

Development of Critical Thinking Ability Through Sets Based Learning Approach: An Action Research on Grade XI IPA 1 SMAN 5 Dumai

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ABSTRACT

The Development of students' critical thinking ability is crucial because based on the survey released by PISA (2018) found that the quality of Indonesian students' critical thinking are in rank of 72 of 78 countries. One of the learning approaches to develop the critical thinking is through Science, Environment, Technology, and Society (SETS). This study was conducted in SMAN 5 Dumai, Riau in three cycles by using an action research consists of four phases: Plan, Action, Observation, and Reflection. While based on the students' test result of Cycles 3, found that the scores of students' critical thinking ability grade XI IPA 1 were 94 in which the lowest score was 76, the highest score was 100, and the level of learning success was 100 %.

Keywords: Critical thinking, SETS learning approach, Science, Environment, Technology and Society.

INTRODUCTION

The purpose of education in Indonesia is in line with the 21st Century learning Framework, namely to develop the potential of students to become human beings who have faith and be devoted to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens who are democratic and responsible (Law No. 20 of 2003 article 3). The purpose of this education is strengthened by the high school SKL, namely having factual, conceptual, procedural, and metacognitive knowledge at the technical, specific, detailed, and complex level with regard to: (1) science, (2) technology, (3) art, (4) culture, and (5) humanities. Able to link the above knowledge in the context of themselves, family, school, community and environment, nation, state, and regional and international regions (Permendikbud No. 20, 2016).

Educational objectives as mandated by Law No.20 of 2003 and Minister of Education and Culture Regulation No. 20 of 2016 have not been achieved, this is proven based on a survey of the PISA (Program for International Student Assessment) survey initiated by the OECD (Organization for Economic Cooperation and Development) in 2018 for critical thinking ranked 72 out of 78 countries and for literacy capabilities are in rank 72 out of 77 and for science is ranked 70 out of 78 countries (OECD, 2019). And if we look at the results of the 2018 PISA survey, critical thinking ability is closely related to the literacy ability of students or to produce students who have scientific knowledge (scientific), it is very necessary to have reading habits, and if reading ability increases, the critical thinking ability of students also increases (Abdulkarim, Ratmaningsih, & Anggraini, 2018, Ministry of Education and Culture, 2016).

Civics teachers as the agents of change at school should apply a learning approach to develop students' critical thinking skills and creative thinking skills (Sapriya, 2019, Suarniati et al., 2019). A teacher must think about how to apply a learning approach that can develop students' critical thinking skills from those who do not know to know, those who do not understand to understand and from those who do not active become active (Volman & Dam, 2015).

If we look carefully at the demands of 21st century learning, teachers must have the knowledge and ability (competence) to develop an active learning approach to encourage students to think critically, try to express opinions, communicate and collaborate. (Chang, Li, Chen, & Chiu, 2015, Wahab & Sapriya, 2011). The aim of the application is to improve students' critical thinking skills through literacy movements must continue to be encouraged because critical thinking can encourage the emergence of students' creative ideas (Sapriya, 2019, McDougall, 2019). The learning model developed must be able to balance literacy between online and online learning in learning. It also aims to literate teachers with technology and information, which can be combined in a learning model (Agustin, 2011). The learning model aims to stimulate the development of science, technology, economics, social and politics (Rosyada, 2007). This development must be examined by systematic methods to obtain accurate knowledge or information (Drew, Hardman, & Hosp, 2017).

Realizing the problem of education in Indonesia today, it is found that students' weakness of literacy results in the weakness of students' critical thinking patterns since reading is very important in order to improve critical thinking skills (Lu & Xie, 2019). By realizing the two big problems that occur nationally, SMAN 5 Dumai also experiences that problems (Saputra, 2015). Based on the results of observations and interviews with colleagues it was found that the students of SMAN 5 Dumai still lack of literacy/reading which makes the students less ability of thinking critically which was seen while doing the learning process especially when conducting discussions, the students were not active to ask questions in discussions, less ability of expressing opinions, less ability of responding to friends' questions, less ability of concluding the results of discussions, and not using sources in speaking. Based on this problem, researchers want to develop students' critical thinking skills by applying the SETS learning approach to achieve the educational goals.

The purpose of education is to enhance critical thinking skills in the field of developing knowledge, skills and attitudes through literacy activities (Sapriya, 2019, Lu & Xie, 2019). The characteristics of students who have critical thinking competency according to Thonney & Montgomery (2019), namely: (1) evaluating evidence (evaluating evidence), (2) Analyzing and evaluating arguments (analyzing and evaluating arguments); (3) understanding the consequences and their application (Understanding implications and consequences), (4) being able to express opinions (Producing original arguments), and (5) understanding the consequences of talks (understanding causation) To produce students who are able to compete in the 21st century, there should be some new breakthroughs made by teachers in improving the quality of education so that students are confident and able to compete with other citizens globally (Kadir, 2018, Kleinig, 2018).

By looking at the 21st century challenges where high school graduates need to improve their competence to be able to compete nationally and internationally among multicultural society but still interconnected each other (team work). Therefore, students should get a new innovation learning model that can improve students'

competencies (Komalasari, 2017). One of the innovation that can improve the students' critical thinking is by applying the SETS learning approach (Science, Environment, Technology, Society). The problem in the world of education at this time is not all teachers in every learning use approaches in the learning process and there are still many teachers who use traditional models such as lecturing and doctrinizing in learning, and these do not improve students' critical thinking (Indri, 2019).

A. Think critically

Etymologically critical thinking comes from the English language from the word critical and critical from the word kritein which means to assess the value of something, or it can also be interpreted by the actions of someone who considers, respects and assesses the value of something with appropriate norms and standards in terms of purpose, problem questions in question, assumptions, concepts, empirical grounds, reasoning that leads to conclusions, implications and consequences (Johnson in Sapriya, 2019, Canziani & Tullar, 2017). Critical thinking in Civics education uses the ability to think to analyze various problems (questions) in the learning process so that students are able to provide interpretive arguments in making decisions or conclusions (Komalasari, 2017).

Critical thinking skills can be trained through the application of varied learning approaches (Gultom & Adam, 2018), Yunita et al., 2018). Therefore, critical thinking in learning citizenship education is absolutely essential to the law taught (Lau, 2019, Noula, 2018, Enciso et al., 2017). In addition, students who think critically in learning will create creative students (Pantaleo, 2017). How to develop critical thinking skills in learning can be done by giving questions and students answer the questions with concepts using resources (Komalasari, 2017).

Thinking skills here are not negative means to critically criticize a person's argumentation, but relate to the quality of thought or argument presented to support an idea or argument (Rear, 2019, Fisher, 2009). Thinking skills according to Krulik & Rudnick in Fatmawati et al. (2014) are divided into: (1) memorization (recall thinking), (2) basic (basic thinking), (3) critical (critical thinking) and, (4) creative (creative thinking). According to Halpern in Self & Self (2017) defines critical thinking as more than just analyzing results but evaluating thinking processes, according to Facione in Self & Self (2017) argues that critical thinking depends on one's tendencies and reflection on goals. According to Niu in Self & Self (2017) suggested that critical thinking requires individuals to engage in teaching reflection. According to McLaren in Setiarsih (2017) it can be understood as a dialectical process that supports the process of dialogue between students and teachers. According to Costa in Fisher (2009) thinking skills can be divided into basic skills which include qualifications, variable relationships, transformations, and causal relationships while higher order thinking skills are complex thinking skills involving problem solving, decision making, critical thinking and creative thinking.

According to Resnick in Thompson in Fatmawati et al. (2014) primary level thinking (lower Critical thinking can be interpreted as an active and conscientious consideration persistently (continually) from the point of view of supporters and advanced conclusions of the science of knowledge about a belief or form of knowledge that is taken for granted from the standpoint of the reasons that support it and the conclusions that follow. The tendency (Rear, 2019, Sakban, 2015, Dewey in Fisher, 2009), Active can be interpreted as not simply accepting or trusting ideas and information from others, but a process whereby thinking deeper, asking questions and finding

information that other relevant (Kleinig, 2018, Fisher, 2009). According to Edward Gleser in Fisher (2009) critical thinking is: (1) an attitude of wanting to think deeply, (2) the skill to apply logical examination and reasoning methods, (3) examining each belief based on supporting evidence.

Critical thinking is reasonable and reflective thinking that focuses on achieving goals and behaving rationally with five elements of critical thinking: (1) practical, (2) reflective, (3) rational, (4) reliable, (5) in the form of action. Research on critical thinking, researchers mostly develop indicators used by Ennis, the following are indicators of critical thinking according to Ennis (Meneses, 2019, Komalasari, 2017, Ennis, 1990). The critical thinking skill according to Liu et al., (2018) is as follows: (1) written communication, (2) the amount of literacy material (quantitative literacy), (4) civic competency and engagement (civic competency & engagement) and, (5) cultural competence and intercultural competency & diversity.

Critical thinking skills according to Edward Gleser in Fisher (2009) are as follows (1) recognize the problem, (2) find the right way to handle the problem, (3) collect and compile the necessary information, (4) recognize the assumptions and values values that are not stated, (5) understand and use appropriate and clear language, (6) analyze data, (7) assess facts and evaluate statements, (8) recognize the logical relationship between problems, (9) draw conclusions or similarity, (10) testing conclusions or similarities, (11) rearranging patterns of belief based on learning experiences, (12) making judgments based on daily life.

Thonney & Montgomery (2019) provides five critical thinking competencies, namely: (1) evaluating evidence, (2) Analyzing and evaluating arguments (analyzing and evaluating arguments); (3) understanding the consequences and their application (Understanding implications and consequences), (4) being able to express opinions (Producing original arguments), and (5) understanding the consequences of talks (understanding causation).

According to the Delphi Study in Ampuero et al., (2015), there are six critical thinking competencies, namely: (1) self regulation, namely the ability to see with logic, (2) interpretation, namely the ability to predict, (3) analysis which is the ability to analyze arguments, (4)) evaluation is the ability to judge arguments, (5) inference is the ability to decide can be trusted and done, (6) explanation is the ability to explain. The steps of the critical thinking analysis model according to Dunn and Dunn in Sapriya (2019) are as follows: (1) initial focus, the teacher encourages students to think about how best to solve the problem, (2) the teacher gives a statement (why or how), (3) after one of the students answers the question, the teacher asks other students to motivate other students to think of overcoming the problem, (4) the teacher confirms the problem encountered in answering the questions, (5) the teacher asks students to draw conclusions steps to solve problems.

Indicators used to develop critical thinking skills in this study in class XI IPA 1 of SMAN 5 Dumai are as follows (O'Halloran et al., 2017, Ennis, 1990): 1. The ability to ask, 2. The ability to answer, 3. The ability to explain, 4. The ability to conclude, 5. Speaking based on facts, 6. The ability to provide solutions, 7. Using the source in speaking. 8. Listening to other people talk, 9. Appreciating the opinions of others, 10. Communicating with courtesy, 11. Accepting the truth.

B. SETS approach to Civics learning to develop critical thinking

The definition of the SETS approach (Science, Environment, Technology, Society) according to the NSTA Position Statement 1990 is a learning that focuses on problems from the real world that have a science and technology component from the perspective of students, in which there are concepts and processes, then students are invited to investigate, analyze, and apply the concepts, and processes in real situations in the learning process in the classroom (Widiantini et al., 2017), (Khasanah, 2015). The SETS pursuit approach in Indonesian is often referred to as the Salingtemas approach (science, environment, technology, and society). The SETS approach is an approach in learning that links science, technology, the environment and the surrounding community aimed at helping students to be able to apply daily life and be real (facilitation.bpmtv.kemdikbud, 2017, (Nugraheni, Mulyani, & Dwi Ariani, 2013)

The concept of the SETS (Science Environment Technology and Society) learning approach is interpreted as science, environment, technology, and society, constituting a unified implementation so that students have the ability to think at a higher level (higher order thinking), beginning with simple concepts contained in the environment around students' daily lives or complicated scientific and non-scientific concepts (Khasanah, 2015, (Nugraheni et al., 2013).

(1) Science approach

Broadly speaking, science is divided into two, namely natural science and social science, social science discusses human relations as social beings (Toharudin, Hendrawati, & Rustaman, 2011). The characteristics of the SETS learning approach according to Yager in Khasanah (2015) are as follows: (a) begins with the identification of local problems (b) the use of local resources (c) active student participation in finding information that can be applied to solve problems in daily life (d) emphasis on process skills that students can use in problem solving (e) there are opportunities for students to gain experience in solving problems that have been identified.

The stages of the SETS learning approach according to the National Science Teacher operational in (Khasanah, 2015) are as follows: (a) Initiation stage, At this stage the teacher presents actual issues / problems developing in the surrounding community that can be understood by students and can stimulate students to overcome it. The teacher can also explore the opinions of students who are related to the material to be discussed. (b) The exploration stage, namely: students through their own actions and reactions trying to understand or learn the problem given. (c) Solution stage: students analyze and discuss ways of solving problems. (d) Application stage: i.e. Students are given the opportunity to use the concepts they have obtained. In this case students take concrete action in overcoming problems that arise in the invitation stage. (e) Concept strengthening stage: The teacher provides feedback / reinforcement of concepts obtained by students. Thus the SETS approach can help students in knowing science, the technology it uses and the development of science and technology can affect the environment and society.

The learning characteristics of the SETS approach in the 2013 curriculum are: (a) learning the SETS concept is still given, (b) students are brought to the situation to see technology (c) students are asked to explain the interrelationships between the elements of science discussed with other elements in SETS that affect various linkages (d) students are brought to consider the benefits or disadvantages of using science concepts in the form of technology (e). Students are invited to look for alternatives to the losses (if any) caused by the application of science to this form of technology to the environment and society (f). in the context of constructivism, students are invited to talk about SETS in relation to the concepts of science being taught, from various directions

and various points. Scientific Indicators in this study are in accordance with indicators from the government about scientific learning, namely by the steps of learning begins to enrich, try (collect data), associate, and communicate (Khasanah, 2015).

(2) Environment approach

The environmental learning approach is an inevitable necessity if we want to realize civil society as envisioned in Civics learning (Hamzah in Al-Anwari, 2014). Socialization about awareness, care, understanding and environmental preservation must be given to students in schools, this can be done through learning activities (Budimansyah, Sundawa, & Fitriasisari, 2016).

The Ministry of Environment in 2006 developed an environmental education program at the level of primary and secondary education through the Adiwiyata program. The Adiwiyata Program is one of the programs of the State Ministry of the Environment in order to encourage the creation of knowledge and awareness of school residents so that it becomes an environmentally responsible character in environmental conservation efforts. Therefore, the learning process in schools must direct children to love their environment (Ampuero, Miranda, Delgado, Goyen, & Weaver, 2015)

Caring for the environment is an attitude and action that always seeks to prevent damage to the surrounding natural environment and develop efforts to improve. The indicators of environmental care are as follows: throwing trash in its place, cleaning the school yard, not picking flowers in the school garden, keeping the house clean, cleaning the trash, cleaning the school environment, beautifying classrooms and schools with plants, helping to maintain the garden in the school yard (Ministry National Education, 2011).

(3) Technology approach

The use of technology (educational technology) in education can be interpreted as the application of technology to facilitate the educational process implemented because technology can disseminate information widely, evenly, quickly, uniformly and integratedly (Japar, Fadhillah, & Syarifa, 2019), Agustin, 2011). The use of technology in the learning process can help teachers to provide teaching materials logically, scientifically and systematically in realizing an effective, efficient and productive learning process in accordance with the learning competency standards to be achieved (Agustin, 2011).

The advantages of using technology in learning systems according to Niemi and Gooler in

A technological learning approach (e-learning) can improve students' learning abilities and interests (Alsalhi, Eltahir, & Al-qatawneh, 2019). E-learning based learning and electronic learning networks or e-learning began in the 1970s Waller and Wilson in Purba (2019) who globally the concept of computer and network based learning is often interpreted as e-learning that serves the teaching and learning process and evaluation of learning with a computer-based, even in the 4.0 industrial revolution is more use of Android with the aim to expand access to public education at large, as well as in order to improve the quality of learning.

The benefits of using e-learning are as follows: (1) expanding teacher's background knowledge, (2) dynamic and flexible learning, (3) overcoming the limitations of teaching materials, (4) the contribution and enrichment of teaching materials, (4) implementation CBSA (way of active student learning) (Darmawan, 2014). One approach to technology-based learning is an evaluation medium for learning based on e-learning by using quizizz. Quizizz learning evaluation media also provide data and statistics on student performance, and can even download these statistics in the form of Excel

spreadsheets so that teachers can see the progress of student learning outcomes (Purba, 2019).

Quizizz is a game-based educational application, which brings multi-player activities to the classroom and makes it in an interactive and fun practice class (Purba, 2019). By using Quizizz, students can do exercises in the classroom using a laptop or Android phone. Quizizz has game characteristics such as avatars, themes, memes, and entertaining music in the learning process. Quizizz also allows students to compete with each other and motivate them to learn. Students work on quizzes at the same time in class, at home or at any place and see grades immediately, the teacher can view and download reports when the quiz is completed by students to evaluate student performance (Amornchewin, 2018). Using this application helps students to increase literacy interest because before answering questions from Quizizz participants are encouraged to read so that the quiz results are good.

4. Society's approach

School is an official institution in providing education to students and cannot be separated from the culture of the community. The community learning approach is a form of teaching that combines school and community, by bringing schools into the community, and or bringing communities into schools to achieve learning goals. Understanding community-based learning approaches as follows: (1) learning is carried out by teachers by focusing on the ability of students to recognize and support community needs, (2) Community-based learning is prioritized to foster student competence to support the needs of the community in their neighborhood (Tilaar in Masudah, 2015).

The core approaches to community-based learning: (a) Learning is intended to improve the quality of individual students, in terms of skills, attitudes, and conceptual abilities; (b) The community is actively involved in the education and learning process according to the personal and social needs of the community. The improvement of Malay cultural values that can improve students' critical thinking is the use of rhymes when students will ask or answer questions when having discussion (Masudah, 2015).

RESEARCH METHOD

The design of this study uses classroom action research using qualitative data collection. Classroom action research is dealing with a specific practical problem and trying to solve the problem of learning or it can also be said as a systematic procedure carried out by the teacher (or other researchers in the realm of education) to collect information and afterwards improve the learning and teaching outcomes in the classroom (Creswell, 2015). Action research according to Mills in Mertler (2011) is a systematic research carried out by teachers, education providers, counseling teachers/educational advisors or who pay attention to the teaching and learning process with the aim of gathering information about how school works, how to teach teachers and how students learn. Action research design used in this study is the Kemmis and MC design. Taggart in Rahman (2018) which consists of 4 stages, namely (1) Plan, (2) Action, (3) Observation, (4) Reflection.

The first data collection technique is observation. Observation data collection technique according to Muchtar (2015) is an activity to collect data in a research location based on data collection tools that have been prepared based on the research design. In order to avoid criticism of the results of action research where teachers can report research results beyond the view of others regarding events that occur in their class,

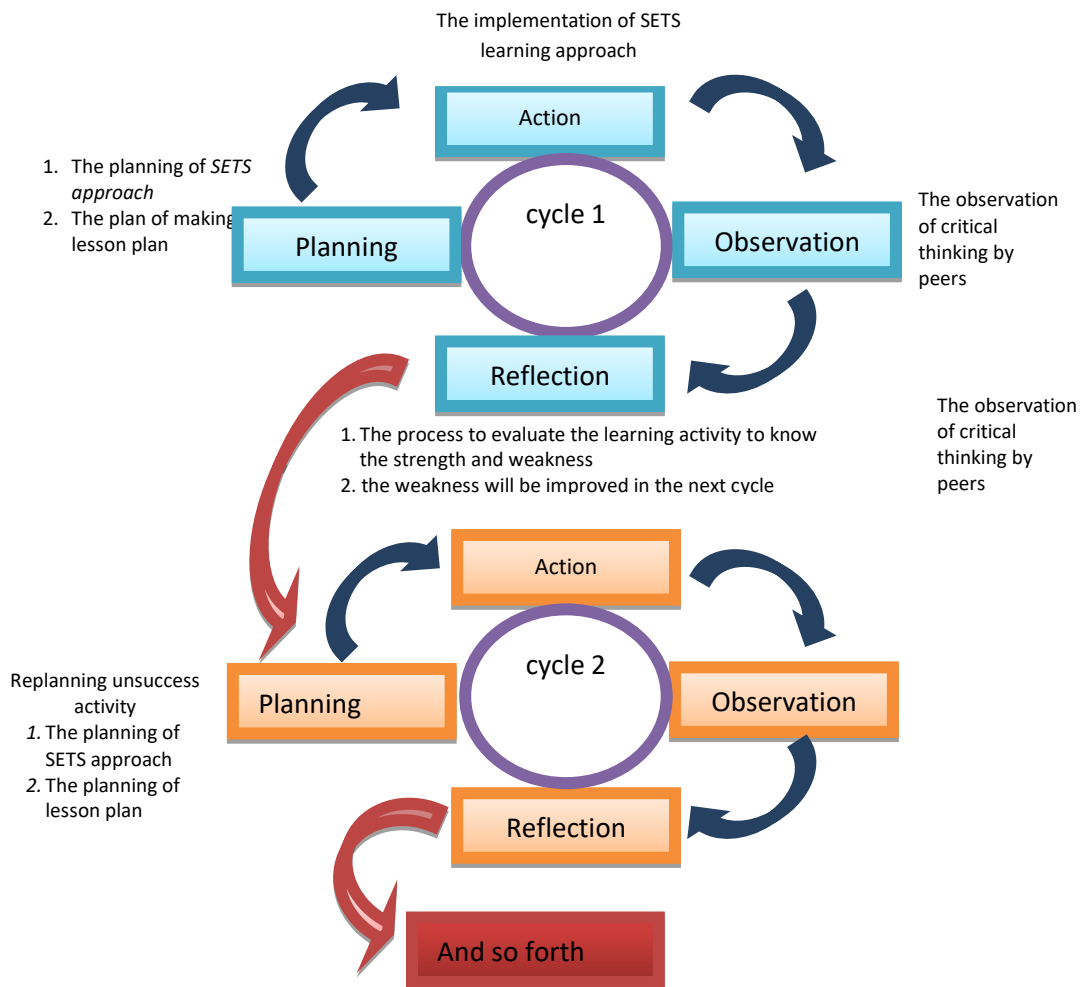
the action research must present a colleague observer to see the learning events that are taking place then record them (Denzin & Lincoln, 2009).

The second data collection technique that is used is Field Notes. Field notes are used to record previously unpredictable things that appear in the learning process (Dewi, 2017). In this study, the observation research instrument will provide a place of advice from observers of peers, this column serves to record suggestions in the observator to be corrected in the next cycle.

The third data collection technique is Test. Tools to evaluate the learning process outline can be distinguished, namely test; a series of questions or exercises to measure students' knowledge in the form of description and objectives (Arikunto, 2018). The test is a technique or method used in order to carry out measurement activities, in which there are various questions, or a series of tasks that must be done or answered by students. This test is an instrument given to students to measure critical thinking skills. The test was used to measure students' learning outcomes. This study provided 10 essay questions that could measure the development of students' critical thinking skills in civic learning.

Data Analysis Techniques. Classroom action research is a complex social situation, therefore it is necessary to reduce the theories that are applicable in analyzing data from classroom action research (Hopkins, 2011). The technique of analyzing data on classroom action research is carried out by: 1. Collecting data. Researchers or teachers gather information about the implementation of learning that has been carried out. After collecting data the researcher makes hypotheses to explain the events in the class starting from the beginning to the last stage (Hopkins, 2011). 2. Validate. To validate the hypotheses of classroom action research it is better to do by triangulation. Triangulasi can involve three different points of view, namely the viewpoints of teachers, students and observers (peers) (Hopkins, 2011). 3. Interpretation. Interpretation is to use valid hypotheses and adjust to the underlying reference frameworks (Hopkins, 2011). 4. Actions. After interpreting the research data, the teacher makes plans for further action based on evidence / evidence collected during the study (Hopkins, 2011).

Picture: The research steps were developed based on Kemmis and McTaggard model



Source: Private document

RESULTS AND DISCUSSIONS

The action research study was conducted after the researcher had a discussion with a supervisor and a colleague at the MGMP in Dumai to make the research plan. This is in accordance with the steps of Kemmis and MC's action research. Taggart consists of 4 stages, namely (1) Planning, (2) Action, (3) Observation, (4) Reflection. The research was conducted at SMA Negeri 5 Dumai from 03 February 2020 to 09 March 2020. This research was conducted in 3 cycles, one cycle consisting of 2 meetings and one meeting consisting of two 45 minutes.

(a) Planning

The preparation of the plan in the second cycle is the result of discussions with observing with peers, school principals and peers in Civic Education teachers' MGMP Dumai. The result of the discussion was the preparation of lesson plans, strengthening SETS learning in developing each indicator of critical thinking.

(b) Actions

The implementation of the learning plan program, in this implementation the researcher was assisted by colleagues to observe by taking notes, taking photos or videotaping the learning process.

(c) Observation

The observation process was carried out by 2 peers during this learning process. Success criteria for applying the SETS approach are as follows: (A) Very Good, (B) Good, (C) Enough and, (D) Poor. Based on the observations from peers for the application of the SETS learning approach to each indicator are as follows:

- (1) Science (scientific) approach, is A, the teacher has given a scientific (scientific) approach to students so that the students showed the ability to observe, to empower, to gather information, to associate, and to inform learning outcomes. This ability is seen starting from the beginning of learning through stimulus provided by the teacher, when discussing and until the end of learning.
- (2) Environment (environment) approach, is A, The teacher had implemented an environmental approach to increase the students' stimulus for critical thinking, so students were interested in critical thinking. The students had paid attention to the classroom environment inside and outside the classroom before, during the learning process and after the learning process.
- (3) Technology (technology) approach, is A, the Teacher had provided technology-based education such as the use of android phones in finding resources, using Quizizz in giving questions, using WA in discussing learning. In addition, students showed enthusiasm in using the internet to find factual information, in the learning process and after the learning process through taking the Quizizz assignments at home.
- (4) Society (society) approach, is A, the teacher had provided social-based education cultural Malay prose in the learning process, because the students had shown interest in making Malay prose related to the material of international relations in Civics learning. Students are more active to think critically to create Malay prose that are used as the opening speech when asking questions and answering questions.

The success criteria for developing students' critical thinking skills are: (A) Very Good, (B) Good, (C) Enough and, (D) Lack. In addition, after observing by two peers, the results are found as follows:

- (1) The ability to ask questions, is A, the students were able to ask critically related to the topics discussed in the discussion. Students were very capable of analyzing the stimulus images provided by the teacher so that students were able to ask questions well according to the topics discussed.
- (2) The ability to answer, is A, because the students were able to provide answers based on facts well and answer questions correctly.
- (3) The ability to explain, is A, the students were able to explain the points of refinement very well
- (4) The ability to conclude, is A, the students could conclude learning during the discussion and the end of learning well and be able to make logical and reasonable conclusions.
- (5) Speaking based on facts, is A, because the students had talked in discussion based on facts such as asking or answering questions.
- (6) The ability to provide solutions, is A, the students were able to provide solutions to problems or questions that arise during discussion. The solutions provided were reasonable and logical.

- (7) Using the source in speaking, is A, the students had used relevant sources in learning and discussion. Students are all active in finding relevant resources when there are questions from friends.
- (8) Listening to other people talk, is A because students had shown a very good listening attitude to their friends and teachers when talking.
- (9) Respect the opinions of others, is A, because students have shown an attitude of highly appreciating their friends opinion and teachers' explanation.
- (10) Good communication, is A, because the students had shown polite attitude when communicating with friends and teachers.
- (11) Accept the truth, is A, because the students wanted to accept the truth when other students or teachers explained new concepts that were in accordance with facts and reliable sources.

The ability of students' thinking knowledge after taking the test of 24 students is as follows: minimum score of 76, maximum score of 100, average value of 94, and standard deviation of 7.44 100% student graduation rate in KKM 70.

(d) Reflection

Based on observations of peers, school principals and heads of the civics MGMP Dumai, based on the observations and test results of students, this study has succeeded in developing students' critical thinking skills and did not need to held a further cycle.

CONCLUSIONS

After conducting research in cycles 1, 2 and 3, it was found that in the third cycle, this research developed students' critical thinking in class XI Science 1. This can be seen from the observation data of peers where when researchers carried out the SETS approach could develop students' critical thinking skills in class XI Science 1 has been maximized. Indicators of students' critical thinking with criterion value A (very good) as follows: 1. The ability to asking questions, 2. The ability to answer, 3. The ability to explain, 4. the ability to conclude, 5. Speaking based on facts, 6. The ability to provide solutions, 7. Using sources in speaking, 8. Listening to other people talk, 9. Appreciating the opinions of others, 10. communicating politely and courtesy and 11. Receive the truth. In addition, the results of students' knowledge tests in terms of critical thinking are as follows the average value of students 94, the minimum score of 76, the maximum value is 100 and the success rate of learning with KKM 70 is 100% or it can be concluded that all students of class XI Science 1 that totally 24 students with the application of the SETS approach could develop critical thinking skills. It can be concluded that from 24 students of class XI IPA 1 taking the critical thinking ability test in the 3rd cycle, a minimum score is 76 and a maximum score of 100 with the average values of students is 94, by looking at the level of learning success of students with a KKM value of the school is 100%. From the above data it can be concluded that the ability to think critically based on test results had developed or the learning process had been successfull.

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