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Research Article

Measuring creative thinking skills of vocational high school students on dynamic electricity: a case study

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ABSTRACT

Creative thinking is a precise significant ability of 21st century education. Consequently, students are essential to must this ability to be applied in physics learning especially in the field of vocational. This study purposes to quantity students' creative thinking abilities about Dynamic Electricity. Examples remained busy by purposive sample method. Applicants in this study were 22 K-12 students of vocational students in Subang city. The implements used are three essay questions with four aspects that are turned off. The results showed that the average value was 43.43 with a low category. Consequently, students' creative thinking skills about Dynamic Electricity are still relatively low.

Introduction

Physics is one of the subjects that still has to be learned in school. The achievement of physics so far has not been satisfactory, especially the development of students' creativity, even learning physics at school has killed students' creativity [1]. The problem in learning physics at SMK today is the lack of development of creative thinking that guides students to actively solve problems.

In fact, the ability to be creative by solving student's problems is generally still relatively low [2,3], the creative ability to find problems is 1.57. The relationship between these acquisitions and criteria [6] shows that the ability to think creatively when identifying student problems is included in the low category [7]. The development of creativity in schools shows that schools' attention to students' learning potential is still limited to aspects of convergent thinking and still pays little attention to creative thinking processes in learning. Most physics teachers in Indonesia are weak in creativity, vision and knowledge, and are not progressive. In addition, the results of educational research in the learning process have not been utilized optimally to improve the quality of prospective physics teachers. All of this ultimately causes physical learning in schools to become dry, empty and futile. One of the physics materials that can stimulate students' creative thinking is dynamic electricity [10,11].

Methodology

Participant

The subjects of this study were students who had received dynamic electrical material. Participant in this study were 22 K-12 students of vocational students in Subang city. Consisting of 17 men and 5 women.

Research design

The design of this case study uses a single-case design which means it only analyzes one group of students. In this case, the group is students in one class 12 with a focus on the case of creative thinking skills. Creative thinking skills are measured using test questions with the number of three questions in the form of essays. Each question refers to the indicator of creative thinking and each question is given five minutes to solve the problem. The results obtained were then analyzed to see the extent to which students' creative thinking skills in dynamic electrical matter.

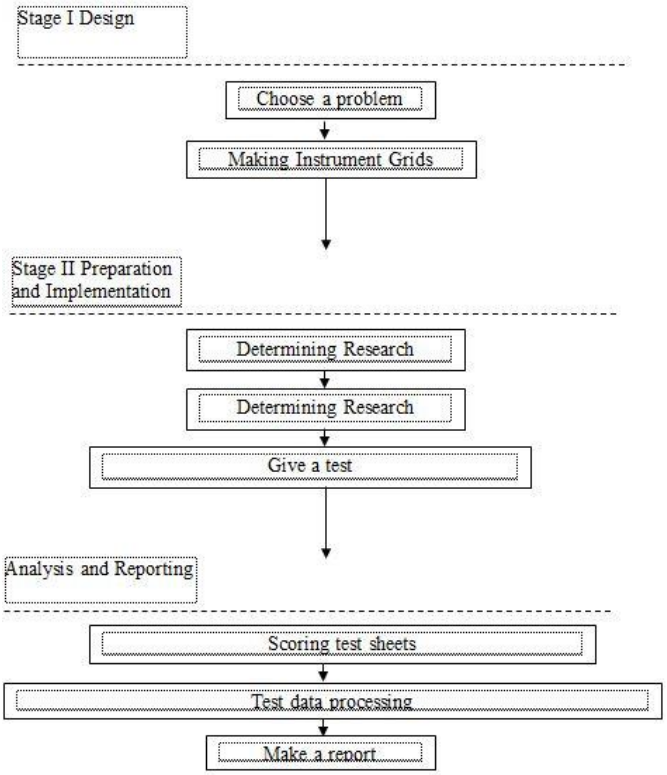

Figure 1. Research procedure

Instrument

The format of the instrument used is an essay with four different indicators. Test questions are guided by indicators of creative thinking, the Torrance concept which is limited to ability, thinking fluently, thinking flexibly, thinking original, and thinking in detail.

Table 1.
Grid of Creative Thinking Ability Tests

Variable	Aspect	Indicator	No. Question	Aggregate
Creative Thinking Ability	Think smoothly Fluency	Give as many answers or questions as possible in building the thought process.	1a, 2a, 4a, 5b	4
		Analyze phenomena so that a correct scientific concept changes.		
	Think flexible Flexibility	Predict a phenomenon in an effort to form an authentic hypothesis.		3
		Extract diverse interpretations through interaction and collaboration activities to agree on a view	2b, 4a, 5b	
	Original thinking Originality	Develop students' ability to think innovative, creative, and imaginative to become independent thinkers.	6,7	2
		Testing hypotheses to form new, unusual understandings.		
	Detailed thinking Elaboration	Analyzing phenomena through collecting data in an effort to form changes in ideas in detail.		
		Find the truth of a question or the truth of a problem-solving plan.	3c, 6	2
		Spark the idea of solving a problem and can implement it correctly		

The maximum value for each item is 3 with the total score of the question is 36. This score can be calculated by the percentage of the average value using the equation.

$$(\%) = \frac{< N >}{Nm} x100\%$$

Information:
(%) = Percentage of average student scores
(N) = Average value of students
(Nm) = Maximum value Results and Discussion

Results and Discussion

The results of students' creative thinking tests are expressed by the average score of students in general. Obtaining results with the results of the scores for each average student, the achievements are presented.

Table 2.
Maximum Score and Minimum Score and average creative thinking skills

Score	Aggregate	Total Percentage (%)
Maximum Score	1	41,67
Minimum score	3	19,45
Normal		43,43

Of the 22 students, one student got a score of 41.67 and three students scored 19.45. The average value obtained in classical is 43.43, this average is still far from the KKM value. Creative thinking skills consist of four aspects, namely fluency, flexibility, originality, and elaboration [12-14]. The diagram of the achievement of students' creative thinking skills in each aspect is presented in the following Figure 2:

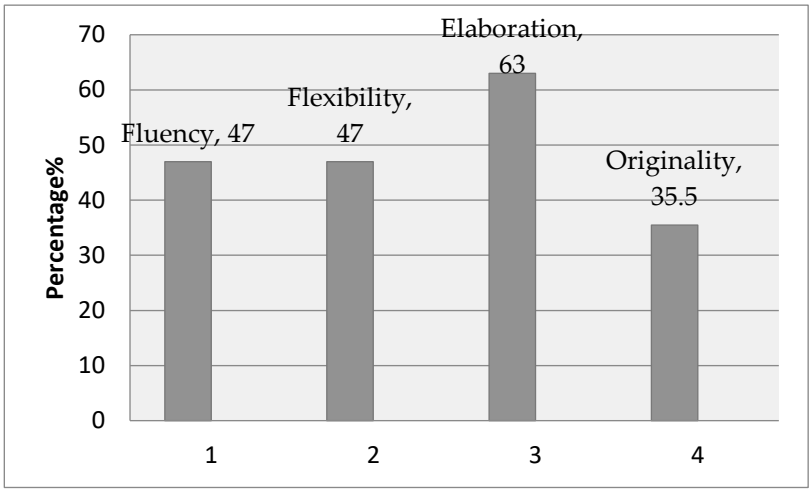

Figure 2. Percentage diagram of the achievement of aspects of creative thinking

Based on the results of a test of the creative thinking ability test which was tested on 22 students in one of the SMKS in the district. Subang is still relatively low. From the test, the data obtained showed that the maximum score was 41.67, the minimum score was 19.45, the average score was 43.43 with the percentage of students' abilities for each indicator was Fluency 47%, Flexibility 47%, Originality 35.5%, and Elaboration 63%. The value obtained by these students is certainly not balanced with the school KKM standard, which is 75.

Of the four indicator creative thinking skills the value is low, there is the fluency indicator 47%. Fluency which means thinking fluently whose activities are in the form of building a thinking process so that a correct scientific concept changes. From the answers given, students still have not been able to understand the basic concepts of dynamic electric matter correctly. This can be seen from the still many students who experience misconceptions in understanding dynamic electrical matter.

Next is 47% Flexibility, Flexibility is an indicator that has the highest percentage of ability, where Flexibility is an activity to form an authentic hypothesis to agree on a view. From the students' answers it can be seen that most students have been able to answer the questions correctly, but the explanation given is still unclear.

The next highest indicator is Elaboration 63%. Elaboration is detailed thinking in the form of activities to analyze phenomena through data collection in an effort to develop and expand an idea. From the answers given, students are still not able to solve problems commonly encountered in everyday life with the concept of solving physics.

Next is the 35.5% Originality indicator, which is the lowest percentage, where Originality is an original process in the form of innovative, creative, and imaginative thinking activities in terms of hypothesis testing. From the students' answers it can be seen that no student is able to think innovatively and creatively in the given solution, but the answers given are not based on the correct study of the theory.

Conclusion

Students' creative thinking skills were tested on 22 students in one of the SMKS in the District. Subang on dynamic electrical material shows unsatisfactory results. that the maximum score is 41.67, the minimum score is 19.45, the average score is 43.43 with the percentage of students' abilities in each indicator is Fluency 47%, Flexibility 47%, Originality 35.5%, and Elaboration 63%. The value obtained by these students is certainly not balanced with the standards of the school KKM, which is 75. Factors that cause the students' low creative thinking ability to connect with the ongoing learning process. The learning process and learning evaluation are still focused on emphasizing concepts, mathematical calculations and have not directed the application of the application concept in an applicative manner. Students only use mathematical calculations and have not applied them in the engineering process.

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Conflicts of Interest

"The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results".

Author Contribution

Roni Permana: Research idea, research planning, data analysis and manuscript writing.

References

1. Cropley, D. H., Kaufman, J. C., & Cropley, A. (2011). Measuring creativity for innovation management. Journal of Technology Management and Innovation, 6(3), 13-30.
2. De Breu, C. K. W., Nijstad, B. A., Bechtoldt, M. N., & Baas, M. (2011). Group creativity and innovation: A motivated information processing perspective. Psychology of Aesthetics, Creativity and the Arts, 5(1), 81-89.
3. Dionne, S. D. (2008). Social influence, creativity and innovation: boundaries, brackets and non-linearity. In M. D. Mumford, S. T. Hunter, & K. E. Bedell-Avers (Eds.), Multi-Level issues in creativity and innovation: Research in multi-level issues (pp.63-73). Amsterdam: JAI Press.
4. Feuer, A. (2011). Developing foreign language skills, competence and identity through a collaborative creative writing project. Language, Culture and Curriculum, 24(2), 125-139.
5. Ghonsooly, B., & Showqi, S., (2012). The effects of foreign language learning on creativity. English Language Teaching, 5(4), 161-167.
6. Hajilou, Y., Yazdani, H., & Shokrpour, H. (2012). The relationship between Iranian EFL learners' creativity and their lexical and production knowledge. English Language Teaching, 5(3), 131-146.
7. Kharkhurin, V. A. (2010). Bilingual verbal and nonverbal creative behaviour. International Journal of Bilingualism, 14(2), 211-226.
8. Leikin, M. (2012). The effect of bilingualism on creativity: Developmental and educational perspectives. International Journal of Bilingualism, 17(4), 431-447.
9. Luk, J. (2013). Bilingual language plan and local creativity in Hong Kong. International Journal of Multilingualism, 10(3), 236-250.
10. Meera, K. P., & Remya, P. (2010). Effects of extensive reading and creativity on achievements in English language. E-journal of All India Association for Educational Research, 22(1), 16-22.
11. Romero, M., Hyvönen, P., & Barbera E. (2012). Creativity in collaborative learning across the life span.

Scientific Research, 3(4), 422-429.
12. Schulz, B. (2011). Syntactic creativity in second language English: wh-scope marking in Japanese-English interlanguage. Second Language Research, 27(2), 313-341.
13. Sternberg, R. (2003). Wisdom, intelligence, and creativity synthesized. New York, NY: Cambridge University Press.
14. Uteubayeva, E. A., Kultanova, Z. M., & Pastushenko, T. A. (2012). Creative thinking as a basis of foreign language learning by the method of project activities. Education and Science Without Borders, 3(5), 115-117.