

Analysis of the Relationship Between Critical Thinking Skills and Student Problem Solving Skills

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Abstract-This study aims to analyze the relationship between critical thinking skills and students' problem solving skills. The research approach uses a quantitative approach with survey research types. The research sample consisted of 65 students (45 women and 20 men) with a research design using a cross-sectional survey. The research data were analyzed using the linear regression test at a significance level of 0.05. Based on the findings of the research that has been done, it can be concluded that, among others; 1) student problem solving skills are lower than critical thinking skills, and 2) there is a significant relationship between critical thinking skills and student problem solving skills. Thus, the implementation of problem-based learning has a strong relevance to students' critical thinking skills so it is very necessary to develop learning models that are able to develop students' critical thinking skills and problem solving skills so that they have a positive impact on their academic achievement.

Index Terms- Critical thinking skills, problem solving skills, students.

I. INTRODUCTION

The development of student soft skills is one of the main focuses in order to achieve maximum learning objectives, including critical thinking skills and problem solving skills. Students' critical thinking skills can be developed through the application of active and innovative learning models so as to stimulate students to think logically and critically which can improve their learning outcomes (Isnaeni et al., 2021; Van Peppen et al., 2021; Wahyudiati, 2022a). The learning process that actively involves students to be involved in learning activities is one of the efforts that can be carried out by lecturers to be able to develop students' critical thinking skills. However, based on the results of previous research, it shows that learning activities still tend to be monotonous and prioritize understanding of concepts or mastery of material compared to developing students' critical thinking skills (Tanti et al., 2020; van Peppen et al., 2021; Wahyudiati & Ningrat, 2022; Wahyudiati & Qurniati, 2022). Thus, learning activities that are oriented towards material mastery alone must begin to shift to developing students' critical thinking skills as one of the learning objectives that must be achieved in tertiary institutions.

In addition to critical thinking skills, problem solving skills as one of the characteristics of 21st century skills must be developed at the tertiary level. Thus, learning activities that are oriented towards problem solving activities determine the

achievement of learning objectives so that they can positively influence the development of student soft skills as a benchmark for achieving learning objectives (Erozkan, 2013; Fadli & Irwanto, 2020). However, referring to the results of previous research, it proves that learning processes and activities in tertiary institutions still tend to apply the lecture method and there is still a lack of application of learning models that can develop student problem-solving skills which have an impact on the low learning outcomes obtained by students (Fadli, 2019; Klachuen & Srisophan, 2021; Wahyudiati, 2021).

Problem solving skills are individual abilities to analyze problems, formulate hypotheses, and are skilled in solving problems through the scientific method. Developing student problem-solving skills can be done through learning activities oriented towards scientific methods starting from identifying problems, compiling hypotheses, and being skilled in solving problems with the stages of learning activities by applying the scientific method (Dewi et al., 2017; Wahyudiati, 2021; Zulfah & Gymnastics, 2018). In addition, the ability to think critically is the ability possessed by individuals in solving problems through logical and systematic thinking with reference to the stages of the scientific method. Improving students' critical thinking skills can be done through the application of learning models that refer to scientific investigation activities that refer to logical and critical thinking so that they are able to solve problems systematically (Fadli, 2022; Fadli & Irwanto, 2020; Iyamuremye et al., 2022; Wahyudiati & Qurniati, 2022). In addition, students' problem-solving skills and critical thinking skills can be stimulated through discussion activities and scientific experiments involving group collaboration in completing assignments so as to improve students' soft skills (Irwanto Irwanto et al., 2021; Mundilarto & Ismoyo, 2017; Simanjuntak et al., 2021; Wahyudiati, 2022; Yustina et al., 2022).

The learning process that activates students to construct knowledge and skills is an alternative that can be applied to improve students' critical thinking skills and problem solving skills. However, the results of previous research indicate that learning activities in tertiary institutions tend to override students' critical thinking skills and problem solving skills as learning objectives (Smith, 2012; Sutrisno et al., 2020). In addition, learning problems in tertiary institutions also occur due to a lack of planning, implementation, and evaluation of learning that is oriented towards a contextual approach so that it has an impact on the low quality of student learning processes and outcomes (Mundilarto & Ismoyo, 2017; Valdez & Bungihan, 2019; Zhu, 2007). Therefore, it is very urgent and urgent to conduct research at the tertiary level which aims to analyze the relationship between

critical thinking skills and student problem solving skills which has so far been rarely done.

II. METHOD

The research approach uses a quantitative approach with survey research types (Creswell, 2000). The research design chosen in this study was a cross-sectional survey design. The research population was all students at Mataram State Islamic University with a total sample of 65 students (45 women and 20 men). The selection of this type of survey research aims to determine whether

III. FINDINGS

Based on the research results, namely to analyze the relationship between critical thinking skills and student problem solving skills. Before the linear regression test was carried out, the average score and standard deviation obtained by students were first determined which aimed to determine the level of critical thinking skills with student problem solving skills. Based on the results of the data analysis that has been done, it shows that students' problem solving skills are lower than critical thinking skills with an average value of 80.50, while the average value of students' critical thinking skills is 86.55 (Table 1).

Table 1. Mean Value of Students' Critical Thinking Skills and Problem Solving Skills

Aspects measured	N	Mean	SD
Critical Thinking Skills	65	86.55	4.85
Problem solving skills	65	80.50	4.65

Further data analysis used a linear regression test. Based on the results of data analysis, it shows that there is a significant relationship between critical thinking skills and student problem solving skills (Table 2), which means that the alternative hypothesis is accepted and the null hypothesis is rejected.

Table 2. Regression Test Results for Students' Critical Thinking Skills and Problem Solving Skills

Test	df	F	Sig
Regression	2	.875	.000

IV. DISCUSSION

The research findings show that students' problem solving skills are lower than critical thinking skills with an average score of 80.50, while the average value of students' critical thinking skills is 86.55. The ability of problem solving skills measured in this study uses four indicators, namely; 1) understand the problem, 2) plan to solve the problem, 3) solve the problem according to plan, and 4) re-check all steps. Referring to the average value of student problem-solving skills with an average value of 80.50, it is included in a fairly high category which is caused by applying learning models that refer to a contextual approach in learning so as to improve the ability to understand problems, the ability to plan, and solve problems that have an impact on improving student learning outcomes (Fadli, 2019; Fadli & Irwanto, 2020; Irwanto et

there is a significant relationship between critical thinking skills and student problem solving skills.

The instrument for measuring problem solving skills uses four indicators, namely 1) understanding the problem, 2) planning a settlement, 3) solving the problem according to plan, and 4) re-checking all steps. The instrument for measuring critical thinking skills refers to the rubric of Oliver Hoyo (2003) with 4 indicators, namely; (1) analytical skills, (2) attitudes towards scientific inquiry, (3) application of scientific attitudes, and (5) learning experiences. Furthermore, to analyze the research data using a linear regression test to determine the relationship between critical thinking skills and student problem solving skills.

al., 2018; Wahyudiati, 2021). Increasing the ability of students' problem solving skills is also relevant to the results of previous research which shows that scientific investigation activities that can involve students to be actively involved in learning activities can have a positive impact on the ability to understand problems, the ability to plan, and solve problems owned by students (Fadli, 2019; Irwanto et al., 2018; Wahyudiati, 2021).

The critical thinking skills measured in this study include 4 indicators, namely; (1) analytical skills, (2) attitudes towards scientific inquiry, (3) application of scientific attitudes, and (5) learning experiences. Referring to the research results, the average value of students' critical thinking skills is included in the high category because the learning experience applied refers to activities that train students to think logically and critically so that students are able to construct knowledge and experience that can improve their critical thinking skills (Isnaeni et al., 2021; Reyk et al., 2022; Suardana et al., 2018). In addition, the results of previous research also show that students' critical thinking skills are also influenced by the application of scientific investigation-based learning models so as to increase students' interest, perseverance, curiosity (Fadli & Acim, 2007; Wahyudiati et al., 2019; Wahyudiati & Qurniati, 2022; Yustina et al., 2022). The research findings are supported by the following interview results:

According to A1 (lecturer) "Problem-solving activities carried out in learning activities make students have higher motivation in carrying out scientific investigation activities so as to be able to improve students' critical thinking skills so that they have a positive impact on increasing student academic achievement". Ca (student) believes "I am very motivated in carrying out problem-solving-based activities because it can develop critical thinking skills and make learning more meaningful".

The results of other studies also prove that there is a significant relationship between critical thinking skills and student problem solving skills. Implementation of scientific method-based learning makes learning more meaningful and enjoyable because learning activities not only memorize concepts, but also prove concepts through scientific investigation activities (Reyk et al., 2022; Suardana et al., 2018; Sumardi & Wahyudiati, 2021; Wahyudiati & Fitriani, 2021). There is a significant relationship between critical thinking skills and student problem solving skills because the lecturer applies a contextual-based learning approach that can involve students to be actively involved independently in constructing knowledge and developing the ability to analyze, think logically, think systematically, and prove hypotheses so that have an impact on improving problem solving skills and students' critical thinking skills. Various other relevant research results also show that a learning environment that refers to students' daily life

experiences can develop more factual learning experiences so that students are more motivated to be actively involved in learning activities and in doing coursework assignments (Irwanto et al., 2018; Zhu, 2007).

Learning experiences that refer to scientific investigation activities can be an alternative in developing students' critical thinking skills and problem solving skills to achieve learning objectives that prioritize the achievement of soft skills. This condition is also proven by the results of research proving that students' problem-solving skills and critical thinking skills can increase student learning interest and motivation which have a positive effect on their academic achievement (Armağan et al., 2009; Fadli, 2019; Mergendoller et al., 2006; Simanjuntak et al., 2021; Wahyudiati, 2021). Thus, it is very important to apply learning models or learning approaches that prioritize scientific investigation-based activities so as to be able to create more interesting and meaningful learning experiences so as to be able to improve students' critical thinking skills and problem solving skills as demands for 21st century learning.

V. CONCLUSION

Based on the research results, it can be concluded: 1) students' problem solving skills are lower than critical thinking skills, and 2) there is a significant relationship between critical thinking skills and student problem solving skills. Thus, the implementation of problem-based learning has a strong relevance to students' critical thinking skills so it is very necessary to develop learning models that are able to develop students' critical thinking skills and problem solving skills so that they have a positive impact on their academic achievement. Likewise, the implementation of scientific investigation-based learning is able to create more interesting and meaningful learning experiences so that it has a positive impact on improving students' critical thinking skills and problem solving skills as demands for 21st century learning.

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