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The influence of emotional quotient, creativity quotient, intelligence quotient and motivation on learning outcomes of expertise in mechanical engineering education students majoring in mechanical engineering faculty of engineering UNIMA

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Abstract
The main problem that will be examined in this research is learning outcomes and the purpose of this research is to determine the effect of Emotional Quotient, Creativity Quotient, Intelligence Quotient and Learning Motivation on Student Learning Outcomes of Mechanical Engineering Education Department, Faculty of Engineering, UNIMA. The method used in this study is a survey method with a quantitative approach and analyzed using the path paradigm, the population in this study amounted to 66 respondents so that the sample taken amounted to 63 respondents. Data collection techniques used are questionnaires, special tests for EQ, CQ, IQ and documentation for learning outcomes. The results in this study found a significant and positive effect between (1) variables CQ, Motivation and IQ on Learning Outcomes, (2) Variables EQ and CQ on Learning Motivation. And found two insignificant effects, namely the effect of CQ on learning outcomes and the influence of IQ on learning motivation.

Keywords: emotional questions, creativity questions, motivation, learning outcomes

Introduction

The success or failure of the University to prepare graduates to become skilled workers will affect the preparation of human resources, which in turn affects national economic growth. Globalization in the economy which means competition and competition has driven changes to the world of work and labor. Globalization, among others, brings changes to the organization of work, and the quality of the workforce. In turn, globalization has an impact on changes or reforms in education. There are at least three reasons why globalization affects education reform; namely reforms driven by competition, reforms driven by austerity in the financial sector, and reforms with the aim of improving the socio-political role of education.

With the aim of achieving learning outcomes that are in accordance with the character of vocational education, of course, the obstacles from outside and within the world of vocational education are very large. Especially in the Department of Mechanical Engineering Education, Faculty of Engineering, Unima which is the printer of "Vocational Education Technicians" for the machining field.

However, one thing that is unfortunate is that the learning outcomes of students majoring in mechanical engineering education, especially in the area of expertise of students majoring in mechanical engineering education, are still unsatisfactory, seen from the cumulative achievement index for the odd semester of the 2018/2019 academic year (Semester V) it is found that the average value of students is 2.50 (Source of data from the Department of Engineering Education Mechanical Faculty of Engineering UNIMA, see attachment).

According to Djamarah (in Supardi, 2015: 5), to find out indicators of learning success, it can be seen from the absorption of students and the behavior that appears in students. (a) Absorption, namely the level of mastery of the subject matter delivered by the teacher and controlled by students either individually or in groups. (b) Change and achievement of behavior as outlined in the basic competencies or teaching and learning indicators from not knowing to knowing, from not being able to being able from being incompetent to being competent.

Problems with learning outcomes may occur because of other factors that influence students in learning, resulting in poor learning outcomes. The learning motivation factors can arise due to intrinsic factors, in the form of desire and desire to succeed and encouragement of learning needs, hopes for ideals. While the extrinsic factors are the appreciation, a conducive learning environment, and interesting learning activities. These factors affect student learning outcomes. see the behavior of students with the naked eye, namely the desire to learn that feels not so strong when they study because of a lack of desire to learn so that it affects the value of the Grade Point Average. This can be seen from the students themselves who have not been able to motivate themselves to read books or find information about the subjects being studied. Also Emotional Quotient or EQ, which is a sense of curiosity from within students that looks still lacking, this is marked by the lack of aggressiveness of students towards new things and can also be seen from the behavior of students who are not fully able to control their emotions, they get bored easily in class while the lecture is running. There is also a Creativity Qoutient or CQ factor that can affect students when studying. There are factors that affect Creativity Quotient CQ, namely: Internal factors, namely factors that arise from within the individual.

The Creativity Quotient CQ factor is the ability to think about something new and unusual, and produce a unique solution to a problem, the ability to create something new,

unique and in new ways whose results can be useful for oneself and others. However, everything can also be based on the Intelligence Quotient or IQ factor of each student, because this is the basis of the intellectual abilities of the students themselves. Other factors that can also affect learning outcomes besides Emotional Quotient (EQ), Creativity Quotient (CQ), Intelligent Quotient (IQ) and Learning Motivation, are external factors such as learning environment, economy, learning facilities and infrastructure, and others. It was also found that these students, based on the factors that influence learning outcomes, factors such as EQ, CQ, IQ and learning motivation have a tendency to affect the learning outcomes of Mechanical Engineering students majoring in mechanical engineering education at UNIMA so that they are raised as problems that need to be investigated in this study. The Emotional Quotient (EQ) factor is the way students respond to material in class, Creativity Qoutient (CQ) which is the ability of students to provide new ideas and apply them in problem solving and Intelligence Quotient (IQ) which is the basis for knowing how far their abilities are. someone in understanding something.

Research Methods

The method used in this study is a quantitative method (Firdaus, 2017) with Ex-Post Facto Research, Ex-Post Facto Research is a researcher who examines events that have occurred in order to determine the cause and effect or factors that can cause these events (Carsel, 2018).

This study uses descriptive data analysis. This analysis will be used to examine the magnitude of the influence of 4 independent variables and 1 dependent variable, namely; Emotional Quotient (X1), Creativity Quotient (X2), Intelligence Quotient (X3), Learning Motivation (X4), and the dependent variable Learning Outcomes (Y).

Population and Sample

1. Population

The population in this study were students of the Mechanical Engineering Education Department, Faculty of Engineering, Manado State University Semester V for the 2018/2019 academic year totaling 66 people consisting of 3 classes. Regarding the number of populations in each class can be seen in the table below:

2. Sample

The sample in this study used a probability sample with a simple random sampling technique. This technique is done by taking a random sample, regardless of the level in the population, each element of the population has the same chance and is known to be selected as a subject (Nasution and Nandiyanto, 2021).

For the sample used in this study by determining the sample size as follows (Sugiyono, 2014):

$$s = \frac{\lambda^2 .N.P.Q}{d^2(N-1) + \lambda^2 .P.Q}$$

λ_2 with dk = 1, error rate 5%, P = Q = 0.5, d = 0.05. s = Number of Samples.

In accordance with the table for determining the number of samples from a certain population with an error rate of 5% in Sugiyono (2014) is a population of 66 with a sample at a probability level of 5% is 63.

A. Data Collection Techniques

Data collection techniques in this study used instruments in the form of special psychological tests and questionnaires, research instruments include:

a. Emotional Quotient, Creativity Quotient and Intelligence Quotient are measured by psychological tests in the form of special tests to determine a person's EQ, CQ and IQ.
b. Learning motivation as measured by the questionnaire instrument that fills out is students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University as respondents.
c. The learning outcomes obtained from the Cumulative Achievement Index (GPA) documentation data for the fifth semester of the 2018/2019 academic year in the mechanical engineering education department, Faculty of Engineering, Manado State University as respondents.

1. Variable Learning Outcomes in Mechanical Engineering Expertise

a. Operational definition

Learning outcomes are a target or target of teaching and learning activities. Because in the process the learning outcomes aim to achieve learning success associated with learning objectives which include aspects of authentic cognitive, affective and psychomotor assessment. While in mechanical engineering courses such as; (1) Engineering Physics, (2) Engineering Chemistry, (3) Engineering Mechanics I, (4) Machine Drawing I, (5) Computer Programming, (6) Engineering Mechanics II, (7) Machine Drawing II, (8) Displacement Heat I, (9) Mechanical Thermodynamics I, (10) Mechanical Measurement Techniques, (11) Heat Transfer II, (12) Engineering Thermodynamics II, (13) Mechanical Elements I, (14) CAD and CAM, (15) Dynamics/ Engineering Kinematics, (16) Materials Science I, (17) Mathematics III, (18) Engineering Mechanics III, (19) Pumps and Compressors, (20) Fluid Mechanics, (21) Materials Science II, (22) Machine Elements II, (23) Automation Control and Robotics, (24) Energy Conversion Machine/Boiler, (25) Gasoline Motor, (26) Mechanical Technology.

B. Data Analysis Techniques

Differential analysis is used to test the hypothesis using path analysis, Juliansyah (2011: 197). Previously carried out normality testing. In this regard, the stages of data analysis carried out are:

1. descriptive statistics
2. testing requirements analysis.
3. Hypothesis Testing.

C. Statistical Hypothesis

The research hypothesis was formulated using a path analysis system and using statistical hypotheses as follows:

1. Hypothesis I
a. H_0 : $\beta_{41} \leq 0$
b. H_1 : $\beta_{41} > 0$
2. Hypothesis II
a. H_0 : $\beta_{42} \leq 0$
b. H_1 : $\beta_{42} > 0$
3. Hypothesis III
a. H_0 : $\beta_{43} \leq 0$
b. H_1 : $\beta_{43} > 0$

Description

β_{41} = Path coefficient in the population stating Emotional Quotient (X1) on Learning Motivation (X4).

β_{42} = Path coefficient in the population stating Creativity Quotient (X2) on Learning Motivation (X4).

β_{43} = Path coefficient in the population stating Intelligence Quotient (X3) on Learning Motivation (X4).

Research and Discussion

A. Data Description

The description of the data presented in this section includes data on the variables Emotional Quotient (X1), Creativity Quotient (X2), Intelligence Quotient (X3), Learning Motivation (X4), and the dependent variable Learning Outcomes (Y), each variable as described the following:

1. Learning Motivation

The research data obtained were 63 respondents, then statistically processed, it was found that the learning motivation variable had an average value of 169.56, standard deviation of 15.880, median 167.00 for class intervals with a maximum score of 198 and a minimum score of 139, so that the range of scores was 59. Length of Class 7 (K= 1 + 3.3 Log n) and Class interval The distribution of the frequency distribution of the learning motivation variable scores can be seen in the following Figure 1:

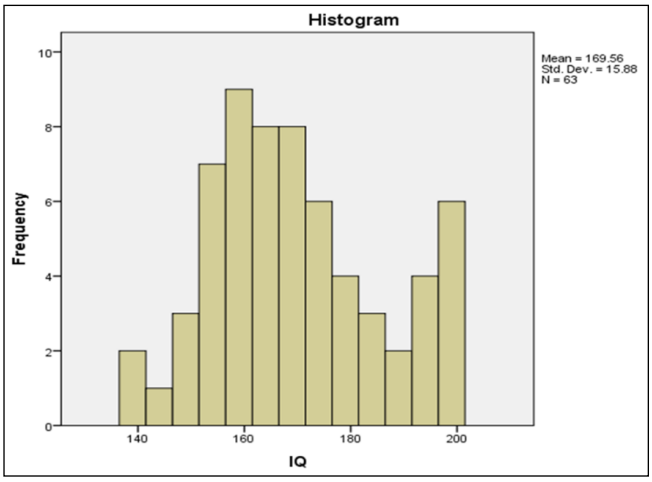

Fig 1: Histogram statistics frequency X4

In the Histogram, it can be stated that the learning motivation score in this study is very good, because the highest frequency lies in the 198 class interval, which is 6.3% of the total respondents. The distribution of learning motivation scores is shown in the histogram image 1.

2. Mechanical Engineering Learning Outcomes

The research data obtained were 63 respondents, then statistically processed, it was found that the Mechanical Engineering Learning Outcome variable had an average value of 80.3, standard deviation 7.607, median 82.00, class interval with a maximum score of 94 and a minimum score of 63, so the score range is 31. The length of Class 7 (K= 1 + 3.3 Log n) and the frequency distribution interval of the learning outcomes variable scores can be seen in the following Histogram:

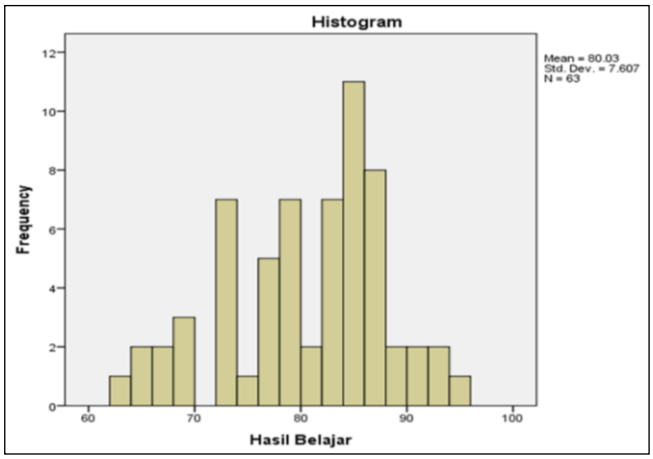

Fig 2: Histogram Mechanical Engineering Learning Outcomes

Figure 2, it can be stated that the score of mechanical engineering learning outcomes in this study is very good, because the highest frequency lies in the interval class 85 or the highest class, which is 12.7% of the total respondents. The distribution of scores for learning mechanical engineering can be seen in the histogram Figure 2.

B. Hypothesis testing

Hypothesis testing is carried out after all the requirements are met in the path analysis of the data obtained which is tested in the field, then the next step is hypothesis testing. The hypothesis to be tested is the effect of endogenous variables on exogenous variables, the model of the influence of the dependent variable which is analyzed based on theoretical concepts. This test is based on the calculation of the path coefficient with the help of SPSS Version 22 software.

Table 1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	76,167	15,168		5,021	,000
	X1	-,068	,173	-,074	-,392	,696
	X2	,047	,129	,071	4,343	,007
	X3	,084	,068	,165	2,229	,004
	X4	-,028	,066	-,058	1,416	,074
2	(Constant)	76,167	15,168		5,021	,000
	X1	-,068	,173	,480	5,549	,000
	X2	,047	,129	,366	4,365	,000
	X3	,084	,068	,212	2,517	,015
a. Dependent Variable: Y						

By using the Backward method, two models of data processing results are obtained, namely model 1 and model 2. The path coefficient will be shown by the standardized coefficients (Beta) column. The hypotheses to be tested are:

1. Hypothesis I

H_0: $\beta_{y2} \leq 0$

H_1: $\beta_{y2} > 0$

2. Hypothesis II

H_0: $\beta_{y3} \leq 0$

H_1: $\beta_{y3} > 0$

3. Hypothesis III

H_0: $\beta_{y4} \leq 0$

H_1: $\beta_{y4} > 0$

From the table coefficients obtained successively

1. 1= 0.074; t0=0.392; p-value = 0.696/2 = 0.348 > 0.05, or H0 is accepted, which means that there is no significant effect of Emotional Quotient (X1) on learning outcomes (Y).
2. 2= 0.071; t0=369; p-value = 0.007/2 = 0.0035 <0.05, or H0 is rejected, which means that Creativity Quotient (X2) has a positive direct effect on learning outcomes (Y).
3. 3= 0.165; t0= 1,229; p-value = 0.004/2 = 0.002 <0.05, or H0 is rejected, which means that Intelligence Quotient (X3) has a positive direct effect on learning outcomes (Y).
4. 7= 0,058; t0= 0.416; p-value = 0.074/2 = 0.037 <0.05, or H0 is rejected, which means that learning motivation (X4) has a positive direct effect on learning outcomes (Y).

From this analysis, it can be seen that the path coefficient (ρ1) is not significant, so the model needs to be improved by removing X1 from the model (trimming), the results of which can be directly obtained or read in the Coefficients model table 2. So the path coefficient after trimming is as follows:

1. ρ_2 = 0.480; t0=5,549; p-value = 0.000/2 = 0.000 <0.05, or H0 is rejected, which means that Creativity Quotient (X2) has a positive direct effect on learning outcomes (Y).
2. ρ_3 = 0.366; t0= 4.365; p-value = 0.000/2 = 0.000 <0.05, or H0 is rejected, which means that Intelligence Quotient (X3) has a positive direct effect on learning outcomes (Y).
3. P_7 = 0.212; t0= 2,517; p-value = 0.015/2 = 0.0075 <0.05, or H0 is rejected, which means that learning motivation (X4) has a positive direct effect on learning outcomes (Y).

Discussion of Research Results

Based on the results of research on the influence of Emotional Quotient, Creativity Quotient, IQ and Motivation on Learning Outcomes in the field of mechanical engineering expertise, students majoring in Mechanical Engineering Education, Faculty of Engineering, UNIMA, have the following findings:

1. Learning Motivation Has a Positive Effect on Learning Outcomes

The results showed that there was a positive influence of learning motivation on learning outcomes. This emphasizes the theory about the influence of Learning Motivation on learning outcomes, that it is proven that the Learning Motivation of students of the Mechanical Engineering Education Department proves that these students have good learning outcomes as well. From the research results prove that there is a significant influence between learning motivation on learning outcomes.

Learning motivation has a direct effect on learning outcomes. This is evidenced by the value of tcount for the variable Learning Motivation on learning outcomes is greater than ttable. Where tcount = 1.416 > ttable = 1.296 at = 0.05. So that the influence of learning motivation on learning outcomes is positive and significant.

2. Emotional Quotient Has a Positive Effect on Learning Motivation

The results showed that there was a positive influence of Emotional Quotient on Learning Motivation. This emphasizes the theory about the influence of Emotional Quotient on Learning Motivation, that it is proven that the Emotional Quotient of the Mechanical Engineering Education Campus proves that these students have good Learning Motivation as well. From the research results prove that there is a significant influence between Emotional Quotient on Learning Motivation.

Emotional Quotient has a direct effect on Learning Motivation. This is evidenced by the value of tcount for the variable Emotional Quotient on Learning Motivation is greater than ttable. Where tcount = 5.818 > ttable = 1.296 at = 0.05. So that the influence of Emotional Quotient on Learning Motivation is positive and significant.

3. Creativity Quotient has a positive effect on learning motivation

The results showed that there was a positive influence on Creativity Quotient on Learning Motivation. This emphasizes the theory about the influence of Creativity Quotient on Learning Motivation, that it is proven that the Creativity Quotient of the Mechanical Engineering Education Department has proven that these students have good Learning Motivation.

Creativity Quotient has a direct effect on Learning Motivation. This is evidenced by the value of tcount for the Creativity Quotient variable on Learning Motivation which is greater than ttable. Where tcount = 2,547 > ttable = 1,296 at = 0,05. So that the influence of Creativity Quotient on Learning Motivation is positive and significant.

It turns out that this is no longer in doubt, because Creativity Quotient is a part or derivative of learning motivation, as stated by Sardiman (2014: 39) namely "Psychological Factors in Learning which is a process of activity to change the behavior of the subject of learning, there are many factors that influence it. Of the many influential factors, broadly speaking, they can be divided into the classification of internal factors (from within or Creativity Quotient) of the subject and external factors (from outside or motivation) of the subject of learning."

Conclusion

After going through a series of research stages starting from the preparation of research proposals, preparation of instrument trials, then continued with data collection and analysis, the following conclusions can be drawn from these findings:

1. Learning outcomes are not significantly influenced directly by Emotional Quotient on the Learning Motivation of students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University. However, it is indirectly influenced by EQ and CQ through the variable of learning motivation of students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University.
2. Learning outcomes are directly influenced by the Creativity Quotient on the Learning Motivation of students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University. However, it is indirectly influenced by EQ

and CQ through the variable of learning motivation of students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University.

3. Learning outcomes are directly influenced by Intelligence Quotient on Learning Motivation on Student Learning Motivation majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University. However, it is indirectly influenced by EQ and CQ through the variable of learning motivation of students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University.

Thus, it turns out that the learning outcomes of students majoring in Mechanical Engineering Education, Faculty of Engineering, Manado State University are influenced by Emotional Quotient (EQ), Creativity Quotient (EQ), Intelligence Quotuent (IQ) and Learning Motivation.

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