksheet using ICT have influence 39.08% towards creativity, 49.66% towards character and 28.26% towards students concept understanding.

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2. Methods
This study was an experimental study with design Nonequivalent Control Group Design. The sample in this study were taken by purposive sampling, to obtain the experimental class and control class. The independent variable in this study is a device-based science learning by inquiry model of multicultural education, while the dependent variable in this study is the character of science in students.

The research instrument used is the critical thinking test. The data were analyzed with quantitative and descriptive analysis. Quantitative analysis of the validity, reliability, two variance analysis test (homogeneity grade sample), the data normality test, calculate the N-Gain, different tests of significance in the development of a scientific character. Descriptive analysis is used to describe the increase of scientific character in every aspect of each meeting.

3. Result and Discussion
Students' critical thinking capability data obtained from the value of pretest and posttest. Data critical thinking skills were tested to determine the homogeneity of each variant data. Then based on the calculation of the final normality test data obtained in which obvious that all the data were normally distributed, therefore parametric statistics are used for data analysis.

Results students’ critical thinking ability in every aspect shown in Figure 1 below.
Data of critical thinking skills of students were analyzed quantitatively using three types of calculation, which calculates the value of N-gain to determine the increase in the ability of students before and after the study, to determine the level of significance of the increase in use t-test significance, whereas to determine differences in the experimental class and the control class used the t-test separated variants. Critical thinking is one of high order thinking skills which is used for reconstructing students knowledge [10]. In the first aspect is to give a basic explanation. Based on the results presented in Figure 1 shows that the first aspect has a value gain of 0.449 at 0.352 experimental class and the control class. In the classroom teaching experiment, there are stages of inquiry especially at the stage of identifying the problem. At the stage of identification of the problem students are trained to give a simple explanation about the things that are being identified. [12] states that critical thinking is an activity to analyze the idea or ideas, sharply distinguish and identify and develop towards a more perfect.

In the first stage, namely the study of self-exploration multicultural and socio-cultural environment, each student is required to give a simple explanation will be ideas and then other students are expected to appreciate and then provide additional new ideas to support the idea of another friend. Hernandez, as quoted by [13] states that multicultural education as a perspective that recognizes the diversity experienced by each individual in the human encounter complex and diverse can be revealed that the educational space as a medium of transformation of knowledge (transfer of knowledge) should be able to give birth the values of multiculturalism by way of mutual respect and respect for the reality that is diverse.

The second aspect of critical thinking skills that build basic skills. Results showed that the second aspect has a value gain of 0.271 at 0.285 experimental class and the control class. The achievement of the basic skill-building aspects of the experimental class lower than the control class. However, the differences shown are not too significant.

At the time of the direct observation of activities enthusiastic and active students. However, when given a problem loading aspect of building basic skills, students are still many who are not able to resolve the issue. This can occur because students are still fixated on textbooks, and do not understand or know about the concept. These results also indicate that students are more motivated active when concrete activities directly and difficult to apply in the abstract.

Figure 1. The results of the N-Gain Critical Thinking Skills Each Aspect
The third aspect of critical thinking skills is concluded. The results showed that all three aspects of the value gained in classroom experiments 0.667 and 0.492 in the control class. On the implementation of the experimental classroom teaching, there are stages of inquiry to develop conclusions. After going through the process of performing predictive then collect data information, so that students find answers to questions that arise. The answers obtained by students then used as the basis for making conclusions. [14] states that at the stage of conclusion, students will involve various aspects of critical thinking skills that is logical, process of inductive, deductive, evaluative, providing logical arguments in decision making.

The fourth aspect of the explanation further shows results of experimental class higher than the class of control. Figure 1 shows the results of the N-Gain 0.504 at 0.446 experimental class and the control class. In the experimental group had looked the student's ability to provide an explanation in the form of arguments, both responding to the observations and content of the report that has been presented. [15] states that the inquiry learning can improve students' ability to explain, because in the process of inquiry learning students are asked to explain the agreement between the predictions and the observations that have been made. Submission of arguments facilitated by teachers in order to create a comfortable atmosphere and mutual respect. Hanum &

The fifth aspect of critical thinking skills are strategies and tactics. Results showed that the experimental class has the ability to set the strategy and metastatic higher than the control class. On inquiry learning, particularly at the planning stage until the investigation process stimulates the ability to manage strategy and tactics of the students. In this activity students are trained at once challenged for equipment and materials as well as the steps do a proper investigation. In the conduct of investigations that observation using a microscope, using a strategy of students in determining the success of the investigation. Therefore, students are required to think critically so that the process of investigation in line with expectations. Rasyida et al.

After knowing the increase in critical thinking skills every aspect, then visits the significance of the increase in critical thinking skills of students before and after treatment. The result of the calculation of the t-test of significance are presented in Table 4.5 below.

Table 1. Significance Upgrades Critical Thinking

| Class | Data | Average | Md | $\sum x^2$ | $t_{count}$ |
|-------|------|---------|----|-----------|-------------|
| Ex    | Pre  | 28.65   | 14.68 | 775.576  | 18,712      |
|       | Post | 43.33   |       |           |             |
| Con   | Pre  | 22.22   | 13.54 | 1121.18  | 14,355      |
|       | Post | 35.76   |       |           |             |

Based on the results of significance test calculations are presented in Table 1. that increase critical thinking skills pretest and posttest results of the experimental class got value $t = 18.712$ and $t_{table} = 2.030$, while the control class is obtained $t = 14.355$ and $t_{table} = 2.030$. Value $t > t_{table}$ then $H_0$ is rejected and $H_a$ accepted. Then accepted hypothesis is that there is a significant increase in critical thinking skills students both in the experimental class and control class, but the results of the experimental class has a significance level higher than the control class.

Then to see the differences in the results of students' critical thinking skills between the experimental class and control class, then the t-test. T-test analysis used is separated variant t-test with $df = n1 + n2 - 2$. This is because the conditions are met for $n1 = n2$ and the data are homogeneous. The result of the calculation of the value $t$ test posttest experimental class and control class can be seen in Table 1.

Table 2. Test Results Experiment t Different Class and Class Controls

| Class   | N   | Mean  | $S^2$  | $t_{count}$ | $t_{table}$ |
|---------|-----|-------|--------|-------------|-------------|
| Experiment | 36  | 43.333| 28,471 | 5,707       | 1,9944      |
| Control  | 36  | 35.764| 34,864 |             |             |
Based on Table 5 shows that the average grade higher than the grade experiment kontrol with t count of 5.707 to t table (df = 70, α = 5%) so that t > t table then H0 is rejected and Ha accepted. Then accepted hypothesis is the average critical thinking skills students experiment class is larger than the average value of critical thinking skills control class.

The principle of multicultural education delivered by Banks, as quoted by [13] that multicultural education as education for people of color. Differences arising pursued as a diversity which spawned a wealth of knowledge of students. In the implementation of learning students are given the opportunity to play an active role in the process pembelajaran. [16] states that activities involving students actively can improve students' critical thinking skills. [17] stated that in an effort to facilitate the students to be critical and creative thinking skills evolve, by a study in which the learning must start from learning makes students so that students are free to think.

Active learning one of which can be realized through multicultural education based learning with inquiry model. [18] states that learning science should be taken of scientific inquiry (scientific inquiry) to foster the ability to think, work, and scientific attitude and communicating it as an important aspect of life skills. Research [2,10] showed that the inquiry learning can improve students' critical thinking skills. [15] in his research showed that the application of learning by inquiry model is able to give an influence on the students' critical thinking skills. These results are also supported by research [1] which showed that critical thinking skills can be enhanced through inquiry learning with the help of worksheets.

4. Conclusion
Based on the research that has been done shows that learning science Based Multicultural Education can enhance students' critical thinking skills.

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