

## NEED ANALYSIS STUDY: CRITICAL THINKING DISPOSITION PROFILE OF SCIENCE CLASS STUDENT IN HIGH SCHOOL

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### ABSTRACT

Critical thinking is essential for individuals who make judgments in their daily life, be them students at school or adults in the work or family environment settings. The aimed of this study was to determine Critical Thinking Disposition (CTD) profile of science class student in high school. This is a mixed method research that emphasizes quantitative and qualitative data collection. In this study, qualitative data was embedded in the quantitative data collection process to support the research results. Students selected as samples in this study were determined by random sampling. The selected students were science students in high school. Students' CTD profiles data were obtained through questionnaires, observations, and interviews. CTD questionnaire using a Likert scale with five answer options. Data obtained from student response questionnaires were processed using descriptive statistics. Based on the results, the average score of students' CTD in general still needs to be improved in each indicator because no one has reached the high category, all of them are still in the low and medium categories. Especially in the indicators of inquisitiveness and self-confidence which obtained scores in the low category. While the open-mindedness indicator is the indicator with the highest score in the moderate category.

**Keywords** :critical thinking disposition; science class; high school



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## I. INTRODUCTION

Many different patterns of thinking that learners need to develop, ranging from basic thinking to complex thinking or higher-order thinking. There are four patterns of higher-order thinking, namely critical thinking, creative thinking, problem solving, and decision making [1]. Among the four patterns of higher-order thinking, critical thinking underlies the other three patterns of thinking, namely creative thinking, problem solving, and decision making. This means that critical thinking needs to be mastered first before achieving the other three higher-order thinking patterns [2]. Critical thinking is one type of high-level thinking that is convergent, i.e. it goes to one point.

Before modern critical thinking theory emerged, critical thinking was defined in terms of cognitive abilities and skills [3]. In recent years, there has been recognition that having the skills to do something does not mean that people will use it when the situation occurs [4]. In addition to having the ability to think, one must have the propensity to use the ability to think when the opportunity arises [3]. Critical thinking consists of two tools, namely: 1) cognitive skills, including identifying issues and assumptions, evaluating evidence, and making inferences; 2) disposition is the willingness to use critical thinking skills [4]. Some researchers expanded the definition of critical thinking to include abilities and dispositions [6][7].

Most theorists agree that the ability to think critically is distinct from the disposition to do so. Many of us may have the ability to be critical thinkers, but unless we are consistently and internally motivated to think and reason this way, these abilities are effectively redundant. Such dispositions are both intellectual character traits,

and dispositions to behave in certain ways. Critical thinking disposition is defined as the tendency to do something given under certain conditions [7]. Critical thinking disposition is a tendency towards certain intellectual behavior patterns [8]. Critical thinking disposition is explained as a person's internal motivation to think critically when facing and solving problems, ideas to evaluate, or making decisions [9]. Based on some of these expert opinions, it can be concluded that a disposition or tendency must appear first before a person uses critical thinking skills.

There has been much research on students' critical thinking skills, but little is known about the propensity to use these skills [9][10]. A person who has critical thinking skills does not mean that the person will use them in situations that require the application of these skills [12]. So, in addition to teaching critical thinking skills, educational institutions need to develop student's critical thinking dispositions. An educator also needs to measure students' critical thinking disposition, so that they can determine the right intervention to be given in learning.

There is widespread acceptance of the idea that critical thinking should be an important dimension of science education [13]. Thus, for example, the National Science Education Standards [14] has as one of its goals the promotion of science as inquiry. Included in this goal are numerous items which focus on critical thinking, for example identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations; analysis of firsthand events and phenomena as well as the critical analysis of secondary sources; testing reliability of knowledge they have generated; and the critical abilities of analyzing an argument by reviewing current scientific understanding, weighing the evidence, and examining the logic so as to decide which explanation and models are best. Therefore, this study aims to determine profile of critical thinking disposition of science class students in high school.

## II. METHOD

This is a mixed method research that emphasizes quantitative and qualitative data collection [15]. In this study, qualitative data was embedded in the quantitative data collection process to support the research results. Students' CTD profiles data were obtained through questionnaires, observations, and interviews. Students selected as samples in this study were determined by random sampling. The selected students were science students in high school.

The questionnaire used was a closed questionnaire developed by Nursyamsi [16]. There are 7 indicators of CTD questionnaire: 1) inquisitiveness; 2) open-mindedness; 3) systematicity; 4) truth-seeking; 5) analyticity; 6) self-confidence; and 7) maturity. CTD questionnaire using a Likert scale with five answer options, namely: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. Data obtained from student response questionnaires were processed using descriptive statistics. The criteria for the achievement of the CTD indicators developed refer to the assessment guidelines [17]. There are criteria for CTD profile, a)  $x \geq 85$  is very good; b)  $75 \leq x < 85$  is good; c)  $65 \leq x < 75$  is moderate; d)  $55 \leq x < 65$  is low; and e)  $x < 55$  is very less.

## III. RESULTS AND DISCUSSION

Based on the results of the questionnaire analysis, the average score of students' CTD in general needs to be improved in each indicator because no one has reached the high category i.e good or very good, all of them are still in the low and medium categories. Especially in the indicators of inquisitiveness, self-confidence, and analyticity which obtained scores in the less category (smaller than 65). While the open-mindedness is indicator with the highest score in the moderate category. The results of the CTD questionnaire analysis are presented in the graph in Figure 1.

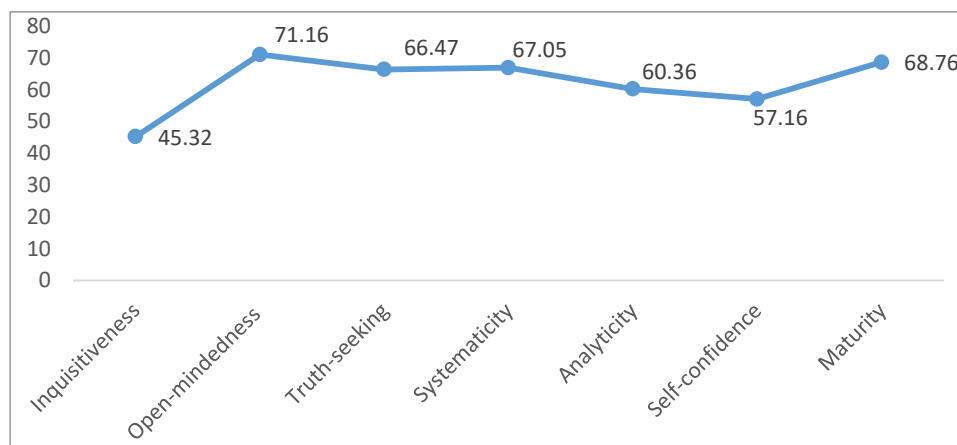


Fig 1. CTD Analysis of Science Class in High School

Figure 1 shows that the average score of the CTD indicator of inquisitiveness is far behind other indicators. Whereas the indicator of inquisitiveness is one of the scientific behaviors that need to be developed and is contained in the core competencies and basic competencies of Physics subjects in high school. Inquisitiveness is needed to encourage students to be interested in learning and exploring information in teaching and learning activities. Inquisitiveness can be identified from the desire to learn, investigate, and find out [18]. Another opinion is that inquisitiveness is an aspect of intrinsic motivation that has great potential to improve student learning [19].

Inquisitiveness is an indicator that is expected to be present in students to be able to carry out an optimal learning process. With a sense of inquisitiveness, students will strive to learn the subject matter, be it through investigation or scientific work. Inquisitiveness is a prerequisite for the investigation of the environment, as well as the investigation of our own ideas and emotions - leading to the integration of new perspectives and experiences [20]. Inquisitiveness is needed to encourage students to be interested in learning and exploring information in teaching and learning activities. The more students feel curious about something they are learning, the closer they will be to their learning environment, including their work groups [21].

In addition to inquisitiveness, Table 1 shows that the CTD questionnaire score on the self-confidence indicator is also a low category score. Based on result, self-confidence is one of the student characteristics that can affect the improvement of learning achievement [22]. Students who have self-confidence will feel confident in their abilities so that they appear to have higher courage, social relationships, responsibility and self-esteem. Self-confidence is an adequate self-ability, aware of his abilities, and can utilize them appropriately [23]. Another opinion that someone who has confidence will dare to try new things in new situations, because they feel safe enough, calm, and have their own measure of failure and success [24].

High self-confidence can be present in students when they believe in their strengths and this belief makes them feel capable of achieving various life goals. Self-confidence is one of the main sources of a person's potential in life. If a person no longer believes in themselves, for example, they do not believe in their life goals and the decisions they make and do not believe in their potential and possibilities, then all their potential is lost [25]. Therefore, self-confidence is one of the characters that can make students optimistic and resilient in facing various problems by optimizing all their abilities.

In addition, it can be seen in Figure 4.1 that the indicator of analyticity also still needs to be improved. The analysis indicator is the application of reasoning in using evidence in solving problems. The analysis indicator is needed to help students solve problems encountered in everyday life. In line with the results which explains that there is a positive relationship between scientific reasoning patterns and the ability to solve Physics synthesis problems [26].

In general, the average score of students' CTD questionnaire still needs to be improved. This is also in line with the results of interviews conducted, Physics teachers also complained that there are still some problems in students, including those related to improving students' critical thinking in decision making. Excerpts of the results of interviews with Physics teachers as shown in Figure 2.

Researcher: "What is problems you encounter when teaching in the classroom?"

Teacher : "In class, the children complained that the previous test (test per chapter) was difficult because they were given different questions from the sample questions. Only 3 students in the class achieved the required score, and other student will be remedial."

Figure 2. A copy of the interview with the teacher regarding problems in the classroom

Based on the copy of the interview in Figure 2, the teacher complained about students' learning outcomes that had not reached the completion grade. Students have difficulty developing their reasoning power in solving problems and applying the concepts they have learned to real conditions. This indicates that students have not been trained to think critically. Critical thinking is an intellectual process to actively and skillfully apply, analyze, synthesize, and/or evaluate information collected or generated by observation, experience, reflection, reasoning, or communication, as a guide to beliefs and actions [27]. So active involvement in learning and assessment activities is needed to be able to develop students' critical thinking disposition. This requires the design of innovative learning and assessment strategies that can support students in developing critical thinking dispositions.

#### IV. CONCLUSION

Based on the results of the questionnaire analysis, the average score of students' CTD in general needs to be improved in each indicator because no one has reached the high category, all of them are still in the low and medium categories. Especially in the indicators of inquisitiveness, self-confidence, and analyticity which obtained scores in the less category. While the open-mindedness indicator is the indicator with the highest score in the fair category. So active involvement in learning and assessment activities is needed to be able to develop students' critical thinking disposition. This requires the design of innovative learning and assessment strategies that can support students in developing critical thinking dispositions.

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