INFLUENCE MODEL OF LEARNING AND CRITICAL-THINKING ABILITY OF LEARNING SCIENCE OF PRIMARY SCHOOL STUDENTS

Ucu Cahyana, Universitas Negeri Jakarta, Jakarta, Indonesia, ucahyana@unj.ac.id
M. Syarif Sumantri, Universitas Negeri Jakarta, Jakarta, Indonesia, mohamadsumantri@gmail.com
Uswatun Hasanah, Universitas Negeri Jakarta, Jakarta, Indonesia, us_nina@yahoo.com

Abstract

The purpose of this study was to determine the effect of learning model and critical thinking skill towards the learning outcomes of science. This research conducted in SDN Menteng 02, Central of Jakarta on fifth grade in academic year 2015 / 2016, by using simple random sampling technique was done to 60 students. The data is collected by test and analyzed by using analysis variant (ANAVA) two way design with treatment by level 2x2. Based on the results and discussion, it concluded that (1) the learning outcomes of students taught by using inquiry training model are higher than students taught by using group investigation model, (2) there is interaction effect between the application of learning model and critical thinking skill towards learning outcomes of science, (3) the learning outcomes of students taught by using inquiry training model are higher than students taught by using group investigation model on group of the students who have high critical thinking skill, and (4) the learning outcomes of students taught by using inquiry training model are lower than students taught by using group investigation model on group of the students who have low critical thinking skill. The result of this research indicates that inquiry training model with critical thinking skill able to improve learning outcomes of science.

Keywords: inquiry training, group investigation, critical thinking skill, and learning outcomes of science.

INTRODUCTION

Based on data from the Programmed for International Student Assessment (PISA) showed that the students' science achievement Indonesia is still low. Here's a science student achievement data Indonesia, compared to other countries, based upon the results from the PISA study, with an average score of 500 internationals.

Table 1: Data Science Literacy Achievement Indonesian Students Based on PISA Study

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Score Indonesia</th>
<th>Ranked Indonesia</th>
<th>Studies of the States Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>393</td>
<td>38</td>
<td>41</td>
</tr>
<tr>
<td>2003</td>
<td>395</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>2006</td>
<td>393</td>
<td>50</td>
<td>57</td>
</tr>
<tr>
<td>2009</td>
<td>383</td>
<td>60</td>
<td>65</td>
</tr>
<tr>
<td>2012</td>
<td>382</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td>2015</td>
<td>403</td>
<td>69</td>
<td>76</td>
</tr>
</tbody>
</table>

Source: http://litbang.kemdikbud.go.id/index.php/survei-internasionalpisa
Based on these data, it can be seen that the achievement of students' science literacy in Indonesia is still low compared to other participating countries or are still far below the international average. In addition, the results of PISA 2009 study also show that 24.6% of Indonesian students are under level 1, 41% at level 1, 27% at level 2, 6.9% at level 3, and only 0.5% of students in level 4. In Indonesian students who achieve level 5 and 6, while other countries many of which reached level 4, 5, even 6. This shows the majority of Indonesian students are only able to use scientific knowledge in some situations. A familiar life that requires low cognitive level and have not been able to use scientific knowledge in a variety of complex life situations that require a high cognitive level.

The low achievement and the level of scientific literacy of students Indonesia compared with other countries also show that the learning process of science in Indonesia is not maximized, because the learning of science in Indonesia is still limited as product and less attention to science as a process so that the understanding of science is not acquired in depth and thorough. The low level of literacy of the sins associated with the learning outcomes of students in science. According to Sudjana (2009: 22) states that the results of learning is the ability among the students after receiving their learning experience. According to Ghanem cognitive Bloom in regard to intellectual learning outcomes of six aspects, memory, comprehension, application, analysis, synthesis, and evaluation. Then Anderson has revised Bloom opinion be given, understand, apply, analyze, evaluate, create.

To improve student learning outcomes, it is necessary to pay attention to the extent to which their thinking abilities. The development of critical thinking skills can be grown from primary school age. According to John Dewey in Yaumi (2013: 66), "critical thinking is an active, persistent, and careful consideration of a belief or supposes the form of knowledge in the light of the grounds roommates support it and a further conclusions to the which tends." Here Dewey stressed that the critical thinking is an active process. Jean Marrapodi introduced six stage process in critical thinking expressed by Peter Faccione, "... process of critical thinking: interpretation, analysis, evaluation, inference skills, presenting arguments, and reflections that may be used in the critical analysis process." Vaccine states there are six processes that can measure a person's ability to think critically, the ability of interpretation, analytical skills, ability evaluation, inference capability, the ability to explain and reflection skills.

The above process sought contrasts the thinking process at the time of receiving or obtaining information from someone else then he is not merely passively receiving information alone, but he evaluates the truth first. This can as long as it is applied in elementary school learning environment is designed to foster students' critical-thinking skills. It is therefore, necessary for a learning model that can enable students and make learning to become active, concrete and fun.

Training inquiry learning model is a model that is perfect for students of primary school age. According to Joyce and Well (2009: 174), inquiry training was developed by Richard Suchman to teach students a process for Investigating and explaining unusual phenomena. The model is deliberately designed to teach students about analyzing an event through the inquiry process. Static expressed training model of inquiry begins with the present situation is full of questions. By doing the inquiry process, students can develop intellectual skills so easy to solve the problem.

Uno (2009: 14) says that the purpose of the inquiry model of training is to train students' skills in researching, explaining the phenomena, and solve the problem scientifically. Harold Spears stating that "learning is to Observe, to read, to imitate, to try something Themselves, to listen, to follow direction." Spears statement asserts that learning does not always read a book, doing exercises, and dwell in the classroom. This is in accordance with the purpose of the training model of inquiry. This model is appropriate learning models in the creation and development of students' critical-thinking skills as students are required to use the power of reason during the learning takes place. In inquiry learning model training, teachers are required to create learning makes students feel challenged to be a problem.

Model Group Investigation (GI) is a cooperative learning model that emphasizes the efforts of students in groups plan their own learning activities to solve problems assessed in accordance with the selected
subtopics. Sutikno (2014: 78) states models GI was composed by Herbert Thelen and John Dewey. Furthermore, this model has the premise of what and how students learn. The purpose of these GI models is to make students able to complete or solve their own problems in the way the investigation group. Each member trying to give the information gained from the experience and resources obtained as books, journals and more.

In addition to learning models that need to be considered, then a curriculum should be applied in conjunction with the character of elementary school students. Curriculum 2013 is in accordance with the cognitive development of students where the students are still in the concrete operational stage. This curriculum prepares students for observation / observation, questioning and reasoning against science is taught. Students are given the subjects based upon the theme that is integrated in order to have knowledge about the environment, life, and have a strong personal foundation in social life and creativity better. By implementing this curriculum in 2013, though the ability to think students will be growing well. If developing students’ critical-thinking skills, it will greatly affect the outcome learn science students.

RESEARCH METHODOLOGY

The purpose of this study was to obtain empirical data for the effect model of learning and critical-thinking skills to the learning outcomes science. This study will be conducted in the second semester in one di kelurahan SDN Menteng, Central Jakarta. The research time in April-May the second semester of school year 2015-2016. This research uses experimental research design in the design of treatment by the level of 2x2. Affordable populations in this study were all students in grade 5 in the Village SDN Menteng, Central Jakarta. Menteng urban village to the region there are three primary schools and scrambled randomly so elected SDN 02 Menteng, Central Jakarta. The test instrument is done in SDN 02 Menteng, Central Jakarta. The sampling technique for this study using simple random sampling technique. Data collection techniques critical thinking skills and learn to use the test results.

RESULTS AND DISCUSSION

Result

The test results on the four groups can be presented as a table:

Table 1. Description of Values

<table>
<thead>
<tr>
<th>Critical thinking</th>
<th>Inquiry Model training</th>
<th>Model Group investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>n A1B1 15</td>
<td>n A1B1 15</td>
</tr>
<tr>
<td></td>
<td>SumX 1328</td>
<td>SumX 1069</td>
</tr>
<tr>
<td></td>
<td>SumX2 118020</td>
<td>SumX2 76423</td>
</tr>
<tr>
<td></td>
<td>Mean 88,533</td>
<td>Mean 71,27</td>
</tr>
<tr>
<td>low (B2)</td>
<td>n A1B2 15</td>
<td>n A1B1 15</td>
</tr>
<tr>
<td></td>
<td>SumX 1056</td>
<td>SumX 1166</td>
</tr>
<tr>
<td></td>
<td>SumX2 75002</td>
<td>SumX2 91158</td>
</tr>
<tr>
<td></td>
<td>Mean 70,40</td>
<td>Mean 77,73</td>
</tr>
</tbody>
</table>

Discussion

The results of hypothesis testing Tuckey test is as follows:

Table 2. Test Results Tuckey
Based on the above table can be described as follows:

1. **Hypothesis 1 (A1 and A2)**
   In studies, it has been found that there are significant differences between the learning outcomes of students studying a science group in the model training and model of group inquiry investigation. The average student learning outcomes learning training model of inquiry that is higher than 88.533 students who study for the model group investigation, namely 71.27. This is because the inquiry model of training, students are more actively observed, reason and try to find a solution for a problem through scientific activities. These activities make students more active, independent, disciplined and can increase their curiosity. Based on research by William P. Hughes, R. Michelle Ellefson (2013: 1), states that the inquiry-based training improves teaching effectiveness of biology teaching assistants. I clearly said that the inquiry model of training can improve the effectiveness of teaching biology. This model familiarizes students to think scientifically and objectively in each face with a case. Students do not just memorize the material but active students observe, discussions, and trying to figure out a way to solve the problem or the solution. Thus, this model can improve the effectiveness of teaching biology and did not rule it also improves learning outcomes science elementary school students. In addition, the results Pandey (2011: 1) the efficacy of the inquiry model of training to students in India indicated that "the teaching of physical science through Inquiry Training Model is more effective than the teaching through the Conventional Method at the secondary level. The ITM models may be advocated as a better tool than the conventional method for teaching Physical Science ". From the above, study stated that the inquiry model of training has been said to be an effective model for learning science. This model is appropriate learning models in the creation and development of students' critical-thinking skills as students are required to use the power of reason during the learning takes place. Based on the above, it can be said that the learning outcomes are learning science by inquiry model of training is higher than students who studied in the model group investigation.

2. **Hypothesis (A x B)**
   The influence of interaction between the learning model for the ability to think critically about the learning outcomes seience is 52.78%. Results of research on the testing of both hypotheses suggest there is an interaction effect between the learning model (inquiry training and group investigation) with the ability to think critically about the science learning outcomes. In this case the effect on the interaction between the learning model (inquiry training and group investigation) with the ability to think critically influential on the level of student learning outcomes in elementary school. According to research conducted Shahrazad Wan Sulaiman Wan states that this research has shown that the approaches employ students on their learning influences the learning outcome. Studies have linked surface approaches with lower order outcomes and deep approaches with higher-order outcomes. He stated that their learning approach greatly affects student learning outcomes. This can be due to a material will be easily understood if the student is given a concrete media and conditioned in an approach and a model that makes active and happy so that learning has increased. According to research conducted Yurdugül, H. & Menzi Çetin, N stated that the learning outcomes in the e-learning process are affected by learner motivation, learning strategies and the way the learner performs learning activities. He stated that one that
affects a person's learning outcomes is a learning strategy and way's students in exploring knowledge. If a study is conditioned by an active learning model and fun AMKA will affect the spirit among the students in learning so that the study results will increase.

Critical thinking, creative and oriented at an intellectual process that involves the formation of the concept, application, analysis, assessing the information collected or generated through observation, experience, or communication as a basis in the action, so it can draw conclusions. Therefore, we need a model that can enable students to explore figuring out the concepts and evidence from the case so that he would get used to cope with the problem based upon the consideration that the logical and objective evidence. Critical-thinking process is always based on rational thought and careful. Slavin (2009: 41) argues that critical thinking involves trying to identify false advertising, weigh the evidence, to the contrary, and identifying assumptions or fallacy in the argument. From Slavin's opinion, can be presented that critical thinking is a complex process that includes several businesses that work on the mind. The work done is due to something considered untrue and something to be false then analyzed through the evidence they have in mind, giving rise to a new belief.

By using the inquiry model of training, students are not just sitting on a seat and hear an explanation from the teacher, but students are actively involved throughout the process. Conditioning of the learning environment with this model encourages student awareness to the process of increasing the intensity of the research conducted at the time directly can be taught how to perform the procedure is scientific research. With this model, the results of student learning will increase. Unlike the case of the group learning model investigation. Basically, this model is designed to guide the students to define the problem, explore the various horizons on the issue, gather relevant data, develop and test hypotheses.

Based on the above, there is an interaction effect between models of learning and critical-thinking skills to the learning outcomes 5th grade science students.

3. Hypothesis 3 (A1B1 and A2B1)

Based Tuckey test showed that Q count < Q table is 12.162 > 3.01. This shows that there are differences in learning outcomes science students who study with the model inquiry training and models of group investigation for students who have the ability to think critically significant high, which shows the results of learning science students who have the critical thinking skills of high studied with models of inquiry training higher compared with students who study with the model group investigation.

The above results are supported by research conducted Seyhan & Morgil (2007: 37). He Compared two classes taught by traditional methods with two classes are taught using the 5E instructional model's method. The study indicated resources that the experimental groups had much greater understanding of the information covered especially on questions that required interpretation.

Based on the above, for the students who learn by using the inquiry model of training to get higher learning outcomes than students who learn by using model group investigation on a group of students who have the ability to think critically high.


Based Tuckey test showed that Q count < Q table is -4.337 < -3.01 . This shows science learning outcomes of students learn by inquiry model of training is lower than students who studied in the model group investigation on a group of students who have the ability to think critically low. Students who have the ability to think critically low, then it needs to be stimulated by all means to evoke critical-thinking skills. At the inquiry model of training, students will be faced with the puzzle of a concept or event. Then the students were given an assignment to gather data such as projects, and other observations. Students who have the ability to think critically low tend to be lazy thinking to find a concept. Therefore, there need to be active learning activities and involve students in its implementation.

Unlike the case if the students who already have the ability to think critically low, and he taught with the model group investigation. Essentially this model either to arouse students' interest. In practice, students who are capable of thinking critically low will be invited into the discussion, and he will be motivated to express ideas or opinions. It is much easier than
she tried to find out through the activities of inquiry. These activities give priority to teamwork and the sharing of ideas so that students who have not mastered the learning will be the exchange of knowledge and opinions of other group members.

According to research conducted by The Network, Scientific Inquiry Resources and Connections in Aunurrahman (2010: 150) through the discussion revealed that: Group investigation is an organizational medium for encouraging and guiding student’s involvement in learning. Students actively share in influencing the nature of events in their classroom. By communicating freely and cooperating in planning and carrying out their chosen topic of investigation, they can achieve more than they would s individuals.

Opinions stated in the model of group investigation is a learning model that encourages the involvement of students on the learning process. Meaningfulness of learning can be created when the needs of students in acquiring and elicits knowledge. Values, as well as their experience can be optimally met through learning activities are carried out. Thus, students who have the ability to think critically low, he will be required to be actively involved in the learning, learns to express ideas and ideas, and share knowledge of other members. These activities will arouse the curiosity of students so that learning will increase.

Based on the above, for the students to learn by using the model group investigation earn higher learning outcomes than students who learn by using the inquiry model of training for the group of students who have the ability to think critically low.

CONCLUSION

Based on the results of research and discussion, it could be concluded as follows:

1. Science learning outcomes among students taught using the inquiry model of training is higher than students taught using the model group investigation.
2. There is an interaction effect between the application of learning models and the ability to think critically against science student learning outcomes.
3. Science learning outcomes among students taught using the inquiry model of training is higher than students taught using a model of group investigation on the student group that can think critically high.
4. Science learning outcomes among students taught using the inquiry model of training is higher than students taught using a model of group investigation on the student group that can think critically low.

REFERENCE

In research study by A.Pandey, et all (2011) Effectiveness of Inquiry Training Model over Conventional Teaching Method on Academic Achievement of Science Students in India. Journal of Innovative Research in Education 1(1) : 7-20


Certification

September 14, 2017

Ucu Cahyna
Universitas Negeri Jakarta,
Indonesia

This letter is to confirm that your papers entitled ”Inclusive Education Program Evaluation in Primary Education Office in West Java Province Indonesia” and “Influence Model of Learning and Critical-Thinking Ability of Learning Science of Primary School Students” were accepted and published at the 29th IBIMA Conference on May 3-4, 2017 in Vienna, Austria conference proceedings (ISBN: 978-0-9860419-7-6, Published in the USA).

The papers have been published and sent along with the whole proceedings for indexing by web of Science (ISI) and SCOPUS. IBIMA International conferences proceedings are indexed by Thomson Reuters (Web of Sciences) since 2006 and by SCOPUS since 2005.

Sincerely

Dr. Khalid S. Soliman
29th IBIMA Conference chair