

## Creativity Profile Of Medical Laboratory Technology Students In Medical Instrumentation Learning

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### ABSTRACT

*Background: Sistem education from various countries prioritizes critical and creative thinking skills to improve individual skills in solving and understanding events in their environment. The aim of the study was to describe the creativity profile of students of the Applied Undergraduate Study Program of Medical Laboratory Technology, Health Polytechnic, Ministry of Health, Mataram. The research method used is descriptive research. Data was collected through a questionnaire made using the Google form and then distributed to research respondents totaling 52 students. The data analysis technique used is descriptive analysis using the percentage of each indicator. The results showed that students' critical thinking skills were low on indicators of providing further explanations and drawing conclusions, and creative thinking skills were low for students to think fluently and originally.*

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## INTRODUCTION

Paradise The gma of education, especially in the field of science, has undergone a fundamental shift. Teaching is no longer seen as a series of activities to convey knowledge (science products), but is more directed at the development and formation of students' mindsets (NRC, 1996). The development of thinking skills is important because they are not only needed in the learning process, but also in the world of work, family and society (Moseley, et al. in Ismet, Liliyasi, & Setiawan, 2012).

One focus of improving education in Indonesia is improving student learning creativity. Creativity has become an important part of the discourse on improving the quality of learning. Until now creativity has been well received as a competency inherent in learning processes and outcomes. The essence of creativity is to produce something better or something new (De Graff & Lawrence, 2002). New can mean as a result of perfecting, adding, changing, and repositioning something that existed before so that something changes for the better. If educators use this concept as a basis for developing learning, then the quality of their human resources will definitely get better. De Graff & Lawrence's opinion is reinforced by the results of research by Mukayatun et al (2013) and Novitayani (2015: 98) regarding the importance of creativity in learning that, high creativity affects the atmosphere and learning outcomes of students. So that creativity is seen as really needing to be improved in a learning process in order to achieve better quality learning

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Sistem education from various countries prioritizes critical and creative thinking skills to improve individual skills in solving and understanding events in their environment. In Higher Education, according to Uloli (2016) the process of creative thinking is very important for educators to know. One of the results of creative thinking is creativity. Creativity is an important provision for everyone in the future. However, the opportunity to express their creativity is still limited. This is in line with Khanafiyah's research (2008), that students need to be given a special forum to develop their creativity, namely with subjects or courses or by juxtaposing them into lecture material, especially practical learning.

The learning process, teaching materials are needed in the form of modules so that students can learn independently. In addition, modules can also function as reference materials and evaluation tools for students. A similar opinion was also expressed by Kiong et al (2011) in their research which stated that using modules could be an alternative approach to students in solving student learning problems. Apart from this, Novitayani (2015) also concluded in her research that the use of modules can help in increasing students' learning creativity. Therefore, good and appropriate module packaging needs to be arranged so that it can facilitate students in achieving good learning.

Kete critical and creative thinking skills are needed in learning science including learning Medical Instrumentation which is one of the courses in the Undergraduate Study Program of Applied Medical Laboratory Technology which aims to introduce students to medical devices used in diagnosing disease. The instrumentation course coded TLM 203 with a weight of 5 credits is a compulsory subject for the Study Program which consists of Theory and Practicum with courses spread over 3 Semesters. In Semester I, there are 2 credits (Theory and Practical), Semester II, 2 credits (Theory and Practicum) and Semester III, 1 credit (Practicum).

In the preliminary study that was carried out by conducting interviews with lecturers of the Medical Instrumentation course, the STr TLM Study Program, it is known that the learning material for the Instrumentation course is only focused on knowledge and skills to know the principles of using tools, parts and functions of tools, how to use and care for tools, how to calibrate laboratory equipment and the concept of calibration of laboratory equipment. Even though this course is expected to be able to train student creativity to be able to modify medical devices and make new, simple tools, so that they can answer the limitations of portable medical devices in the field.

Several panel many students' creativity regarding the modification of medical devices has been carried out under the guidance of lecturers in instrumentation courses. But that is only done by several student groups during the PPKM (Student Creativity Research Program) competition every year. Therefore it is necessary to develop Medical Instrumentation course material to foster the creativity of all students of the TLM Applied Undergraduate Study Program.

## **METHODS**

This study is an exploratory descriptive research (Muliadi, et al., 2023; Muliadi, Mirawati & Prayogi, 2021), fordescribes students' perceptions of creativity in learning medical instrumentation. The respondents of this study consisted of 75 students TLM applied undergraduate study program at the Mataram Health Polytechnic. Respondents were obtained using a convenience sampling technique because it considered the accessibility of respondents in filling out online questionnaires (Fink, 2011). The research instrument was in the form of a closed questionnaire with degraded answers according to the Likert scale (Muliadi, 2020) and utilizing the media google form (Adha, et al., 2020). The questionnaire

was compiled based on indicators of creativity, namely flexibility, originality, elaboration, and fluency (Situmorang, Rustaman & Purwianingsih, 2020). The questionnaire is arranged in 25 statements and has validated by experts (experts) and declared valid.

Analysis of research data using quantitative descriptive statistics and inferential statistics. Quantitative descriptive analysis to describe data on student perceptions about creativity in learning medical instrumentation. Student perception data is interpreted in the form of categories with the criteria as described in the following table.

Table 1. Criteria for interpreting student perceptions

Average score ( $\bar{p}$ )	Interpretation
3.51 – 4.00	Very good
2.51 – 3.50	Good
1.51 – 2.50	Pretty good
1.00 – 1.50	Not good

Inferential statistical analysis was used to determine differences in students' perceptions of creativity in learning medical instrumentation based on gender. The analysis technique used was the t-test at a significance level of 5% ( $\alpha = 0.05$ ) and previously performed normality and homogeneity tests. Interpretation of the results of the t-test analysis, then set the statistical hypothesis formulation is  $H_0: \mu_1 = \mu_2$  (no difference in perceptions of male and female students about creativity in learning medical instrumentation) and  $H_1: \mu_1 \neq \mu_2$  (there are differences in perceptions of male and female students about creativity in learning medical instrumentation). If the results of the analysis are significant or the p-value of the t-test is less than 0.05, then  $H_0$  is rejected and  $H_1$  is accepted or vice versa.

## RESULTS AND DISCUSSION

A description of the TLM applied undergraduate student perception data about creativity in learning medical instrumentation is presented in table 2 below.

Table 2. Data on student perceptions of creativity

Gender	N	$\Sigma$ Score	$\bar{p}$	Category
Man	6	17,32	2.89	Good
Woman	46	118,12	2.57	Good

The description of the measurement results in the table above shows that the perception of students of TLM applied undergraduate study programs about creativity in learning medical instrumentation has an average of 2.89 male students in the Good category and 2.57 female students in the Good category. The description of the data is emphasized in the following figure.

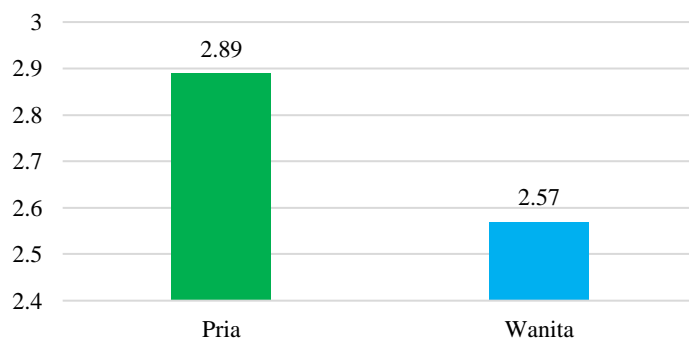


Figure 1. The average score of student perceptions

Data on student perceptions of TLM applied undergraduate study programs about creativity in learning medical instrumentation was analyzed by t-test, after fulfilling the prerequisite test, namely the homogeneity test and normality test at a significance level of 5% (0.05) as presented in Table 3 below.

Table 3. Homogeneity and normality test results

N	Homogeneity		Normality		
	Levenes Statistical test score	Sig.	Kolmogorov-Smirnov's test score	Sig.	
56	1,936	0.170	0.773	0.588	

The results of the homogeneity test in Table 3 show that the significance value is  $0.170 > 0.05$ , which means that the data variant is homogeneous. While the results of the normality test show that the significance value is  $0.588 > 0.05$ , which means that the data is normally distributed.

Analysis of differences in the perceptions of male and female TLM undergraduate students was carried out using the t-test (independent sample t-test) at a significance level of 5% (0.05) with the results of the analysis presented in Table 4 below.

Table 4. T-test results (independent sample t-test)

Student Perception	Group	Gender	t-test for Equality for Means			
			t	df	Sig.	Mean diff.
	Equal Variances Assumed		1.455	50	0.152	0.31884

The results of the t-test in Table 4 show that the significance value is  $0.152 > 0.05$ , so that H1 is rejected and H0 is accepted. This means that there is no difference in the perceptions of male and female students about creativity in learning medical instrumentation.

The results of students' critical thinking skills are described based on the following indicators. The results for the indicator "providing simple explanations" show that when students provide simple explanations it is like expressing existing facts. Overall, the "give a simple explanation" indicator gets a score of 50.4% in the moderate category.

The results for the "build basic skills" indicator show that when students check the accuracy of the data with a variety of different sources. Overall, the indicator "building basic skills" scores 50.4% in the moderate category. Overall, the indicator "building basic skills" scores 56.0% in the medium category. Acquiring scores in the moderate category on the indicator "building basic skills" supports the results of previous studies which stated that students' critical thinking skills were classified as moderate (Ariyatun and Octavianelis, 2020).

The results for the "draw conclusions" indicator show that student skills are still relatively low with a score of 39.0%. The skills of drawing conclusions and inferences are student skills in describing and drawing conclusions (Seventika, et al., 2018). This skill is very important for every student to understand and interpret learning material properly so that learning outcomes from learning are achieved.

The results for the indicator "making further explanations" show that students have difficulty providing further explanations from the data that have been obtained and

concluding problems from different perspectives, this is consistent with the acquisition of a score of 25.0% in the low category. While the results for the "strategy and tactics" indicator show that the skills possessed by students are still relatively low with a score of 33.0%, students are less able to provide alternative strategies in solving a problem.

High critical thinking skills can improve academic skills and students' curiosity about something so that students can easily find solutions to the problems they are facing. Critical thinking skills can increase students' self-confidence and independence in solving problems wisely (Adi and Junining, 2013).

Student knowledge and skills are only limited to learning materials provided by lecturers so that students are not trained to think at a higher level (higher order thinking skills). Low critical thinking skills not only cause students difficulties in understanding knowledge, but students also experience difficulties in facing exams and solving problems in everyday life. Critical thinking skills that are classified as low and moderate can affect students' skills in choosing the right profession in the future (Aizikovitsh-Udi and Cheng, 2015).

Hasil the creative thinking skills of TLM Applied Undergraduate Study Program students tesse in Table 5.

**Table 5 Results of Students' Creative Thinking Skills**

<b>indexator Percentage (%) Category</b>
Ketefluent thinking skills 40.0 Low Flexible thinking skills (flexible) 44.7
Moderate Original thinking skills 24.0 Low
<b>Raverage 36.2 Low</b>

Creative thinking skills are also very much needed in the Industrial Revolution 4.0 era. The results of students' creative thinking skills are seen from various aspects according to the indicators. The results of creative thinking skills to think fluently indicate that students are somewhat less trained in generating ideas and providing ideas for solving a problem. This can be seen from the distribution of scores obtained through a questionnaire. Overall the result of students' fluent thinking skills is 40.0% in the low category. Whereas for flexible thinking skills a score of 44.7% is obtained in the medium category, students have started to be able to discuss and discuss a problem and become a mainstay in their group. Flexibility shows the various ways that students give so that they refer to different answers and are a combination of knowledge that students have previously obtained (Endang, 2012). Flexibility is needed by students to be able to produce an innovation in learning.

Original thinking is also needed by students, but students still find it difficult to have their own way that is different from their friends in solving a problem. Overall the average score for the original thinking skill indicator is 24.0% in the low category. The low category of students' creative thinking skills shows that there is no effect of high, medium, and low academic ratings on learning (Nurhamidah, et al., 2018; Sugiyanto, et al., 2018).

## **CONCLUSIONS**

Based on the results of the study, it can be concluded that the critical thinking skills of TLM Applied Undergraduate Study Program students in the Medical Instrumentation Course are classified as low on indicators of providing further explanation and drawing

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conclusions. Meanwhile, the creative thinking skills of students of the TLM Applied Undergraduate Study Program to think fluently and original are still relatively low. So it is necessary to develop modules and learning models in the Medical Instrumentation Course.

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