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Watson-Glaser's Critical Thinking Skills

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Abstract. One of the objectives of education in Indonesia based on the curriculum of 2013 (as stated in Kemendibud, 2016, p. 1 point 9) is to develop the mindset related to the learning system in attempt to enhance critical thinking ability. This paper will discuss the critical thinking skills and indicators developed in measuring students' critical thinking skills at the secondary school level. The characteristic used in measuring this ability was Watson-Glaser's critical thinking skill. Watson-Glaser was one of the figures in the development of critical thinking skills. In his work, he mentioned that critical thinking focuses on the relationship between rational thought and the process of education. The competencies measured by Watson-Glaser in developing critical thinking skills were Recognizing Assumptions, Evaluating Arguments, and Drawing Conclusions. This concept was expected to be used in the developing and improving individuals of professionalism as well as achievements and also in understanding students' learning both in school or outside the school.

1. Introduction

Thinking is a process that created unconsciously in a person. It can be seen from daily activities, thinking process is used as a way to solve the problems faced by people in their lives. This thinking process will determine how the results obtained later, if the thinking process is done well and full of consideration, it will give good results. Conversely, if the thinking process is done without consideration, then the result will not good. The purpose of education is not only memorize something but also provide full understanding and meaningful learning. If the learning is only focus on memorizing something, it will be forgotten when the other materials are taught by teacher. This issue should be concerned by educators and researchers in reducing the boredom of saturation faced by students in teaching and learning process with memorization and meaningless activity.

Developing critical thinking skills is one of the goals of education, as stated in the 2013 curriculum [1] which states that ... one of the goals of the 2013 curriculum is to improve the mindset related to learning that develops critical thinking skills. Each State has an educational standard as one of the goals of science development, some of which also include the development of critical thinking skills in the national education curriculum. This is similar to the National Science Foundation report [2] which is stated that the educational system in America in the 21st Century is a mandatory development of critical thinking skills in studying education and especially in science.

In the development of critical thinking skill, it is important to note the fundamental problem of critical thinking is. Because critical thinking is often interpreted in terms of process or on a skill. Several literatures of educational researches equate the ability of critical thinking as a procedural



process in practice and refers to cognitive abilities. This idea is based on a process that is interpreted in various interpretations. In the interpretation, it is often found some mistakes, one of them is that not all processes carried out in doing critical thinking can be observed well, whether they were done in mental or physical processes. Because it can be seen only after someone found the fact that he has needed a thinking process in accomplishing his tasks.

The process of critical thinking will involve some specific processes of analyzing a problem, collecting the data, evaluating the data and synthesizing in deciding a conclusion. Smith [2] argues that in doing thinking it needs some processes of observing, analyzing and interpreting, it is not only seen from a mental process. observing, analyzing and interpreting are not only detected from a mental process.

2. Method

This study used Grounded Theory method. The aim of this method is to find a new theory or to empower the existed theory by studying the principles and the fundamentals by which the basic conclusion will be taken to formulate the basic principles of a theory.

Grounded Theory is a method of qualitative research which use some systematical procedures to develop inductive Grounded theory about a phenomenon. Grounded Theory does not test the hypothesis, but it finds and determines the theories which support such kinds of the research. As stated by Strauss and Corbin (5) Grounded Theory is a research which is aimed to recognize the research situation and at least to figure out the implicit theory in the data.

3. Discussion

3.1. *The Ability Of Critical Thinking*

According to [5] critical thinking skills are some processes such as interpretation, analysis, evaluation, conclusions and explanations. Halpem [6] defines critical thinking as the use of cognitive skills or strategies to improve desired outcomes. In line with Halpem, Rudd et al [6] say that critical thinking is something reasonable, problem solving, and it provides the best solution.

Bonney et al [7] defines critical thinking as a thought that occurs when individuals or groups use accurate evidence to evaluate and assess what they are learning and thinking about. Critical thinking skills are important in developing students' mathematical skills in understanding what they are learning, as we know that the purpose of education is to provide understanding and meaningful learning to students. Several studies shown that the ability to think critically applied in the lesson plan in the school will give good results in the improvement of learning achievement as well as understanding students' learning more meaningful.

According to [7] there are two factors that can influence the students' motivation to engage in critical thinking skills, as follows: 1. The existence of beliefs, achievements, and goals of studying influence the relationship between motivation and critical thinking, it also encourages students whether highly motivated to do critical thinking with persistent effort. 2. The different desires, whether the students prefer to engage in critical thinking in their own way and different from their friends do.

The factors above will give students the opportunity to solve problems in their daily lives critically not only in the classroom, and this is one of the types of critical thinking. someone who thinks critically can be seen from how and what the results obtained when he solves a problem and it is not just seen from the cognitive skills that he shows. According to [5] the characteristics that can be found when a person begins to perform critical thinking skills are as follows:

1. Curiosity related to various problems;
2. Pretensions into becoming a concern as a good informer;
3. Opportunity in thinking process;
4. Confidence in investigating and having a reason;
5. Confidence toward capabilities they have;

6. Open-mindedness about the different views of the world;
7. Understanding the other opinions;
8. Be honest in the faces of opposition or differences given by the others
9. Be careful in providing an assessment
10. Reconsider and reflect in making a decision

The results of critical thinking skills will be seen in a person, as follows:

1. Doing the job with sincerity
2. Being diligent in finding the required information
3. Being able to choose a decision carefully
4. Having strong perseverance despite facing difficult problems
5. Being able to solve problems with appropriate considerations and decisions

3.2. *The Watson-Glatser Critical Thinking Skill*

Edward Glatser's critical thinking ability was developed in 1941, he defined that critical thinking involves several things: 1) a wise attitude in considering problems; 2) knowledge of logical investigation; 3) skills in applying the methods of critical thinking. Watson-Glatser provides the view that critical thinking is a skill set that strongly underlies students' success in learning.

For several years, Watson-Glatser has researched and developed critical thinking skills. This development is based on encouragement in combining the attitudes, knowledge and skills that are formed from critical thinking skills. The steps Watson-Glatser examine how students with critical thinking when they solve a problem are described as follows:

1. Inference Making
Students' ability to distinguish between true or false conclusions from the data given
2. Recognition of Assumptions
The ability of students to recognize an assumption of a statement given orally or written
3. Deduction
The ability of students in determining a decision on the conclusion that must be followed from the provided information.
4. Interpretation (Induction)
The students' ability to consider and decide whether the evidence and conclusions obtained can be generalized.
5. Evaluation of Arguments
The ability of students to give more appropriate and relevant arguments through specific questions of the given problem.
1. The steps above are a tool developed by Watson-Glatser that can be used widely in measuring and assessing students' critical thinking skills in schools and university. This instrument is considered to be a tool in assessing success to improve critical thinking skills.

After 85 years of development of Watson-Glatser's work with the trust of several educational institutions and companies, Watson-Glatser introduced a change in their work namely Watson-Glatser II. They transformed the five structures into three inseparable structures without reducing the essence of need in the goal of critical thinking ability. Inference, Deduction and Interpretation that are interconnected can be contained and associated with the withdrawal of conclusion (Draw Conclusions). While Recognition, assumptions and evaluation of Arguments are as an independent factor. The model proposed by [8] is as follows:



From the new RED model, the author tries to develop several indicators of the RED Watson-Glatser above that have been modified from several research sources. The development of RED Watson-Glatser critical thinking ability indicator can be seen in the table below:

Critical Thinking Skill	Sub-Critical Thinking	Description
Recognize Assumptions	(Recognize) assumptions	Giving comments with the correct information
		Responding and questioning an assumption
		Collecting keys or problems as the further information
		Information and facts about the problem
		The ideas or assumptions that support the strategy or plan
		Is there a strong evidence to support the given assumptions
		What are the ideas you can explore
		What to know for the next plan
Evaluate Objective Arguments	Analyzing Arguments	Analyzing of arguments to evaluate, analyze information objectively and accurately
		Questioning the quality of supporting evidence
		Being objectively to sort through the validity in drawing more accurate conclusions
		Identifying each argument is strong or weak
		Identifying relevance and irrelevance
		Looking for similarities and differences
		Identifying conclusions
	deduction	Giving information through a list of decision-making
		Whether the certain conclusions should follow the information in the given report
		Defining the problem
		Selecting criteria to create a solution
		Formulating the possible alternatives
		Deciding what to do tentatively
		Reviewing
		Monitoring the implementation
Draw Conclusion (Menyusun Informasi untuk sampai pada kesimpulan)	Information	What information is still needed to be added
		The results of the investigation which become as specific findings
		Interpreting the information found to draw a conclusion
		Analyzing how it will be done
		How to interpret it
	Conclusion (inference)	The reason to think that it is the right answer or the accurate solution
		Giving the best judgment with quality decisions
		After evaluating all of the facts, what are the possible conclusions
		The evidence that leads to a conclusion
		Is there any new evidence that will impact to a decision

What are the conclusions that can be drawn?
The decision must be based on the given information
Making generalizations
Making conclusions and hypotheses
Interpretating of the statement

The development of this indicators is expected to assist in measuring and developing the critical thinking skills of individuals and groups. The final goals of the ability are to improve professionalism and to perform as well as possible the students' learning both in their environment or outside of the work environment or learning.

4. Conclusion

The ability of critical thinking becomes one of the goals of education in every country especially Indonesia. The importance of developing critical thinking ability makes each educational system in some countries to oblige every learning activities involve of applying and developing critical thinking ability especially in science.

Critical thinking is an attempt to use the skills and strategies that are likely in improving the desired outcomes and solve the problems faced. Watson-Glatser is one of the leaders in the development of critical thinking skills, Watson-Glatser in his work mentions that critical thinking focuses on the relationship between rational thought and the process of education. The steps of critical thinking skills are 1) Inference Making; 2) Recognition of Assumptions; 3) Deduction; 4) Interpretation; 5) Evaluation of Arguments.

This ability is used as a tool that can be used in measuring the students' critical thinking ability. The development outcomes after 85 years are obtained by collaborating several steps without compromising the essential needs of the steps. The new model is Recognize Assumptions, Evaluate Arguments and Draw Conclusions (Inference, Deduction, and Interpretation)

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