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The correlation between critical thinking skills and decision-making skills of prospective physics teacher students

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Abstract

This research aims to find out the relationship between critical thinking skills and the decision-making skills of prospective physics teacher students. This research is correlational or relationshipal, and it is ex post facto research with a quantitative approach. The population of this study was all first-semester students, totaling 99 students at one of the universities in South Sulawesi. The sample used in this research was 76 students, taken using convenience sampling. The results of the research show that there is a positive correlation between critical thinking skills and the decision-making skills of prospective physics teacher students, with a correlation coefficient (r_{xy}) of 0.549 at a medium level and a coefficient of determination of 30.1%. Thus, if a student's critical thinking skills are high, the higher their decision-making skills, or vice versa, the lower the student's critical thinking skills, the lower their decision-making skills.

Keywords: correlation; critical thinking skills; decision-making skills

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INTRODUCTION

In the 21st century, people will be faced with decision-making problems in various matters, whether in terms of work, education, the use of tools or goods, and so on. People living in the 21st century are required to have skills for making decisions when faced with a variety of choices, each of which has advantages and disadvantages. With skill in making decisions, the decisions taken will be the best decisions and will provide real benefits (Gok & Silay, 2008).

The learning process plays a role in supporting students' decision-making skills (Kaşkaya et al., 2017; Robinson & Kaleta, 1999). A person's skills in decision-making depend on personal experience or what they learn in classroom learning activities (Robinson & Kaleta, 1999). Therefore, provision (training) of decision-making skills can be carried out through learning activities that are designed both in terms of content and learning activities (Swartz, 2001). Courses that are considered to provide decision-making skills are the science courses (Robinson & Kaleta, 1999)(Jho et al., 2014)(Covitt et al., 2013)(Solem & Boehm, 2018). Students have the perception that science courses have the potential to

train decision-making skills (Soobard & Rannikmäe, 2014).

Physics is a science lesson that has content and activities that really support the provision of decision-making skills. Physics covers a variety of content and concepts that are closely related to everyday contexts. In physics content, there are relationships between concepts with many variations, so there will be many choices of relationships between concepts (formulas or equations) that can be chosen to solve a relevant problem. Which equation (formula) should be chosen is, of course, the most relevant to the problem at hand. Choosing relationships between concepts that will be used in solving a problem is training in the ability to choose and make decisions. It is clear that physics content can be used as a means of providing decision-making skills.

There are two things that support decision-making skills, namely knowledge relevant to choice problems and the ability to evaluate and assess the variety of options available. The ability to evaluate and assess is closely related to critical thinking skills. Thus, it is clear that someone who has the ability to evaluate and assess or has critical thinking skills will be able to produce the best decisions when faced with choices and has to make a decision. Decision-making skills are strongly supported by critical thinking skills as the basis (Balela et al., 2021).

Based on the background explained above, research will be carried out on the relationship between critical thinking skills and the decision-making skills of prospective physics teacher students. The purpose of this research is to find out the relationship between critical thinking skills and the decision-making skills of prospective physics teacher students.

METHODS

The type of research used is correlation or relationship research and ex post facto research with a quantitative approach. Correlation research aims to find out whether there is a relationship or not and if there is, how close the relationship is and whether the relationship is meaningful or not (Arikunto, 2013). This research uses an associative research design, namely the relationship between the independent variable, namely critical thinking skills, and the dependent variable, namely student decision-making skills. The research design carried out can be seen in Figure 1 (Sugiyono, 2020).

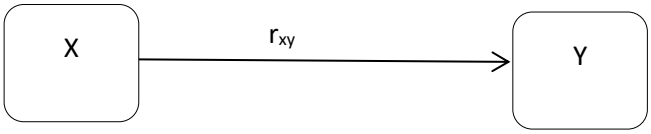

Figure 1. Research design

The population in this study was all first-semester students, totaling 99 students at one of the universities in South Sulawesi. The population sample was 76 students, and the technique used in sampling was convenience sampling. Convenience sampling is sampling based on the availability of elements and the ease of obtaining them (Sekaran, 2006).

Data on critical thinking skills was obtained through administering critical thinking skills tests in the form of descriptions developed based on indicators of critical thinking skills from Tiruneh (Tiruneh et al., 2014). Meanwhile, data on decision-making skills was obtained through administering a decision-making skills test in the form of a description developed based on indicators of decision-making skills from Chattabud dkk (Chattabud et al., 2015).

The data analysis technique used to describe the correlation between critical thinking skills and decision making skills uses product moment correlation. Equation 1 shows the formula for product moment correlation (Sugiyono, 2020).

$$r_{xy} = \frac{\sum X_i Y_i}{\sqrt{(\sum X_i^2)(\sum Y_i^2)}} \quad (1)$$

To determine the closeness of the relationship or correlation, use the guidelines for interpreting the correlation coefficient values contained in Table 1 (Sugiyono, 2020).

Table 1. Interpretation of Correlation Coefficient Values

Coefficient Interval	Relationship Level
0.00-0,199	Very low
0,20-0,399	Low
0,40-0,599	Moderate
0,60-0,799	Strong
0,80-1,000	Very strong

In correlation analysis, a coefficient of determination will also be determined, whose value is a square function of the correlation coefficient value. The goal is to find out the percentage of explanation for one variable by other variables. The equation used in determining the coefficient of determination is shown in equation 2 (Tiro, 2010). Kd is the coefficient of determination and r is the correlation coefficient.

$$\mathrm{Kd} = \mathrm{r}^2 \quad (2)$$

RESULTS AND DISCUSSION

Figure 2 shows the relationship between critical thinking skills and decision-making skills of prospective physics teacher students who are research subjects.

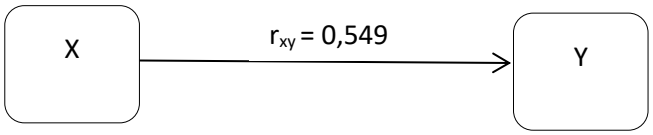

Figure 2. The relationship between the variable critical thinking skills (X) and decision-making skills (Y)

Table 2 shows the results of the correlation analysis and coefficient of determination between the variables critical thinking skills and decision-making skills.

Table 2. Calculation of the Product Moment Correlation and Coefficient of Determination between Critical Thinking Skills (X) and Decision-Making Skills (Y)

Correlation coefficient (r_{xy})	Category	Coefficient of determination
0,549	Moderate	30,1%

Based on the results of the correlation analysis and coefficient of determination in Table 2, it shows that the correlation coefficient value between critical thinking skills (X) and decision-making skills

(Y) is 0.549 in the medium correlation category. The coefficient of determination on the correlation between critical thinking skills (X) and decision-making skills (Y) is 30.1%, meaning that 30.1% of decision-making skills (Y) can be explained by critical thinking skills (X), while the remainder of 69.9% is explained by other variables.

Based on data analysis, it shows that there is a positive relationship between critical thinking skills and decision making skills with a moderate correlation category and a coefficient of determination of 30.1%. In the decision making process, activities to assess and evaluate each alternative solution are carried out so that the best solution is obtained. The results of this study are in line with the results obtained by Hill and Heidari & Ebrahimi. Heidari & Ebrahimi's research used a correlational research design, comparing critical thinking scores with decision making scores for 86 students. Critical thinking questionnaires from the California Critical Thinking Skills Test (CCTST) and decision-making questionnaires were created to collect data. The results of this study showed that the average critical thinking score was 8.32 ± 2.03, the average decision making score was 8.66 ± 1.89, and found a very significant relationship between critical thinking scores and decision making ($p < 0.001$) (Heidari & Ebrahimi, 2016). Hill's research, with a correlational research design, compared critical thinking scores from the Watson-Glaser Critical Thinking Appraisal with decision-making scores from the Clinical Simulation Self-Assessment Examination for 110 students. Hill's (2002) research results show a positive and very significant relationship ($r = 0.32$, $p < 0.01$) between critical thinking and decision making (Hill, 2002).

Critical thinking is a thinking process involved in decision-making. The combination of decision-making and problem-solving with critical thinking leads to great ideas and solutions (Humphrey, 2000). Being a good decision-maker cannot be separated from being a good thinker (Paul & Elder, 2002). Critical thinking is any mental activity that helps in making decisions. Critical thinking is a thinking process involved in decision-making (Swartz, 2001). Critical thinking is efficient in the decision-making process (Joshi, 2017). In developing and evaluating solution strategies, students need to engage in critical thinking to be able to identify solutions, combine multiple perspectives, and monitor and regulate their own problem-solving processes, especially during group work (Eggert et al., 2013). Someone who thinks critically will not receive information and immediately believe it but will first look for facts that support determining assumptions and then make a decision (Ivone, 2012).

There are several roles of critical thinking in decision-making: (1) assist in identifying the problems faced; (2) assist in gathering relevant information; (3) assist in analyzing alternative problem solutions to determine the best choice; and (4) assist in evaluating decisions that have been taken. Someone who wants to be a skilled decision-maker must be a skilled thinker.

Critical thinking is a mental activity that requires cognitive skills in solving problems, making decisions, and drawing conclusions (Mitrevski & O.Sajkov, 2012). Critical thinking is the process of making reasoned decisions based on consideration of available evidence, contextual aspects of the situation, and the concepts in question. Critical thinking is thinking that facilitates decisions (Yusal et al., 2021). Someone who has good critical thinking skills will provide good recommendations for taking action because critical thinking has its essence, namely an attitude used to assess something (Ennis, 1985) [25]. Someone can be said to think critically when they are able to make a judgment or make a reasoned decision about the quality of what they have seen and thought about.

CONCLUSION

Based on the results and discussion, it is concluded that there is a positive relationship between the critical thinking skills and decision-making skills of prospective physics teacher students, with a moderate correlation category. This means that if a student's critical thinking skills are high, the higher their decision-making skills, or vice versa, the lower the student's critical thinking skills, the lower their decision-making skills. The results of the data analysis show that the correlation coefficient value between critical thinking skills and decision-making skills is 0.549 in the medium correlation category. The coefficient of determination on the correlation between critical thinking skills and decision-making skills is 30.1%, meaning that 30.1% of decision-making skills can be explained by critical thinking skills, while the remaining 69.9% is explained by other variables. Thus, if students' decision-making skills are to be improved, students' critical thinking skills must be trained first through the science or physics learning process.

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