Biology prospective teachers’ critical thinking disposition and critical thinking skills of IKIP Mataram

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Abstract: Preparing prospective teachers as professional teachers is a very basic part of universities based on education and teacher training. In order to support professionalism career, prospective teachers must be equipped with 21st century skills, one of which is critical thinking skills, but to be able to think critically, prospective teachers must also have a critical thinking disposition, because critical thinking disposition is a prerequisite for acquiring critical thinking skills. This research is a survey study aimed at explaining the relationship between thinking dispositions and critical thinking skills. The prospective teachers critical thinking skills data were collected using essay questions, while the critical thinking disposition was collected using a critical thinking disposition questionnaire adopted from the California Critical Thinking Disposition Inventory (CCTDI). The Sample in this research is taken by simple random sampling, obtained sample or respondent as many as 103 prospective teachers. The data in this study was statistically analyzed using Pearson product-moment ($r$). Based on the result of an analysis, $R$-value is 0.209. This $r$ value indicates the low critical thinking disposition of prospective teachers, although there is a relation between the critical thinking disposition itself and the critical thinking skills of the prospective teachers, so that the value of $r$ also indicates to be taught about the critical thinking disposition to the prospective teachers to acquire critical thinking skills as their professional career supporters.

1. Introduction

Talking about the 21st century there must be a different definition between everyone. The difference is strongly influenced by the understanding it has, but the most basic is that we can not resist the changing times, including the 21st century. Partnership for 21st century skills (P21) classifies some of the learning objectives that students should possess, including innovative skills, information, media, and technology literacy, life and work skills [1]. Based on this course, universities have the challenge to prepare prospective teachers to become professional teachers, ie prospective teachers who have an understanding of how students learn, how to teach effectively including understanding the material being taught, having an understanding of the culture, and the context of learning[2].

Preparing prospective teachers to become professional teachers as stated by [2] is the basic part or agenda of every college based on education and teaching. Kong, Loving & Wilson, Wangenstein, Johansson, Bjorkstom & Nordstrom, stated that critical thinking skills are an attribute of intellectual development, knowledge acquisition, and application knowledge, so that teachers are required to teach critical thinking skills to their students [3], but not only that, the teachers also have to develop their critical thinking skills [4], or with other statements, a teacher can not teach or facilitated students to have critical thinking skills, before the teacher itself have the critical thinking skills. Therefore, to support his professional career, prospective teachers must be equipped with critical thinking skills [4].
The critical thinking skills as one of the skills that must be possessed by the prospective teacher have been reviewed by the experts, so that there will be no uniform definition of critical thinking skills, but even so, the existing definitions of critical thinking have the same attributes. According to the Critical Thinking Cooperation, it is argued that critical thinking skills are more than memorizing skills, which when students perform critical thinking skills, they think of themselves, ask questions, hypothesize, analyze and synthesize events, prove facts through new hypothesis testing [5]. Ennis, Black & Black, Ellis, stated that critical thinking refers to the ability to evaluate and explain a phenomenon through the search for relevant information or evidence before making a decision, solving problems, evaluating the situation, and performing an action in an accurate manner or method [6]. Elder, that critical thinking is a model of thinking about the subject, concept or problem of critical thinkers clearly changing the structure of thinking and developing their thinking by applying it [7], and Facione explains the components of critical thinking skills, which are analyzing, giving a comment, self-regulation, identifying assumptions, explaining and evaluating [8].

Based on the definitions of critical thinking skills provided by the experts above, it can be seen that critical thinking skills refer to the first; a series of processes, such as finding information, analyzing, evaluating, explaining. Second; is the ability to solve problems, develop thinking and knowledge through hypothesis testing and its application Thus the importance of critical thinking skills in education so that it becomes one of the learning orientations in every level of education, but even so, in order to have critical thinking skills, prospective teachers must have a critical thinking disposition, because the disposition of critical thinking is a prerequisite for critical thinking skills [9], critical thinking skills depend on the disposition of a person [10], so the prospective teacher requires the disposition of critical thinking to use his critical thinking skills [3].

Prospective teachers may have critical thinking skills, but they must also have a critical thinking disposition, or with other statements, both (critical thinking disposition and critical thinking skills) should be taught together [3]. Facione calls critical thinking disposition as an internal motivation, that an internal motivation to solve a problem and make a decision using critical thinking skills [3]. The disposition of critical thinking as a factor related to critical thinking consists of inquisitiveness, systematicity, analyticity, truth-seeking, open-mindedness, self-confidence, and maturity [11]. Facione further argues that ideally the critical thinker is having inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, 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 [12].

Based on the conclusion [13] critical thinking skills are very supportive for the progress of the nation, so critical thinking skills must be developed for Nigerian students and students, and become the main content or purpose of education, but based on the statement [3] that the disposition of critical thinking is a precondition or precursor of thinking skills critical. Based on this statement [3], it is claimed that the disposition of critical thinking should first be trained or learned, and/or integrated on learning rather than critical thinking skills. While studies conducted by [14] only come to identify the critical thinking disposition of prospective teachers in different faculties, Computer Education and Instructional Technology, Primary School Mathematics Teaching, Classroom Teaching and Science Teaching Departments of Faculty of Education, but it has not shown the relationship between critical thinking disposition with the thinking skills of prospective teacher students. Based on this, it can be claimed that it is very important to teach the critical thinking disposition because the disposition of critical thinking is a bridge for prospective teacher students to develop their critical thinking skills [3]. In addition, the disposition of critical thinking is a factor influencing thought patterns or quality of
thinking, which involves various thought processes, and invests their thought processes [15]. Therefore, research on Biology Prospective Teachers Critical Thinking Disposition and Critical Thinking Skills of IKIP Mataram was carried out with the aim to explaining the relationship between the disposition of critical thinking with the critical thinking skills of prospective biology teacher candidates for FIMIPA IKIP Mataram.

2. Methods
This research is a survey research that aims to explain the relation between critical thinking disposition and critical thinking skills of biology prospective teachers, IKIP Mataram.

Sampling procedure
Samples in this study amounted to 103 biology prospective teachers who remained using simple random sampling technique, and the data in this study were collected using test techniques and questionnaire techniques. The test technique used in the form of an essay test is used to collect data about critical thinking skills of biology prospective teachers, while the questionnaire technique is used to collect data about the disposition of critical thinking of biology prospective teachers. The questionnaire used was adopted from California Critical Thinking Disposition Inventory (CCTDI).

3. Results and Discussion
The data of this study were analyzed using Statistical Package for the Social Sciences (SPSS). Correlations between critical thinking dispositions and critical thinking skills were analyzed using Pearson product-moment (r) correlation at a 0.05 level of significance. The result of Pearson product-moment (r) SPSS analysis is shown in Table 1 and 2 below.

Table 1. Descriptive Analysis of the Score of Critical Thinking Disposition and Critical Thinking Skills

| Descriptive Statistics | Mean   | Std. Deviation | N   |
|------------------------|--------|----------------|-----|
| CCTDI                  | 55.42  | 8.515          | 103 |
| CTS                    | 52.94  | 7.956          | 103 |

Table 2. Pearson product-moment analysis (r) Critical Thinking Disposition and Critical Thinking Skills correlations

|                  | Std. Deviation | N   |
|------------------|----------------|-----|
| CCTDI Pearson Correlation Sig. (2-tailed) N | 8.515          | 103 |
| CTS Pearson Correlation Sig. (2-tailed) N   | 7.956          | 103 |

*Correlation is significant at the 0.05 level (2-tailed)

Table 1 above shows the results of descriptive analysis of critical thinking disposition scores of 103 biology teacher candidates, that the average critical thinking disposition score is 55.42, standard deviation of 8.515, while Table 2 shows the results of Pearson product-moment (r) analysis at the level significance of 0.05, that is known that the value of $r = 0.209$. From this value of $r$, it is known that the disposition of critical thinking skills correlates with critical thinking skills.
Critical thinking skills is one of the themes in 21st century education, so critical thinking skills serve as one of the goals or achievements of learning that students should have, including prospective teachers, but to have critical thinking skills, the disposition of critical thinking skills, and this is a very influential basic idea in education.

Based on the results of research that has been done as shown in Table 1, namely that the critical thinking disposition of biology teacher candidates, Mathematics Education Faculty, Teacher Training and Education Institute is still low, although there is a correlation between the disposition of critical thinking and critical thinking skills, as shown in Table 2 ($r = 0.029$). This result is also reinforced by the findings of previous research, that is, especially at the level of higher education (university) shows the same result, i.e. the disposition of critical thinking of students is still low [4][11][16][17][12][9].

Referring to the statement [18], that the disposition of critical thinking is internal motivation, so the low disposition of critical thinking of the biology teacher candidate is understandable, first; not in line between intellectual ability (critical thinking skills) with internal potential. These internal potentials are expressed as beliefs to have something, including in of having critical thinking skills, the ability to solve problems, or with other assertions that prospective teachers do not believe that the disposition of critical thinking can be a factor that influences critical thinking skills, [19] added that a lack of confidence in knowledge acquisition or the ability to solve problems has an impact on the unresolved problem.

Second; this second factor is more methodical, the learning method used focuses on the development of critical thinking skills, but is not followed by the teaching of critical thinking disposition as the precursor of critical thinking skills, or with other statements, the disposition of critical thinking is rarely nominated or expressed, as stated by [3], namely that between the disposition of critical thinking and critical thinking skills should be taught simultaneously, as [15] stated that developed a critical thinking disposition using task-based learning, and pointed out the differences, both at the critical thinking disposition between class experiment and control class, as well as on ability to solve problems, make a decisions.

4. Conclusions

Based on the result of the study and the limitations of the discussion, it is known that there is a correlation between the critical thinking disposition and critical thinking skills. Both theoretical and empirical support the results of this research, namely that the critical thinking disposition is a prerequisite or precursor to having critical thinking skills, and to be a good thinker, prospective teacher candidate must have a critical thinking disposition [18], and based on the result analysis conducted, it is known several factors that influence the low critical thinking disposition, such as not being informed or not taught the critical thinking disposition itself. Because the disposition of critical thinking is a prerequisite of critical thinking skills, therefore, several things can be recommended from this study, first; as a logical consequence of the demands of 21st century skills learning that emphasize critical thinking skills, the disposition of critical thinking must be integrated on learning. Second; for further research to examine in detail the influence or relationship between each component of critical thinking disposition on critical thinking skills, as well as research to develop thinking disposition.

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