Research Article

INFLUENCE MODEL OF LEARNING AND LEARNING INDEPENDENCE OF CRITICAL THINKING SKILLS SCIENCE IN PRIMARY SCHOOL

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A R T I C L E   I N F O

A B S T R A C T

This study aims to determine the effect of learning models and learning independence of critical thinking skills. This research was conducted in class V State Primary School. The research design used a 2-way analysis of variance (ANOVA). The results of this research are (1) The difference of critical thinking ability of students who learn to use the cooperative model of Numbered Heads Together type with students who learn to use expository model. (2) The existence of interaction between learning model and students learning independence on students critical thinking ability (3) Critical thinking ability among students who learn by using cooperative model of Numbered Heads Together type which has higher learning independence is higher than the students who learn by using an expository model that has a high learning independence. (4) The ability to think critically among students who have learned by using the cooperative model of Numbered Heads Together type with low learning independence is higher than students who learn by using an expository model that has low learning independence. (5) The ability to think critically among students who learn by using model co-operative type Numbered Heads Together who have higher learning independence is higher than the students who learn by using expository models that have low learning independence. (6) The ability to think critically among students who are learning by using the cooperative model of Numbered Heads Together type who has low learning independence is lower than students who learn by using expository models that have high learning independence.

INTRODUCTION

Education is an important means to improve the quality of Human Resources (HR) in ensuring the sustainability of a nation's development. Increasing human resources is much more urgent to realize, especially in the face of the era of global competition. In fact, in the field of Mathematics and Natural Sciences, the quality of education in Indonesia is low, as expressed by the International Trends in Mathematics and Science Studies (TIMSS), that the achievement of science in 2011, Indonesia ranks 40 of 42 countries, at a low level. While the study report of the Program International Student Assessment (PISA), that science learning is not optimal, the education outcomes in Indonesia have an only low achievement, Indonesia is ranked 64 out of 65 countries. This shows that the low quality of learning has an impact on the low learning outcomes of students.

Based on the observations made in SDN Ketileng 2 that science learning in primary schools still use traditional models, science lessons are still teacher-centered, student activeness in

conveying ideas or opinions to solve problems is still low, not train students in critical thinking, high still low, learning independence is still low, learning is still fixated by the book, the lack of utilizing the surrounding environment as a source of learning, learning-oriented mastery of the concept of knowledge without the process of discovery itself. so student activity is still low. In addition, the lack of experimentation in science and students is given less opportunity to have direct experience during the learning process, so that learners look quickly bored and less enthusiastic in learning.

One way to improve it is to use a learning model that does not require students to memorize the concept of Natural Science, but the learning model can encourage students to build knowledge in their minds. Approaches deemed appropriate for achieving goals are the cooperative model of Numbered Heads Together and the expository model.

Student independence has been the goal or demand of all subjects, including Natural Sciences since science is a science that has special characteristics of learning factual phenomena, whether it is real or events and causal relationships (Wisudawati *et al*., 2014: 12). According to Powler in Usman (2016: 3), science is a science that deals with natural phenomena and systematic nature arranged regularly,

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generally in the form of a collection of observations and experiments / systematic (regular).

According to Desmita (2012: 153) critical thinking which means reflecting deeply the problem, keeping the mind open to various approaches and perspectives, not trusting information coming from various sources (oral or written), and reflective thinking rather than simply accepting outside ideas without understanding and a significant evaluation. According to Ennis in Ahmad Susanto (2013: 121), critical thinking is thinking with the goal of making sensible decisions about what is believed or done. Critical thinking is thinking with the goal of making sensible decisions about what uses logic. Based on the above definition, it can be understood that what is meant by the ability to think critically is the ability to think logical, reflective, and productive applied in assessing the situation to make good judgments and decisions.

Paul (Rasiman,2015) defined critical thinking as the ability to make inferences based on observation and information. Beyer described critical thinking as an activity to assess the authenticity, accuracy, and the value of a claim, belief, and argument, or shortly he stated that critical thinking is the act of making a reasonable assessment. Norris stated that critical thinking is the application all of knowledge and feelings to evaluate their own thoughts, in particular to change the behaviour. According to Beyer (Rasiman, 2015) he described the critical thinking as an activity to assess accurately, trust, and by using argument, or briefly he stated that critical thinking is an act committed by a person in making judgments with good reasoning.

Halpern (Mesfer, 2014) defined critical thinking as "purposeful, reasoned, and goal directed—the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions"

(Umit, 2018), Cognitive theorists have defined critical thinking as having a logical/thoughtful, attitude/behavior towards the situations and problems encountered by individuals in their own lives, knowledge of the methods of reasoning, accepting the evidence necessary to support what is claimed to be true, having knowledge regarding logical inquiry and reasoning methods. According to this, critical thinking is defined as a process of purposeful, self-regulatory judgment that directs problem-solving and decision-making.

(Murat, 2016) critical thinking is an ability which is beyond memorization. When students think critically, they are encouraged to think for themselves, to question hypotheses, to analyze and synthesize the events, to go one step further by developing new hypotheses and test them against the facts. Paul and Elder (Murat,2016) revealed a list about the characteristics of critical thinkers. They list the characteristics of critical thinkers as: Raises vital questions and problems, formulating them clearly and precisely; Gathers and assesses relevant information, using abstract ideas to interpret it effectively; Comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards; Thinks open-mindedly within alternative systems of thought, recognizing and assessing as need be, their assumptions, implications, and practical consequences; Communicates effectively with others in figuring out solutions to complex problems.

(Guslah and Esin, 2015) Critical thinking is an intellectual concept that encourages individuals to analyze, evaluate and explain through interpreting ideas from a broader perspective.

(Hasruddin, 2015) Critical thinking is defined as the process of decision-making that encourages self-regulation aimed at solving problems and making the right decision or the "engine" that drives how to decide what to do or believe in a certain context. Critical thinking includes behavioral tendencies (eg, curiosity, openmindedness) and the skills of analysis, conclusions, and evaluation.

According to Mohamad Surya (2014: 146), the age of grade V primary school takes place at the age of 10 years to 12 years who are still in a concrete operational stage, the child has been able to make thoughts about the situation or concrete things. logically. According to Syamsu Yusuf (2017: 25), one of the hallmarks of upper-class children is: an interest in daily concrete daily life, very realistic, curious, wanting to learn, interest in things and special subjects, form a peer group.

From the above explanation it can be concluded that the characteristics of grade V primary children in critical thinking skills that are incorporated in this concrete operational stage, the child has been able to show a more critical attitude, develop logical thinking, rational and have the maturity to learn.

Robert Ennis in Maulana (2017: 7) categorizes five indicators of critical thinking skills, namely: provide simple explanations, build basic skills, conclude, provide further explanations, establish strategies and tactics.

According to Hosnan (2016: 252) cooperative learning model Numbered Head Together (NHT) is one type of cooperative learning that emphasizes special structures designed to influence the interaction patterns of students and has a goal to improve academic mastery.

From the above explanation, it can be concluded that the model of learning Numbered Head Together (NHT) is a model that prioritizes the activities of students to train to understand, accept friends regardless of hunger back, and improve self-confidence.

According to Hosnan (2016: 373), expository learning model is a learning activity that emphasizes the process of delivering verbal material from an educator to a group of learners with the aim that learners can master the subject matter optimally. Roy Killen named this expository strategy with the term direct instruction strategy (direct instruction) because in this strategy the subject matter delivered directly by the teacher. Students are not required to find the material. This expository model is often also called the term "chalk and talk". (Wina, 2006: 179) From the above explanation can be concluded that the model of expository learning is an approach that emphasizes a process of delivering the material verbally so that students master the subject matter well.

Pintrich in Babita (2018: 27) defines that learning independence is an active and constructive process in which learners set goals for their learning and then try to monitor, organize and control their cognitions, motivations, and behaviors guided and constrained by purpose and contextual. Meanwhile, according to Lanny (2014: 211) independence is the readiness and ability of the individual to stand alone characterized by the courage to take the initiative, trying to

overcome the problem without asking for help from others, trying and directing the behavior toward perfection.

Based on the above explanation can be concluded that the independence of learning is an activity of a person who can be directed to himself, without expecting the help of others, and trying to solve problems well. Desmita (2012: 186) suggests indicators of learning independence include the desire to compete, decision and initiative, confidence, and responsibility.

The purpose of this research is to know: 1) difference of critical thinking ability taught by cooperative learning model of Numbered Head Together (NHT) type and student taught by using expository learning model 2) influence of interaction between learning model and learning independence to critical thinking ability, 3) differences in critical thinking skills taught by cooperative learning model type Numbered Head Together (NHT) and students taught using expository learning models that have high learning independence, 4) differences in critical thinking skills taught by using cooperative learning model type Numbered Head Together (NHT) and students taught using expository learning models that have low learning independence, 5) differences in students critical thinking skills taught using cooperative learning model Numbered Head Together (NHT) high learning and students who are taught using expository models that have low learning independence, 6) differences in critical thinking skills of students who are taught using cooperative learning model type Head Together Number who have low learning independence and students are taught using expository learning model have high learning independence.

METHOD

This research was conducted on students of grade V SDN Ketileng 2 Cilegon. The research was conducted in the second semester (two) academic year 2017/2018 which lasted from March to May 2018. The method used in this research is an experimental method with design treatment by level 2 x 2. Sampling technique with random sampling. The data collecting technique used in this research is required by instrument in the form of test, among which are (1) student independence learning instrument in the form of a questionnaire, (2) critical thinking ability instrument in the form of description test. The data analysis technique used two-track ANOVA which previously had to perform the requirements analysis test consisting of normality test and homogeneity test. Normality test using liliefors test, homogeneity test of this research using Barlett test as a way to know the variance of a homogeneous group or not.

RESULTS

Based on the calculation of normality of data in all study groups note that L_{count} smaller than L_{table}, this means that in all research groups normal distribution. The result of normality test with Liliefors test as a whole can be seen in the following table:

Table 1 Normalities Test Recapitulation

Group	Number of Samples	L_{count} (L_o)	L_{table} ($L_{t: \alpha = 0,05}$)	Conclusion
A_1	20	0,142	0,190	Normal
A_2	20	0.144	0,190	Normal
A_1B_1	10	0,197	0,258	Normal
A_1B_2	10	0,182	0,258	Normal
A_2B_1	10	0,140	0,258	Normal
A_2B_2	10	0,128	0,258	Normal

While the recapitulation of the results of homogeneity test data by using a Barlett test where $X^2_{count} \leq X^2_{table}$ at the level of significance α = 0.05 can be seen in the following table:

Table 2 Recapitulation of a homogeneous test

Group	Variants S^2	Variants Combination S^2	Value B	X^2_{count}	X^2_{table}
A_1B_1	2,234				
A_1B_2	2,261				
A_2B_1	2,440	2,349	13,356	0,062	7,81
A_2B_2	2,461				

From the test results of normality and homogeneity of the research data, it can be concluded that the data came from a normally distributed population and homogeneous, so it can be followed by hypothesis testing. The calculations have been done using a two way ANOVA analysis obtained as in the table below:

Table 3 Results of Analysis of Variance Using Two-Way ANOVA.

Source of Variance	Db	JK	RJK	F_{count}	F_{table}
Between Columns	1	84,1	84,1	33,64	4,11
Between Lines	1	72,9	72,9	29,16	4,11
Interaction	1	25,6	25,6	10,24	4,11
Inside	36	90,0	2,5		
Total Reduced	39	272,6			

Based on the results of the first hypothesis testing, the calculation of ANOVA 2 x 2 shows the results of the calculation of variance analysis of the difference in effectiveness between the two models as a whole that F_{count} (A) = 33.64>F_{table}= 4, 11 at the significance level α = 0.05, thus H_0 is rejected. So the ability of critical thinking between groups of students is given cooperative learning model Number Heads Together type higher than the group of students who are given the expository model. It can be seen from the average score of the ability of critical thinking skill given by Cooperative Learning Model Number Heads Together ($\bar{X}$= 71,55) is better than the expository model ($\bar{X}$= 68,65). The result of calculation of ANOVA 2 x 2 can be concluded that there is a significant difference of influence between the group given cooperative learning model Number Heads Together type with a group of students who given expository model to critical thinking ability.

Based on ANOVA calculation result, it can be seen that the value of second hypothesis test result is presented in ANOVA table in AXB interaction row shows that H_0 is rejected based on value that F_{count} (AB) = 10,24>F_{table} = 4.11 Thus it can be concluded there is a significant interaction effect between learning model and learning independence to critical thinking ability.

Based on the results of the analysis show that the calculation

of Tuckey test $A_1B_1>A_2B_1= Q_{count} = 2.60$ is greater than Q_{table} (α = 0.05) = 2.04 or $Q_{count}>Q_{table}$, at the significance level α = 0.05 thus H_0 is rejected. The average value of the A_1B_1 group is 72,1>A_2B_1= 70,8, it can be concluded that the critical thinking ability of students who are given cooperative learning model Type Heads Together Number and who have higher learning independence is higher than the group of students who are given model expository and who have high learning independence.

Based on the calculation results $A_1B_2>A_2B_2= Q_{count} = 9.00$ is greater than Q_{table} (α = 0.05) = 2.04 or $Q_{count}>Q_{table}$, at the level of significance α = 0.05, thus H_0 is rejected, it can be concluded that there are differences in critical thinking skills that are modeled on cooperative learning of Number Heads Together type and who have low learning independence with groups of students who are exposed to expository models and have low learning independence.

Based on the result of calculation $A_1B_1>A_2B_2= Q_{count} = 11,2$ bigger than Q_{table} (α = 0,05) = 2.04 or $Q_{count}>Q_{table}$ at significance level α = 0,05, thus H_0 rejected, hence can be concluded that there are differences in the ability to think critically to the group of students who have high learning independence which is given model of learning cooperative Type Number Heads Together with groups of students who have low independence and given the expository model

Based on the calculation results $A_1B_2>A_2B_1 = Q_{count} = 0.4$ is smaller than Q_{table} (α = 0.05) = 2.04 or $Q_{count}<Q_{table}$, at the significance level α = 0.05, thus H_0 is accepted, it can be concluded that there is no difference in the ability of critical thinking to the group of students who have low learning independence which is given model of learning cooperative type Number Heads Together with a group of students who have high independence and given the expository model.

DISCUSSION

Based on the findings of the researcher revealed that there is a difference between students who are given cooperative learning model Number Heads Together type with students who are given the expository model. The results show that critical thinking ability in students who are given cooperative learning model Number Heads Together type is higher than students who are given expository learning model. This finding is consistent with the results of research conducted by Ricky Marojahan Manullang, EllyDjulia (2016: 74-80) with the results of research showing the results of biology learning on the material of student regulation system taught by NHT type cooperative learning model is higher than students who are taught by model expository learning which means there is influence of NHT type cooperative learning model on learning outcomes.

The findings of the further research indicate that there is an interaction effect between the learning model and the ability to learn independence to critical thinking skills. The results showed that the group of students who have high learning independence and modeled cooperative learning Type Number Heads Together, the critical thinking ability obtained is higher than the students who are given expository learning model. This is confirmed by Wahyuddin's opinion that cooperative learning. Numbered Head Together (NHT) is a type of cooperative learning that emphasizes special structures designed to influence student interaction patterns and has a goal to improve academic mastery

The findings of the study revealed that there were differences in critical thinking skills in the group of students who were given cooperative learning model of type Numbered Heads Together and who had high learning independence with groups of students who were given expository learning model and had high learning independence. The result shows that critical thinking ability in the group of students who are given cooperative learning model of Number Heads Together is higher than the group of students who are given expository learning model and who have high learning independence.

The findings of the study revealed that there were differences in the ability of critical thinking in groups of students who were given cooperative learning model Number Heads Together Type and who had low learning independence with groups of students who were exposed to learning the expository model and who had low learning independence. The result shows that critical thinking ability in the group of students who are given cooperative learning model Number Heads Together is higher than students who are given expository learning model which has low learning independence.

The findings of the study revealed that there were differences in the ability of critical thinking in groups of students who were given cooperative learning model Number Heads Together Type and who have high learning independence with groups of students who were given exposure model of learning and who have low learning independence. The result shows the ability of critical thinking in groups of students who have high independence and given the model of cooperative learning Type Number Heads Together higher results than the group of students who are given exposure model learning that has low learning independence. This finding is consistent with research conducted by Femmy Roosje and Kawuwung with the results of the study indicating that there is an effect of NHT cooperative learning strategy on improving the critical thinking ability of learners, compared to conventional learning.

The findings of the study revealed that there was no difference in the ability of critical thinking in the group of students who were given cooperative learning model Number Heads Together Type who have low learning independence with the group of students who are given exposure model learning that has high learning independence. The result shows that critical thinking ability in the group of students who have low independence and given the model of cooperative learning Number Heads Together type is smaller than the group of students who are given expository learning model which has high learning independence. This is in accordance with research conducted Wakiyem, expository model is able to make students can do learning activities in accordance with its ability, so that will have an impact on learning outcomes, so that obtained optimal learning results.

CONCLUSION

The conclusions of this research are: 1) Critical thinking ability in the group which is given cooperative learning model Type Heads Together (NHT) is higher than the critical thinking ability in the group of students who are given expository learning model. 2) There is an interaction effect between learning model and learning independence to critical thinking ability. 3) Students who have high learning

independence ability, critical thinking skills between groups taught cooperative learning model Type Heads Together (NHT) is higher than the group of students taught using expository learning model. 4) Students who have low learning independence, critical thinking skills between the groups taught using cooperative learning model Type Heads Together (NHT) is different from the group of students who are given expository learning model. 5) There is a difference between the groups of students who have high learning independence and given the model of cooperative learning Type Number Heads Together (NHT) is higher than the group of students who have low learning ability and given the model of expository learning. 6) There is no difference between the groups of students who have low learning independence and modeled cooperative learning Type Number Heads Together (NHT) is smaller than the group of students who have high learning ability and given the model of expository learning.

Based on the result of the research, the researcher can give suggestions as follows: 1) For the teacher, should be able to improve the ability in choosing and even designing the learning model in accordance with the material and the character of the students as well as in accordance with the independence of learning owned by students, so that students can further improve learning outcomes accordingly with the expected learning objectives. 2) For learners who have high independence and low should use the model of Cooperative Type Number Heads Together (NHT) in order to improve learning outcomes and better achievement. 3) This research is inseparable from various limitations and weaknesses. To that end, to the next researcher is suggested to examine the ability of critical thinking and learning independence by using cooperative learning model Number Heads Together (NHT).

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