Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.7, No.8, 2016

The Enhancement of Mathematical Critical Thinking Ability of Aliyah Madrasas Student Model Using Gorontalo by Interactive Learning Setting Cooperative Model

Husnaeni

ABSTRACT
Critical thinking ability of students' mathematical is a component that must be mastered by the student. Learn to think critically means using mental processes, such as attention, categorize, selection, and rate / decide. Critical thinking ability in giving proper guidance in thinking and working, and assist in determining the relationship between the material with more material. Critical thinking skills very needed in solving the problem / solution search, and task completion. But the fact is this ability have not developed well, even at the middle school students. Therefore, should the effort to implement an instructional model that is expected to help improve KBKM students in mathematics. This research applies the Interactive Learning Settig Cooperative Model (ILSC) as an alternative to learning that is expected to enhance these capabilities. The sample in this research is 68 students of class X MAN Model Gorontalo in Gorontalo. The hypothesis was tested at 5% significance level. The data were analysed by applying the mean, standard deviation, and n-Gain. The result shows that: (1) there is a difference achievement, the enhancement of KBKM, in experiment class and control class; (2) Learning with ILSC models better than Conventional method.
Keywords: Mathematical Critical Thinking Ability, Interactive Learning Setting Coopertive Model (ILSC)

A. Background

Mathematics is a subject that is always present at every level of education, from elementary school through college. Mathematical characteristics different from the characteristics of other sciences. Mathematical knowledge is knowledge that is created through thinking about the experience will be something particular object or certain events. According Gallgher & Reid (Suparno, 2001), this knowledge is obtained of abstraction based on coordination, relationships, or the use of objects (reflective abstraction). Mathematical knowledge can develop only when students act toward that object.

In the study of mathematics as a network concept, the main difficulty experienced by students is to link one concept with another concept (Widdiharto, 2008: 6). Often the lesson plan designed by the teacher greatly influenced by supporting books that became the reference of teachers and students in the classroom, so that the learning process in the classroom is not optimal considering the existing conceptions in students.

Ruseffendi (2006: 328) argues that during the time in mathematics teaching and learning process in the classroom, in general, students learn math just told by his teacher, and not through exploration. Meanwhile, according to Rifa't (2001: 25) teaching and learning activities like these tends to make students learn to memorize and less grasp and understand the concept of mathematical truth. If a student is given a different matter with exercises, students confused finish, and do not know where it began to operate. Habits such students to learn concepts as rote without a deep understanding, and students are not able to apply it. Things like this make students less able to think critically and not trained to do the analysis before making a decision. Therefore, the learning of mathematics should be focused on the development of critical thinking, students are free to try their own solutions. This means avoiding the conventional teaching methods.

Through the provision of constructive problem in mathematics learning, students become accustomed to studying the mathematical concepts that are difficult and apply it to resolve the issue and mathematics critical mindset can provide color in the lives of students. The learning activities like these can also encourage the active participation of students to participate in the learning process and can interact optimally with teachers, other students, and with the material being studied mathematics. The interaction between the various components can be maximized through the use of models ILSC.

This study uses a model ILSC, requires active students and can help improve learning achievement and attitudes toward mathematics. The study was conducted on students MAN Model Gorontalo class X2 (experimental class)

and class X3 (control group) the school year 2014/2015, to see an increase in critical thinking skills mathematically, as well as to minimize the difficulties faced by students in learning

B. Formulation of the Problem

Issues that were examined in this study was formulated as follows:
Is the increase in mathematical critical thinking ability of students acquire model of learning by ILSC better than mathematical critical thinking ability students acquire mathematical conventional learning (CL)?

C. Research Purposes

In accordance with the formulation of research problems, the goal of this research is:
To examine comprehensively the enhamcement mathematical critical thinking ability students that mathematical learning with ILSC models and conventional learning (CL).

D. The advantage of Research

The result is expected to be useful for:

1. Teacher: for teachers, this study provide a correct understanding of a material on a particular topic, so that students can understand the material to develop mathematical critical thinking abilities of students through ILSC models.
2. Student: for students, this study provides a new experience and a lot for students to actively participate in the learning of mathematics in the classroom, so that in addition to developing mathematical critical thinking abilities students, it also makes the learning of mathematics more meaningful and useful.
3. Researchers: for researchers empirically can improve the ability of researching, developing learning models with mind mapping strategy as a theory which was introduced in mathematics education and valuable experience that can be considered to develop mathematical critical thinking ability students at various levels of education.

E. Review of Literature

1. Mathematical Critical Thinking Ability Students

Thinking can be assumed as a process of cognition in an attempt to gain knowledge. Thinking is the capability or ability that can be learned. Fisher (Launch Pad, 2001) describes that at least three important aspects of thinking skills, namely critical thinking, creative thinking, and problem solving. Three are inextricably berkomplementer but interrelated.

Critical thinking (critical thinking) is a synonym of decision-making (decision making), strategic planning (strategic planning), the scientific process (scientific process), and problem solving (problem solving). Critical thinking is a deepening awareness and intelligence comparing of several problems that are and will happen so as to produce a conclusion and the idea to solve the problem. everyone has a different mindset. However, if everyone is able to think critically, problem they face would be more simple and easy solution.

Critical thinking is a cognitive activity associated with the use of reason. Learn to think critically means using mental processes, such as attention, categorize, selection, and rate / disconnect. Critical thinking ability in giving proper guidance in thinking and working, and assist in determining linkages with other things more accurately. Therefore, critical thinking skills are needed in solving the problem / solution search, and project management.

According to Walker (2006), critical thinking is an intellectual process in conceptualizing, applying, analyzing, synthesizing, and or evaluate a variety of information obtained from observation, experience, reflection, where the results of this process is primarily used as the basis to take action. In addition Halpen (in Achmad, 2007) that critical thinking is to empower cognitive skills or strategies for goal setting. The process passed after specifying the destination, consider, and refer directly to the target-is a form of thinking that needs to be developed in order to solve the problem, drawing conclusions, collecting a variety of possibilities, and make a decision when to use all these skills effectively in the context and the appropriate type. Critical thinking is also an activity to evaluate, considering the conclusions to be drawn when determining several contributing factors to make a decision.

The same is stated by Mustaji (2012) that critical thinking is grounded and reflective thinking by emphasizing decision-making about what to believe or do. The following are examples of critical thinking skills, for example, (1) comparing and contrasting, (2) create a category, (2) identify small parts and the whole, (3) explain why, (4) create a sequence / order, (5) determine the source of the trust, and (6) to make a prediction. From the opinion of some experts concluded that kitis thinking is a process for evaluating, comparing various information to obtain a conclusion.

Critical thinking in learning mathematics is a process of cognitive or mental action in an attempt to gain knowledge of mathematics is based on mathematical reasoning. Mathematical reasoning (Sumarmo, 2005) covers draw logical conclusions; provide explanations using models, facts, attributes, and relationships; estimate

the answer and the solution process; use patterns and relationships to analyze mathematical situations; Interesting analogy and generalization; formulate and test conjectures; give the opponent an example (counter example); follow atu ran inference; check the validity of the argument; construct a valid argument; arrange direct evidence, indirect evidence and using mathematical induction.

Critical thinking ability can be trained when that ability is applied in situations in classroom discussions that discuss certain mathematical concepts. In the discussion between students argue rationally. If in the process of learning a teacher always tries to train students to critically think, the out-put of learning to produce students better critical thinking.

Bullen (1997) identified four phases of critical thinking, namely: (1) Clarification (clarification), which assess / understand the nature on the points different views on issues, dilemmas, or problems. (2) Assessing evidence (assessing the facts), which decided the credibility of the source, assess the evidence to support a conclusion; establishes the basic conclusions. (3) Making and judging inference (make and draw conclusions), which is suspected inductively and deductively, and rate decisions; decisions with consideration of sufficient evidence to support the argument, and (4) Using Appropriate strategies and tactics (using strategies and methods appropriate), using heuristics or strategies to direct the mind in the process of achievement of conclusion, to make a decision, or solution a problem effectively.

The garrison, Anderson, and Archer (2001) divides the four phases of critical thinking, namely: (1) Trigger event (responsive to events), namely to identify or recognize an issue, a problem, a dilemma of one's experience, spoken instructor or other students , (2) exporation (exploration), thought of the idea of personal and social in order to make preparation for the decision, (3) integration (integration), which is constructing the intent / meaning of the idea, and integrate relevant information that has been set in the previous stage, and (4) Resolution (repeating settlement), which proposed a hypothetical solution, or applying the solution directly to the issues, dilemmas, or problems and test ideas and hypotheses.

Fisher emphasis on indicators of critical thinking skills that are important include: (1) Telling the truth is a question / statement; (2) to analyze the question / statement; (3) Thinking logically; (4) Sorts, for example, temporally, logically, is causation ; (5) Classification, eg, ideas, objects; (6) determine, for example, whether sufficient evidence; (7) Predict (including confirming the prediction); (8) theorizing; (9) Understanding others and himself.

Based on the description that has been said so, critical thinking ability that are used in this study is made up of five phases, namely the trigger event (Trigger events), exploration (Eksporation), draw conclusions, clarification, and resolution. Trigger events, namely the ability to identify the completeness of the premise of a statement, the concepts needed to prove a statement. Exploration, namely the ability to construct meaning / significance, investigate mathematical ideas. Drawing conclusions that the ability to make and decided mathematical ideas inductively or deductively. Clarification: the ability to evaluate and explain, define the context of mathematical ideas. Resolution, ie the ability to propose / repair measures mathematical proof of a statement.

2. Interactive Learning Model with Setting Cooperative

According to Holmes (Ratumanan, 2002) model of interactive learning activities puts pressure on students to construct knowledge in problem solving. Besides the interactive learning is based on two things: (a) developing an understanding as a process of construction of information and ideas mentally; (B) is very important to stimulate problem solving knowledge.

Interactive learning allows teachers and students to think interplay respectively. Teachers create a task that provoke thought students to construct the concepts learned and build rule maalah solving strategies. In interactive learning, social interaction among students and teachers to get attention. Learning in cooperative settings provide benefits for students, namely: (a) the students can help each other in learning activities; (B) can serve as a clever student tutor group's success; and (c) the continuous and regular interaction between students and groups has always can improve their understanding of the group members teaching materials, as well as improving students' communication, (Slavin in Ratumanan, 2003).

In the interactive learning model cooperative settings (SSIPs), students can understand the material given by the teacher and students are able to interact in performing learning or problem-solving activities in their respective groups. In the model SSIPs teachers to work in order to facilitate student interaction with students in teaching and learning activities can take place properly.

Principles that are supported in the model SSIPs namely: (a) cooperation; (B) freedom of expression; (C) responsibility to yourself and groups; and (d) equality.

3. Syntax Models ILSC

Phase	Activities Teachers and Students
1. Introduction	a. Teachers organize the classes to learn b. Students taking place in their respective groups c. Teachers convey ranking group d. Teachers provide instructional materials e. Teachers convey to students about what they would do: solve the problem, do activities, to continue studying a topic or task.
2. Activity or Solution to problem	a. Teachers remind students on the material preconditions relating to the material the students will learn b. Perform activities determined by the teacher
3. Presentation and discussion	a. Reported the results of the group's activities b. Teachers lead discussions and provide the opportunity for other groups to give their opinions and respond to it. c. The question that the teacher allows students to think critically and connect the model to the relevant symbolic representation.
4. Cover	a. Re-examine what students do and learn b. make summaries
5. Assesment	Assessment is done before and after learning

F. Research Hypothesis

Of problems are formulated, the hypothesis proposed in this study as follows:
Of the problems are formulated, the hypothesis proposed in this study as follows: the enhancement mathematical critical thinking ability students model ILSC better than mathematical critical thinking ability students conventional learning (CL).

G. Design and Research Instruments

This study is a quasi-experimental research. According Ruseffendi (2010) that, quasi-experimental research subjects are not grouped randomly, but researchers receive state sober subject. Design research is pretest-posttest design or the pretest posttest control group design (Tuckman, 1978; Ruseffendi, 2005). Experimental design that authors use in classifying the subject of research, treatment and retrieval of data for each school rankings.
Experimental Design Comparison group pretest-postest

O	X	O
O		O

Whith :
O: Measurement tests of mathematical reasoning skills students (pretest and posttest)
X: Treatment Learning through Models ILSC
Each class is given a pretest and posttest research to measure mathematical critical thinking ability students and see the impact of learning on mathematical critical thinking ability of students'. The research instrument consists of a set of test to measure mathematical critical thinking ability students. Then performed a descriptive analysis of data obtained by calculating the average, and the percentage of each indicator so dperoleh overview.

H. Population and Sample

The population in this study were all students of class X Aliyah Madrasas Model Gorontalo 2014/2015 school year in the city of Gorontalo. Two classes were used in the study of class X_2 as an experimental class (learning with models ILSC has 34 students, and class X_3 has 34 students as the class of the control (conventional learning) at Aliyah Madrasas Model Gorontalo.

I. Results and Discussion

Mathematical Critical Thinking Ability (MCTA)
Mathematical Critical Thinking Ability Data
Picture quality of student teaching is done through the calculation of mean and standard deviation. While the increase MCTA students can be seen in Table 1 below.

Table 1.
Mean Increased MCTA Students

Mathematical Critical Thinking Ability											
class experiment	N	$\bar{x}$ & SD	ILSC			control class	N	$\bar{x}$ & SD	CL		
			Pre	Post	<g>				Pre	Post	<g>
	34	$\bar{x}$	9,45	26,35	0,48		34	$\bar{x}$	7,90	24,42	0,42
		SD	2,80	3,38	0,01			SD	0,98	3,33	0,09

Ideal MCTA Maximum Score = 50

Overall, students who obtain teaching model has a mean pretest MCTA with ILSC Models by 9.45 higher than the average pretest MCTA students who obtain the CL of 7.90, and the mean posttest MCTA students acquire learning by ILSC Models at 26.35, higher than the average post-test students who received CL at 23.42. Likewise, average <g> MCTA students acquire learning by ILSC Models of 048 is higher than the average <g> MCTA students who obtain the CL of 0.42. Based on the criteria of Hake (1999), an increase in the medium category.

MCTA students picture quality indicators mean and percentage calculations can be seen in Table 2 below. Mathematical Critical Thinking Ability (MCTA) measured by the instrument used in the research include aspects: (1) trigger event (Trigger events); (2) exploration; (3) draw conclusions; (4) for clarification; and (5) resolution.

There are 5 test items description form used to express the students' work to see the ability of student learning outcomes to the fifth aspect of the above. Problem number 1 to see the performance of students in the aspect 1, Question 2 look at the performance of students on aspects 2, Question 3 looking at the performance of students on aspects of all three, question number 4 to see the performance of students on aspects of all four, and Question 5 see the student's performance on aspects of 5. Here is presented the average and the percentage of students' work on the five aspects.

Table 2
Recapitulation Average Percentase Data
Mathematically Critical Thinking Ability Students

Classes	Mean and Persentace Mathematical Critical Thinking Ability Studnts				
	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
	1	2	3	4	5
Experiment.	0,78	2,45	2,03	2,51	0,89
	78,46 %	**61,15 %**	**50,77 %**	**62,69 %**	**89,00 %**
Control	2,40	3,57	3,69	1,58	0,80
	60,00 %	**44,62 %**	**46,15 %**	**52,82 %**	**80,00 %**

Of the five items critical thinking skills mathematically, the lowest percentage in the experimental class and control class, located on Question 3 (in table above). Question 3 concerns the second aspect. Question 3 contains a highly varied tasks for students. Due to the first, students are required to be able to explore their ideas for solving mathematical problems mathematically. Second, the fact that students are required to be able to formulate a link between the fact that the one with the other facts in the relevant mathematical models and can be completed to obtain the appropriate conclusions. The maximum score for question number 3, from the work of students in the experimental class, earned the lowest score is 3 and the highest is 7, while the control class, the results of student work to Question 3 lowest score is 1 and the highest is 5. The maximum score for question 3 is 1. in question number 2 gains the lowest score at a grade ekspermen which is 6, while the control class, to question number 2 is the lowest score 2. From the results of student performance against both about the ability of critical thinking mathematically it can be concluded that the ability to think critically mathematical students in the second and third aspects to question 3 and are in the lower category, while to question 2 is in a class lower categories of control.

The mean increase in critical thinking skills of students in a class of mathematical experiments with the model SSIPs dijarkan is 0.40 while the average increase in critical thinking skills in students' mathematical control class is taught by conventional teaching is 0.28. From the results of students' work on Question 3, students have not been able to explore their ideas well to formulate conclusions dimita in solving problems .. This is reinforced by the results of interviews with students that the cause is the student less careful and still difficult to determine the

conclusions and students still wrong in scrutinizing the statement given to the settlement to be one. From the above description it is said that the increase in critical thinking skills of students in the experimental class mathematically better when compared to students in control class. This is because the learning provided in either the experimental class and the control class is different. This increase is not to say that the students in the experimental class mastered the five aspects of the mathematical critical thinking ability students.

In the experimental group there are the test results are not optimal due to a difficult test questions. After the test, there are some students who recognize that the test questions on the research more difficult than the questions that are usually provided by the teacher in the learning prior to the study. The big difference in students' critical thinking skills mathematical possibility because most students try to solve problems with the critical thinking test different ways of thinking that is using its own experiences. In addition there is the impression that students are afraid to work on the problems outside the way they have been taught teachers. As a result, the way of thinking has changed in test-taking led to the students' answers are less precise. The above findings when linked with constructivism theory that students must actively construct their own knowledge by answering questions raised and students can explore new ideas or different ways to find the concept and break it.

ILSC on learning models, learning begins with cooperation in studying an Matei. Mathematically critical thinking skills needed at this stage is giving students freedom to express opinions on the material to be studied and responsible to self and group. Mathematical Critical thinking ability at this stage students are expected to present ideas clearly has in mind, and is responsible for the group, if there are different opinions with other friends causing cognitive conflict within him, there is dissatisfaction with the ideas and encourage students to make a change.

This indicates that if the learning model is applied consistently ILSC can be an integral part of the curriculum then it is possible the five components / aspects of students' critical thinking skills can be improved mathematically optimal. This is an advantage of learning with models ILSC in improving Mathematical critical thinking ability, and data in this study generally support the theory.

J.Conclusion

Based on the research that has been presented obtained the following conclusions.

1. Improving the mathematical critical thinking ability students of learning by ILSC model better than students who received conventional learning. Overall improvement of mathematical critical thinking ability students by ILSC model medium category.
2. Learning with ILSC models can be used to enhance students' mathematical critical thinking ability.

K. Bibliography

1. Bullen, M. (1997). *A Case Study of Participation and Critical Thinking in a University Level Course Delivered by Computer Conferencing.* Tersedia: http://www2.cstudies.ubc.ca/~bullen/Diss/thesis.doc
2. Garrison. D. R., Anderson, T. & Archer, W. (2001). *Critical Thinking and Computer Conferencing: A Model and Tool to Assess Cognitive Presence*. Tersedia: http://communitiesofinquiry.com/documents/ CogPres_Final.pdf
3. Launch Pad. (2001) *Thinking Skill*. Westminster Institute of Education. Oxford Brookes University.
4. Mustaji (2012). Development of Critical Thinking and Creative Ability in Learning. Available online: http://pasca.tp.ac.id/site/pengembangan-kemampuan-berpikir-kritis-dan-kreatif-dalam-pembelajaran accessed on 22-9-2014.
5. Ruseffendi, E.T. (2010). Introduction to Helping Teachers Develop Competence in Teaching Math To Improve CBSA. Bandung. Tarsito.
6. Sumarmo, U, (2005). Development of High-Level Thinking Mathematics junior and high school students as well as the Student Tier One (S1) Through Different Learning Approach. Graduate Grant Research Reports Third Year. UPI Bandung.
7. Ratumanan, T.G. (2002). The introduction of the Interactive Learning Model Cooperative Setting (Model SSIPs). Mathematics Education Bulletin No. 1. Vol. 4. Mathematics Education FKIP Unpatti.
8. 8. ----------. (2003). Development of Interactive Learning Model with Cooperative Setting (Model SSIPs) And Its Influence On Results Math Students secondary school in the city of Ambon. Dissertation.
9. Widdiarto, R. (2008). Models of Learning Mathematics SMP. [On line]. Available: http: //p4matematika.org/downloads [February 25, 2015].