Contribution Model Thinking Electronic Digital Creative And Knowledge Of Competence Of Electrical Engineering Students Surabaya State University

N Kholis¹, and Munoto¹
¹Faculty of Engineering, Department of Electrical Engineering, Universitas Negeri Surabaya

nurkholis@unesa.ac.id

Abstract. The ability to think creatively is a mental process that is used by the individual to bring up new ideas. Creative thinking abilities include smooth, flexibility, elaboration, and originality. The ability to think creatively is necessary as capital to face the global era. This study uses a quantitative research approach with case study method. A quantitative approach is a research method inductive, scientific, and objective in which the data were obtained in the form of numbers or statements were assessed and analyzed with the statistical analysis. The purpose of this research is to get an explanation of the theories and laws of reality. Quantitative research was developed using a mathematical model, theory or hypothesis. The correlation obtained by the correlation coefficient of 0.857, which shows that there is a positive correlation high between the value of the creativity of the students (X) and the value of the data the results of the final study (Y). In addition to the correlation coefficient of 0.857 also means that the increase in the value of students' creativity (X) then the value of the results of the study end (Y) will also increase. Furthermore, based on the results of hypothesis testing on the correlation coefficient it can be concluded that with a confidence level of 95% is sufficient evidence to show that there is a strong relationship statistically significant between the creativity of students (X) and the value of the results of the study end (Y).

1. Introduction

Viewing from the field that the student competence to digital electronics knowledge is necessary to increase knowledge, there are times when students simply get information from educators theory without knowledge can process this information further and do not associate the material with everyday life. Students on creative thinking ability is still low. This is evident from the attitude of the students who tend to still passive when the learning process and had difficulty answering questions that contain analysis of the issue. In explains that the ability of creative thinking is a mental process that individuals use to bring up new ideas [1]. According to research Jazuli explains that the ability to think creatively include fluency, flexibility, elaboration and originality [2]. The ability to think creatively indispensable as the capital facing the global era [3].

According to the Law on National Education System 20 2003 explained that "vocational education is secondary education that prepare students especially for work in a particular field". Meanwhile, according to the curriculum in 2013, that education is supposed to prepare the Indonesian man to have the ability to live as individuals and citizens who believe, productive, creative, innovative, and affective and able to contribute to society, nation, state, and world civilization. that in order to improve the economy and prosperity of Indonesia, it takes 4 million (2% of the population) particularly innovative entrepreneurs, while there are as many as 400,000 employers (0.18%).

Why in digital electronics knowledge required creative spirit? Some other questions that can be made are: (1) whether the creative thinking has a contribution to the Electrical Engineering Student competence ?; (2) whether the knowledge of digital electronics will increase the contribution to the competence of the Electrical Engineering Student entirely please ?; (3) whether the creative thinking
required in digital electronics knowledge?; (4) whether learning digital electronics does not affect the competence of the Electrical Engineering Student?.

Minister of Education and Culture Muhadjir Effendy (Jawa Pos, 22 November 2018, P.20), states that the Government will: (1) recruiting 72 thousand teachers productive professional backgrounds who already have work experience in the industry; (2) changing the curriculum of the paradigm of "supply drive" to "drive demand", by engaging business and industry to formulate a curriculum required by the world of work. Thus, as mentioned step is to recruit teachers / lecturers from the industry who already have extensive experience and have a certificate of competence test is applied in the world of education, it will increase the skills, so that creative thinking in students will grow and grow. Thus after graduating the students can apply their skills to the industry.

In digital electronics knowledge needed some arranging skills, know the characteristics and specifications of each IC, and logic skills, so some of these things can support the competence, the necessary creativity in students.

2. Research methods
Creativity/creative thinking can be defined depending on the beholder. This is because there are two reasons, (1) because creativity "hypothetical constructs" (2) can be interpreted creativity depends on the basic theory that a source of reference within the meaning makers. In keeping with its emphasis meaning of creativity differentiated into four dimensions; (1) person, (2) processes, (3) product and (4) press. In research describes "the four P's of creativity", based on the analysis of the factors at Guilford suggests five qualities that characterize the meaning of creative thinking abilities, namely: (1) fluency fluency, (2) flexibility, (3) originality, (4) decomposition (elaboration), and (5) the reformulation (redefinition). In addition, there are two meanings of creativity also perbedakan namely consensual definition and conceptual [4]. Consensual emphasize the meaning of creative products that can be assessed degree of creativity by an expert observer. Explains that a product or one's response is said to be creative if in the judgment of the experts or observers who have authority in the field that it is creative [5]. Therefore, kreativitas is the quality of a product or a creative response assessed by an expert observer. In the study Xianhan Huang says that the student-teacher in a school setting is less, although there is some consensus that enough that creativity can be achieved at the school. Explains that a product or one's response is said to be creative if in the judgment of the experts or observers who have authority in the field that it is creative. Therefore, creativity is the quality of a product or a creative response assessed by an expert observer [6].

Some understanding of each term can be described as follows: The word novel (new) means that a product is considered a creative nature orisional. although not new, the resulting product may reflect the combined results of new or reintegration of some things that already exist, so create something new. Sentences in that the creative work in tenable or useful or satisfying to have the sense that something creative products to be useful, effective, and can satisfy the extent of the judgments of others. Of these three terms to explain that resulted from the creative process must be communicated to others, then the product can experience the results of consensual validation. Therefore, the recognition of others, especially the experts, it is very important.

There are six approximate understanding of creativity, namely: (1) Everyone has creative abilities with different levels, there is no any person who lacks creativity; (2) Creativity is manifested in the form of some creative products, either in the form of objects or ideas; (3) The actualization of creativity is the result of the interaction between psychological factors (internal) and environmental (external); (4) In the individual and the environment are factors that can support or hinder the development of creativity; and (5) Creativity person does not take place in a vacuum, but rather preceded.

Differentiated approach to the creativity of three types, namely: (1) The psychological approach; (2) sociological; and (3) socio-psychological. Psychological perspective see the creativity of some of the strength in a person as a determinant of creativity, such as: intelligence, talent, motivation, attitudes, interests and other personality dispositions. estimates underlying psychological approach that is human is alloplastis organism that can change the environment [7]. Sociological approach, better look at the factors socio-cultural environment in the development of creativity. Estimated underlying this approach, the more creativity is a function of several environmental factors. Socio-psychological approach called the transactional approach.
This study uses a quantitative research approach with case study method. The quantitative approach is inductive research methods, scientific, and objective where the data was obtained in the form of figures or statements that are assessed and analyzed by a statistical analysis. Quantitative research usually used to prove and reject a theory. The purpose of this study to obtain an explanation of the theory and the laws of reality. Quantitative research was developed using mathematical models, theories or hypotheses. Based on these opinions, it can be concluded quantitative methods as the research methods used to examine the population or a particular sample [8].

The sampling technique is done at random, data collection using research instruments, data analysis is statistical in order to test the hypothesis.

The population in this study is the third semester student of Electrical Engineering at Digital Electronics course the odd semester 2018/2019 with the number of 20 students, so that the entire study population was the third semester student of Electrical Engineering at Digital Electronics course. Number of Electrical Engineering Student who serve a population of less than 100 people, this study did not use the sample as a whole following members of the population in the study. To determine the relationship between creativity Students with a final value subject Digital Electronics in this study used a correlation analysis were further from the analysis of these correlations will be tested the hypothesis on the correlation coefficient was obtained to determine whether the relationship between the creativity of student learning outcomes the end of the course of Digital Electronics significant statistically.

Correlation analysis can be defined as a statistical method used to measure the relationship between two variables. Said variable itself can be interpreted as a characteristic of the object under study. In the correlation analysis the researchers measured the relationship between two variables without regard to variable that is affected or variables that affect and how much influence one variable against another. From the correlation analysis conducted found a value that is called the correlation coefficient. Koefsien correlation can be positive or negative and the correlation coefficient ranges from -1 to +1.

The negative correlation indicated by the correlation coefficient is negative and vice versa positive correlation indicated by the correlation coefficient is positive. Interpretation of correlation coefficients are shown in Table 1.

### Table 1. The interpretation of the correlation coefficient

| Large correlation coefficient (positive or negative) | Interpretation of correlation coefficient |
|-----------------------------------------------------|------------------------------------------|
| 0.00                                                | There is no correlation                  |
| 0.001 to 0.20                                       | The correlation is very weak             |
| From 0.21 to 0.40                                   | weak correlation                         |
| 0.41 to 0.70                                        | correlation was                          |
| 0.71 to 0.99                                        | high Korealsi                            |
| 1.00                                                | perfect correlation                      |

In this study, the correlation coefficient was calculated using SPSS statistical software assistance. Then, as the correlation coefficient values obtained from the analysis of hypothesis testing stage then performed on the correlation coefficient. In digital electronics knowledge needed some arranging skills, know the characteristics and specifications of each IC, and logic skills, so some of these things can support the competence, the necessary creativity in students.

### 3. Results and Discussion

Correlation coefficient for the data activity of students and final learning outcomes data calculated using statistical software SPSS statistical correlation coefficient values obtained for the data activeness of students (X) and the final study outcome data (Y) which is equal is equal to 0.857. As already described in the early part of the value of the correlation coefficient ranges from -1 to +1. The value of the correlation coefficient \( r \) showed a positive relationship between variables X and Y are
the same direction, this means that increasing the value of the variable X, the value of the variable Y will increase. While the value of the correlation coefficient (r) showed a negative relationship between variables X and Y to the contrary, it means that the increase in the value of the variable X, the value of the variable Y will decrease. Correlation coefficient of 0.857 indicates that there is a high positive correlation between the activity of the student (X) and the value of the final study outcome data (Y). The positive correlation of 0.857 means that there is a high closeness of the relationship between the value of the activity of the student (X) and the value of the final learning outcomes (Y). Positive correlations that occur in these two variables may also mean that increasing the value of the activity of the student (X) then the value of the final learning outcomes (Y) will also increase. 857 means that there is a high closeness of the relationship between the value of the activity of the student (X) and the value of the final learning outcomes (Y). Positive correlations that occur in these two variables may also mean that increasing the value of the activity of the student (X) then the value of the final learning outcomes (Y) will also increase. Furthermore, after obtained a correlation coefficient is equal to 0.857 and then testing the hypothesis on the correlation coefficients have been obtained. The hypothesis in this study are: H0: ρ = 0 vs. H1: ρ ≠ 0.

Statistical tests are used to test the hypothesis that the correlation coefficient is the Z-test statistical significance level α used was 5% (α = 0.05). A significance level used was 5% (α = 0.05) and the alternative hypothesis used are hypothetical two-way (Two Sided Alternative), so that the rejection and acceptance regions H0 is as follows:

\[ Z_{\alpha/2} = Z_{0.025} = 1.96 \]

Rejection Region H0 and H0 Reception area

Data Collection and Test Statistics:

\[ Z_{hit} = \frac{\sqrt{N-2}}{2} \ln \left[ \frac{1+r}{1-r} \right] \]

Decision: The area that is not shaded is the rejection of H0.

\[ = (1.94) \ln(12.99) = 4.97 \]

Decisions are made by comparing the test statistic with a critical point. The value of the test statistic Z 4.97 is greater than the critical point \( Z_{\alpha/2} \) (1.96) or were in the rejection of H0, so that the decisions taken are Reject H0. Conclusions based on the results of hypothesis testing is with a confidence level of 95% is sufficient evidence to suggest that there is a close relationship statistically significant between the activity of the student (X) and the value of the final learning outcomes (Y).

4. Conclusion

In correlation analysis obtained correlation coefficient of 0.857 which indicates that there is a high positive correlation between the value of the creativity of the students (X) and the value of the final study outcome data (Y). Besides the correlation coefficient of 0.857 also means that increasing the value of creativity of students (X) then the value of the final learning outcomes (Y) will also increase. Furthermore, based on the results of testing the hypothesis on the correlation coefficient can be concluded that with a confidence level of 95% is sufficient evidence to suggest that there is a close
relationship statistically significant between the creativity of the students (X) and the value of the final learning outcomes (Y).

In the correlation analysis we only measure the closeness of the relationship between two variables without regard to variable that is affected or variables that affect and how much influence one variable against another, so the advice that can be given is to use statistical analysis others such as regression analysis to be able to know how much influence the value of the creativity of the students (X) to the value of the final learning outcomes (Y).

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