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PROCEEDING
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*Harmonization of Science, Technology, and Society
(STS) in Science Learning to Prepare
21st Century Generation*



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PREFACE

Praise be to Allah SWT for all the blessings and guidance given to us all, so that the program book of the International Seminar on Science Education (ISSE) 2015 bringing about *Harmonization of Science, Technology, and Society (STS) in Science Learning in the 21st Century* held on 31 October 2015 in the Rectorate Hall, Yogyakarta State University can be completed. This book comprises a number of abstracts presented in the seminar, written by lecturers and students from Yogyakarta State University and other universities.

We owe many parties for the success of the seminar. Therefore, we would like to sincerely extend our gratitude to:

1. Rector of Yogyakarta State University, Prof. Dr. Rochmat Wahab, M.Pd., M.A. for facilitating all the activities of the International Seminar on Science Education (ISSE) 2015;
2. Director of Graduate School of Yogyakarta State University, Prof. Dr. Zuhdan Kun Prasetyo, M.Ed. for providing all the facilities of the International Seminar on Science Education (ISSE) 2015;
3. the invited speakers for their willingness to share thoughts and insights on science teaching and learning in the seminar;
4. all committee members for the time, effort, and thoughts for the success of this activity; and
5. all presenters and participants who have come a long way to contribute to the success of the seminar.

However, we realize that there are some imperfections in this book and in the seminar. Thus, suggestions and constructive criticism are very much welcome. Finally, we do hope that this book can bring some contributions to learning of science in the 21st century.

Yogyakarta, 31 October 2015

Chairperson

Dr.rer.nat. Senam



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SCIENCE LEARNING WITH SETS Vision (Science-Environment-Technology-Society) To GROWING CRITICAL THINKING SKILLS

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Abstract

Every time when people face a problem to be solved. Good problem solving course is based on sufficient information and has processed and combined with other things related. Solving the problem requires creativity and wisdom. Creativity to find a solution that is effective and efficient, while wisdom is needed because the solution should always pay attention to the interests of the various parties and the surrounding environment. Therefore, from an early age, students need to learn to solve problems, according to the level of thinking. Basically thinking skills. is a priority prowess mind / ratio optimally. Thinking in a higher level is critical thinking. One effort that can be done to improve the ability of thinking is through science learning activities. Those efforts include the linked lesson material with its application in everyday life or attempt concrete object of discussion, training process skills Science (science) and also combines (Science-Environment-Technology-Society). This paper seeks to provide an overview SETS visionary learning model that can foster critical thinking skills through the study of literature or literature review.

Key words: Learning Model, Vision SETS, Critical Thinking Skills

INTRODUCTION

Innovations in science education as approaches to learning arise in this last period. This is an attempt to learners so that they can learn optimally. A wide variety of innovations in the learning developed, often associated with a specific learning theory or anticipate the direction of the development of science and technology in the future. In general assessment of an innovation in science education can we examine with due respect to the philosophy, characteristics, and main characteristics, as well as its implications in practice. Especially for learning science, have reported a variety of research results relating to the activities learners. The work done and continues to be continued so that learners have a stock to anticipate the direction of the changes. Efforts were among others teaching materials with application in daily life or attempt object of discussion, training science process skills (science) and also integrating the environmental-science-technology-society.

In the Indonesian language known as *Salingtemas* (*sain, lingkungan, teknologi dan masyarakat*). Vision SETS give color to one's perspective in viewing and understanding, in which everything was understood to have SETS elements, which influence the overall reciprocity, which may seem obvious compared to when the same thing was not observed



with the vision SETS. While SETS visionary is a real praxis learning process in which the vision SETS applied in the learning process (Binadja, 2002). Praxis learning and SETS vision that if implemented seriously will certainly benefit the various parties, the learners themselves, educators, and community (Binadja, 2002). Further vision and approach SETS it allows preservation at positive values of education, religion, and culture (Binadja, 2002). KTSP is a new curriculum is expected to have a conservative role, creative, and critical and evaluative in its application at this time. KTSP is operational curriculum developed and implemented by each educational unit. KTSP preparation undertaken by the education unit is a characteristic that is different from the previously used curriculum.

KTSP as an operational curriculum still refer to the contents or basic competency standards developed by the National Education Standards Agency (BSNP). Thus it can be understood that the KTSP as a curriculum which is operational at least three meanings. First, the development can not be separated from statutes drafted national government through the National Education Standards. BSNP establish national education standards, such as content standards, competency standards, process, or judgment. Second, the development of the curriculum should pay attention to regional characteristics, in accordance with Law No. 20 of 2003 Article 36, paragraph 2 that the curriculum at all levels and types of education developed in accordance with the principle of diversification of educational unit, the potential of the area, and learners. Third, the development of SBC provides the opportunity and flexibility to the teacher or school creating strategies and learning methods, media, and evaluation according to the conditions and characteristics of students at school. Making of the SBC as an operational curriculum developed by the school should be blurred in the implementation and execution. Because of the orientation of the curriculum which is still seen as the content of the subjects, then the standard of competence and basic competences for each subject is sufficient for teachers to implement teaching without having to develop their own curriculum

Siswono research results (2008) states that schools turns out there who have not yet developed the KTSP. Of the 40 schools that already compile their own curriculum as much as 21 schools, or 52.5%, and the school has not compile their own curriculum as much as 19 schools, or 47.5%. Reasons for not making the curriculum, among other things because of the lack of funds, there is no training, lack of understanding of the curriculum, and infrastructure is limited. Teachers at 23 schools administratively have devised lesson plans that show a student-centered learning or innovative using contextual



learning or discussion, while the remaining 19 schools have not demonstrated innovation. Teachers in the implementation in 21 schools already implementing the RPP made, while the rest have not. Teachers prepare lesson plans that are innovative, but not implemented because the RPP is not made alone. RPP is the result of a group of teachers through KKG or MGMP or publisher. From these results it can be seen that the need for the development of learning tools that is one feature of the curriculum has not been fully implemented.

One of the life skills (life skills) that need to be developed through the process of science education is the thinking skills (Depdiknas, 2003)). One's ability to succeed in life among others, determined by the skills of thinking, especially in efforts to solve the life problems that it faces. In addition to the development of godless nature. the formation of a moral nature and character, then the inquiry and critical thinking suggested as a means to achieve the objectives of science and education are the two things that are very related to each other. Every time when people face a problem to be solved. Good problem solving course is based on sufficient information and has processed and combined with other things related. Solving the problem requires creativity and wisdom. Creativity to find a solution that is effective and efficient, while wisdom is needed because the solution should always pay attention to the interests of the various parties and the surrounding environment. Therefore, from an early age, students need to learn to solve problems, according to the level of thinking.

Basically thinking skills. is a priority prowess mind / ratio optimally. Thinking in a higher level is critical thinking. Critical thinking is a mental process that is well organized and play a role in the decision-making process to solve the problem by analyzing and interpreting the data in the activities of scientific inquiry. Critical thinkers scrutinize their thought processes and thought processes of others to gain an understanding of the most complete (Liliasari, 2008). In fact on the ground, we have not much education oriented towards habituation and increase critical thinking skills but still focuses on learning outcomes in cognitive (Trianto, 2010). Another problem faced by the school is with regard to the hawker food including beverages and food. Center for Drug and Food Control (BPOM) Semarang, Central Java, on Tuesday (January 5, 2011), found formaldehyde snacks in elementary school cafeteria Pendrikan 01-02 and SD Masehi at Imam Bonjol street. At the school found the noodles contain a substance used to preserve dead bodies. In this raid, officers also carry out tests on the content of dye that should not be used in foods (Liputan 6.com.Semarang).

The question that then arises is whether the legal tools we have is not enough to



conduct the addition of dangerous substances above persists. According to Law No. 71/1996 Article I (4) that "Food safety is the condition and measures taken to prevent food from possible contamination of biological, chemical, and other objects that can disturb, harm and endanger human health." Another rule is PP 28/2004 on the safety, quality and nutrition of food and Regulation of the Minister of Health No. 722/1928 on the additional material prohibited from use in food. Facts prove that we do not lack legal instruments governing the use of substances added to food. Implementation of legal instruments in the field have not been able to provide optimum results, it is still far from expectations. Practice the addition of food ingredients and dyes still ongoing. School children continue to consume food and drinks that have a negative impact on health. Without a comprehensive approach to the prevention of the use of the above ingredients is impossible to do. Required an effort that can touch the subject matter so that awareness of the dangers of the materials above can be improved.

Curriculum Science must consider the nature of science, as scientific products, the scientific process, and scientific attitude so that when students learn science students can understand the concepts, theories, and laws at the same time knowing how knowledge was obtained, and no less important students have scientific attitudes required in the development of science and its application in everyday life. Of law education and curriculum aimed at forming citizens who are noble. Learning would be more meaningful if the child has what he learned and not know it. Learning oriented mastery of the material proven to be successful in the short term given the competition but failed to equip children to solve problems in the long-term life. Therefore, the tendency today is to create an atmosphere of learning in the natural environment (Mariana, 2008).

DISCUSSION

A. Learning science Visionary SETS (Science-Environment-Technology-Society)

SETS visionary learning science, students are requested to connect the four elements SETS with the material being studied. Students practice a variety of ways (observe, discuss, ask, answer, solve the problem) Binadja (1999). With these students are actively learning and critical thinking, so that the learning outcomes to be achieved are met. Elements in SETS can not be separated from one another. Science as a focus of attention of teachers and students in learning science, can see the shape of the relationship of science are studied (science) is associated with other elements SETS. The linkage between elements SETS with science as the focus of attention can be seen in Figure 1.

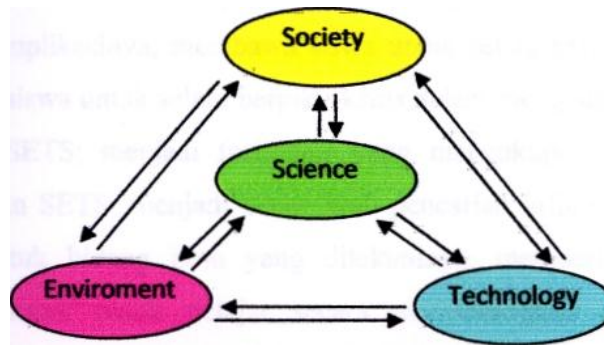


Figure 1. Linkage Elements SETS

SETS visionary science teaching have traits or characteristics that need to be displayed in the learning, namely: 1) continue to provide science learning science that has been determined. 2) students brought to the situation to see the technology related to the concept of science as well as utilize the concept of sains to form technology for the benefit of society. 3) The students were asked to think about the positive and negative results in the process of transferring the sains to form technology. 4) students invited to seek alternatives to overcome the loss (if any) generated by the application of science to form these technologies on the environment and society (Binadja, 2002b). Through the implementation of the above characteristic features in the learning process, then the principal learning science is taught and students are expected to be achieved will be active learning, creative in developing the skills possessed, understanding of the concepts taught to rise and is expected to be achieved optimal learning results. SETS visionary learning offers the advantage that forming graduates who have the reasoning ability and comprehensiveness of thought when students are faced with a problem to solve Binadja (2002c). With a habit of critical thinking, students have a tendency to seek the best alternative solutions, without sacrificing the environment. In the study by using SETS teachers and students alike have a decisive role in the achievement of specified learning objectives from the outset.

The teacher's role; creating a pattern of thinking that sees the future with different implications; bring students to always think terintegratif; invites students to always think critically in the face of something by referring SETS; a facilitator sufficient in learning sound SETS; a reference search direction information for students and colleagues to the field of science is practiced, giving tasks that stimulate students to learn in a fun in the scope SETS; arouse interest in finding a more in-depth knowledge; give stimulus to solve the problem riel according to the field of science and integrate with other sciences with regard linkage SETS; giving stimulus to the students to innovate, be creative, and berinvesi with insight SETS; provide an evaluation of learning is also insightful SETS.



The role of the student in the learning SETS; trying to always insightful SETS in learning, thinking, acting; actively participate dalam SETS sound activities; think about how to utilize the knowledge gained through the SETS; trying to actively contribute insightful SETS activities, have always had a vision of a productive alternative thinking SETS; willing to accept positive feedbacks to improve the quality of learning and career guidance relating to the field of study; think of themselves on a career that can be created from insightful knowledge SETS. Thus, if done in earnest study with a vision SETS will be interesting and fun as well as the intended purpose can be achieved optimal.

B. Applications SETS Vision in KTSP

The principles adopted an approach of learning in SETS (Environmental Science Society Technology), packed in Syllabus, Learning Implementation Plan (RPP), and the Student Activity Sheet (SAS). In RPP developed, at least include the objectives, stage, or the process of achieving the learning objectives (including the steps suggested), and also measuring devices adapted to the achievement of the objectives of SBC. The direction of development in accordance Permendiknas No. 41 of 2007 on a standard process for primary and secondary education units. The achievement of learning objectives apply appropriate stages in the form of syntax that is exploration, elaboration, confirmation, formulation solutions, and action plans. Learners are given the opportunity to obtain a source of learning as much as possible, both the learning resources that may be brought into the classroom and learning resources that exist outside the classroom. In the exploration of the issues that exist in the community that match the topics can serve as a trigger learners to express things that are already known in a study. Based on the things that have been known to proceed with a question of science (look for an explanation for natural phenomena) as well as technological problems (finding a solution to the problems faced by the community).

In elaboration, the students assisted SAS (Student Activity Sheet) or manual activity in writing or orally. Sources of information used is not limited tools and materials in the laboratory, as well as learning resources, such as magazines, newspapers, resource persons (experts), the Internet, and others. In this phase, the students act like a scientist looking for further information made conclusions. The role of teachers helping and directing students to obtain information. Confirmation stage is the stage of formulation of the solution of problems faced by the community and explanations of natural phenomena (according to the concept of science) obtained learners. At this stage, learners are also introduced to scientific concepts, namely the views of experts on the concept. Then the



students compare the conclusions obtained with the concept of the experts on the same concept. In this case if there is a difference between the concept of experts with the conclusions obtained learners, happen negotiation of meaning. The next stage is the follow-up or action plan or action to be performed learners in their daily lives, both as personal and as a community and as learners.

C. Critical Thinking Skills

All teachers would agree to say critical thinking is an important skill for students to develop. Unfortunately, many students do not develop critical thinking skills. Perhaps the problem is rooted in the teaching of teachers. Do teachers understand the concept of critical thinking well enough to teach students to think critically in the disciplines studied. Good thinking skills will not develop itself, this capability must be taught and trained. Teaching critical thinking skills is a difficult business. Teaching to train critical thinking takes time to prepare, plan, and limit the amount of content "taught." Teachers can no longer simply be a conduit of information. On the other hand, students should learn thinking skills and reasoning to reach their full potential in today's society. If we want to prepare students to be able to pass on to a higher level and plunge into society, we must be committed to develop problem-solving and decision-making through teaching critical thinking skills and dispositions necessary to develop critical thinking. Pascarella and Terenzini (1991) in Rudd (2007) defines critical thinking as follows:

".. critical thinking has been defined and measured in a number of ways but typically involves the individual's ability to do some or all of the following: identify central issues and assumptions in an argument, recognize important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given, and evaluate evidence or authority," ...

Crunkilton (1996) in Rudd (2007) presents a pragmatic approach to critical thinking in students through the necessary conditions for thinking. The first condition is to have something to think about as people, objects, situations, problems or processes. The second condition is to have something to think with, such as background knowledge and resources (maps, charts, records, computers). The third condition is to have a way of thinking. In other words, students need structure thought to guide the thinking process. Examples include comparing, estimate, evaluate, problem solving and interpreting. The final condition is a reason to think. Reason to think vary from thinking to resolve the controversy, to solve problems, or complete an assigned task. Some clarity in defining critical thinking is achieved when a group of leading researchers with expertise in the field were asked to define critical thinking through a Delphi study in 1990 (Facione).



They hypothesize that there is a set of intellectual virtue or habit of mind that reflects a person's disposition to think critically. identification of the Delphi consensus report:

The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit."

According Facione(1990) in Rudd, (2007), a critical thinking has a set of affective dispositions that enable them to cope with situations that require critical thinking. Although one can have the cognitive skills to think critically, their minds are more effective if they exhibit affective dispositions listed in Table 1.

Table 1. Disposition Affective Critical Thinking in Rudd, Rick D(2007)

APPROACH	DESCRIPTION
	<ul style="list-style-type: none"> •Curiosity about various issues. •Concern to maintain and keep well informed, •Precautions for the opportunity to use critical thinking. •confidence in the investigation process. •confidence in one's ability to reason. •an open mind about the different views.
PUBLIC LIFE	<ul style="list-style-type: none"> •Flexibility in considering alternatives and opinions, •An understanding of the opinions of others. •without prejudice to assess reasoning. •Honesty in dealing with its own biases, prejudices, •stereotypes, egocentric and trends sociocentric. •discretion in considering, making or changing judgments. •Willingness to go back and revise views where honest •reflections show the necessary changes. •Clarity in asking questions or concerns. •Orderliness in working with complexity •diligent in seeking relevant information.
SPECIAL ISSUES	<ul style="list-style-type: none"> •Fairness in selecting and applying criteria. •Attention to focus attention on the hand. •Persistence despite the difficulties encountered. •Accuracy with the level permitted by the subject and the circumstances.



Paul (1995) in Rudd (2007) writes that critical thinking is a unique shape and purpose of thought practiced systematically and deliberately. Thinkers impose standards and criteria in the thought process and use it to build thought. Table 2 summarizes the operational definition of critical thinking Paul.

Table 2. Operational Definition of Critical Thinking in Rudd, Rick D (2007)

DEFINITION OF OPERATIONS	DESCRIPTION
The uniqueness of the destination thinking	One every subject area or topic, whether academic and practical, requiring intellectual training for the mind, a sort of physical training for the body.
Systematic thinker and demonstrate habits	Actively develop traits such as intellectual integrity, intellectual humility, fair-mindedness, intellectual empathy, and intellectual courage
Establish criteria and intellectual standard on the premise	Identify criteria for solid reasoning, such as precision, relevance, depth, accuracy, sufficiency, and set clear standards where the effectiveness is thought to be assessed
Took over the construction of thought	Awareness of elements such as thoughts, assumptions, and viewpoints that are present in all the well-reasoned thinking. A conscious effort, active and discipline to cope with each element displayed
Guiding thought in accordance with the construction standards	Continue to assess the development program during the process. Adjust the way and increase the use of criteria and standards
Assessing the effectiveness of thinking consistent with the objectives, criteria and standards	Assessing deliberately thought to determine the strengths and limitations in determining the objectives, criteria and standards. Studying the implications for future thinking and increased

Paul further argued critical thinking to identify three attributes of mind and / or processes that the critical thinkers. The three properties that thought is an element of the reasoning, the properties of reasoning, and reasoning standards. The elements of reasoning consists of seven components that help guide the process of reasoning. These components include the goal of thought or question that will be answered, the information and / or facts about the question, the assumptions made about the question, interpretation of facts and data collected, theories and concepts related to the question, and the inclusion



of other points within viewpoint. Finally, an assessment of the conclusions drawn with an emphasis on the implications and consequences of the decisions reached as a result of the thought process (Figure 2).

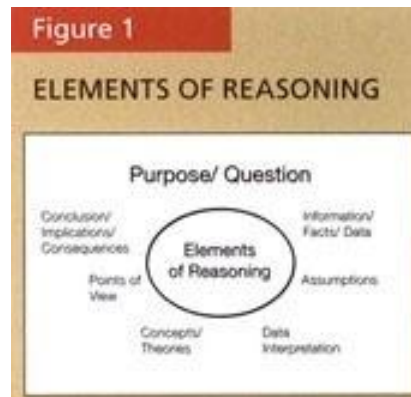


Figure 2: Elements of Reasoning In Critical Thinking
in Rudd, Rick D (2007)

The nature of critical thinkers including independent thinking, intellectual empathy, intellectual humility, courage, integrity, perseverance, intellectual curiosity, faith in the intellect, intellectual propriety and intellectual responsibility. This character is not only present in critical thinkers, they are consciously used to guide the process of thinking (Rudd, 2007). Standards that guide thinking including clarity in the thought process, accurate, precise and relevant thinking, utilizing information that is directly related to the situation thinking; deep thinking, and think broadly. These standards can guide the thinkers for a product idea or decision that is not covered by the information that is irrelevant and has been fully investigated. Although critical thinking using higher order thinking, critical thinking and high level thinking is not equivalent terms. Critical thinking does not accommodate all the categories for higher-level thinking. Critical thinking is one of the members of which are closely related to the form of high-level thinking. Skills and sub-skills that are identified by group.

Table 3. Critical Thinking consensus in Rudd, Rick D (2007)

Cognitive Skills	SUB-SKILLS
interpretation	categorization
	decoding significance
	classification meaning
Analysis	test ideas
	identifying arguments
	analyzing argument



evaluation	assessclaims assessingthe arguments
conclusion	alternativerelationship drawingconclusions
search for evidence	explanation statingresults justifyingprocedure presentingarguments
independentsettings	Rouseassessment Self correction

Facione (1990) in Rudd, (2007) uses the information from the Delphi study to identify seven construct critical thinking. This construction includes analysis, self-confidence, curiosity, maturity, openness of mind, systematic, and the search for truth. Rudd, Irani, Ricketts, Friedel, and Rhoades (2007) perfected the construction identified by Facione to incorporate three critical thinking disposition. Three such disposition is involvement, cognitive maturity, and innovation (engagement, cognitive maturity, and innovativeness) can be used to describe the disposition of the students towards critical thinking. Engagement: disposition engagement describe an individual's ability to anticipate situations in which they can perform reasoning and judgment. Students with high disposition in engagement enjoy problem solving, confident in their ability to think, and can explain their reasoning process to others. Cognitive maturity: People with more developed cognitive maturity are aware of their own biases and tendencies that influence decision-making and reasoning. Cognitive maturity of individual will feel comfortable with dissent and listening to what others have to say with an open mind. They are willing to change their position in solid evidence. Innovativeness: Innovative people are always looking for opportunities to learn more. New knowledge, insights and innovations that improve their lives greatly appreciated. Intellectually innovative people have a curiosity and ask questions to clarify and learn.

There are eight steps to develop the habit of critical thinking in a person as described by Johnson (2007), namely: (1) define the problem to be investigated clearly, (2) set a viewpoint objective on the issue under study, (3) menentukan reasons / argument is right for an issue that is discussed, (4) break assumptions that could weaken the argument, (5) use clear language, (6) looking for evidence of accurate (reliable) to assess any reason, (7) to consider decisions for the right reasons, (8) looking for an indication of the conclusions drawn in order to prevent adverse side effects in making a



decision. Robert Ennis (1985) in (Liliasari, 2001) provides a definition of critical thinking is reflective thinking focused on the pattern of decision-making about what should be believed and should be done. Based on these definitions, the critical thinking skills in Ennis consists of twelve components, namely: (1) to formulate the problem, (2) analyzing the arguments. (3) ask and answer questions. (4) assess the credibility of sources of information, (5) observe and assess the results of observation reports, (6) to make deductions and assess deduction, (7) makes induction and assess induction. (8) evaluate, (9) defines and assesses the definition, (10) identifying assumptions, (11) to decide and implement. (12) interacts with other people. As for the components and indicators of each component of critical thinking can be presented in Table 4

Table 4. Indicators Critical Thinking Skills

Critical thinking skills	Indicator
Classification of elementary	<ul style="list-style-type: none"> a. focusing questions b. analyzing argument c. Ask and answer questions that require clarification or challenge
Build basic skills	<ul style="list-style-type: none"> a. Consider the credibility of sources b. Doing consideration observation
Conclusion	<ul style="list-style-type: none"> a. Conduct and consider deduction b. Conduct and consider induction c. Conduct and consider the value of decision
Creating further explanation	<ul style="list-style-type: none"> a. Identify terms and considering the definitions b. identifying assumptions
Strategy and tactics	<ul style="list-style-type: none"> a. Determining a course of action b. Interact with others

(Ennis in Liliasari, 2001).

Critical thinking skills is one of the authorized capital or intellectual capital is very important for everyone (Liliasari, 2001; Ministry of Education. 2003) and is a fundamental part of human maturity (Penner 1995 in Liliasari 2001). Therefore, develop critical thinking skills become very important for students at every level of education. Critical thinking skills using basic thinking analyze arguments and bring insight to each interpretation to develop a cohesive pattern and logical reasoning, the ability to understand the assumptions. formulating the problem, do the deduction and induction as well as taking the right decision. Critical thinking skills are intellectual potential that can be developed through the learning process. Every human being has the potential to grow



and develop into critical thinkers because the real thing thinking activities have relationship with the pattern of self-management (self organization) which is in every being in the universe, including man himself (Liliasari, 2001).

Teachers can help students to develop critical thinking skills through strategies, and learning methods that support for active learning. SETS visionary learning model is one way for it. With visionary SETS learning activities, there will be a learning process that concretized so that learning becomes more fun. Considering the eighth grade junior high school students are thinking process is still in early stages of operational thinking in the universe of real ideas. Abstract ideas grounded not only will cause children estranged from their own learning activities, be verbalis (memorize words without understanding the meaning). Learning by linking components in SETS will make students actively to formulate the problem, investigate, analyze and interpret the data, and make decisions to solve the problems it faces so indirectly cultivate the habit of critical thinking. SETS visionary blend of learning activities undertaken cooperatively can also train students to collaborate with peers.

CONCLUSIONS AND SUGGESTIONS

Based on the results of a literature review can be concluded that the critical thinking skills can be developed through learning SETS vision. SETS students in learning vision will link the components in SETS that will make students actively formulate problems, investigate, analyze and interpret the data, and make decisions to solve the problems it faces so indirectly cultivate the habit of critical thinking.

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