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Improving Students' Creative Thinking Skills Using Problem-Based Learning (PBL) Models Assisted by Interactive Multimedia

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Abstract

This study determines the improvement of students' creative thinking using problem-based learning models assisted by interactive multimedia on the concept of substance pressure. Research conducted at SMP 2 Mandalawangi, using one-sample classes, class VIII the second semester of 2017/2018 academic year, was held in May 2018. The method used is quantitative research, while the type used is quasi-experimental research, using a one-group pretest-posttest design research design. The instrument used was a test instrument for creative thinking skills in the form of elaboration questions on the concept of pressure. The analyzing data using paired sample t-test or paired sample t-test analysis to see the effect of PBL on creative thinking skills, and n-gain to see an improvement in creative thinking skills. The study gives an increase in students' creative thinking skills. The average value of 41 to 81 with an n-gain of 0.68 or an improved of 68%, which included the medium criteria. Paired sample t-test results indicate that there is an influence of the use of problem-based learning models assisted by interactive multimedia on students' creative thinking skills on the concept of substance pressure.

Keywords: Problem Based Learning (PBL), creative thinking skills, substance pressure

INTRODUCTION

Education in the 21st century puts forward four thinking skills that must be developed, namely: critical thinking skills, communication skills, collaborative skills, and creative thinking skills (Wijaya et al. 2016; Zubaidah 2016). Creative thinking skills are the skills to develop or find original, aesthetic, and constructive ideas, which relate to views and concepts and emphasize the intuitive and rational aspects, especially in using information and materials to bring up explaining them with the original perspective of thinkers (Tawil 2013). Creative thinking skills consist of four components, namely: fluency, flexibility, originality, and elaboration (Sudarma 2013).

Creative thinking skills must be continuously developed and improved at students starting primary up to college. Students have creative thinking skills, and teachers need to provide space so that students are given the freedom to develop creative thinking skills of its (Munandar 1999). However, the reality on the ground shows the opposite. The learning process in the classroom, including science learning, is still teacher-oriented (teacher-centered), so it does not provide opportunities for students to develop creative thinking skills. For that, it needs the efforts for science learning in the classroom to make students more active and innovative to develop their creative thinking skills (Detagory et al. 2017).

One of learning model that can facilitate students' creative thinking skills is the problem-based learning model (PBL). The ability to solve problems in higher-order thinking skills is still low (Mustofa & Rusdiana 2016; Nurhayati & Angraeni 2017). This learning begins the activity by presenting problems designed in contexts that are relevant to the concepts to be studied, then organizing students to learn, guiding individual or group investigations, developing and presenting their work, and analyzing and evaluating problem-solving processes (Sumarmo et al. 2012).

The purpose of the problem-based learning model is to ask teachers to provide motivation and encouragement to students to express their opinions about the problems given by the teachers in the learning process (Liliawati 2011). The application of problem-based learning in physics lessons can improve creative thinking skills in all aspects, such as fluency, flexibility, originality, and elaboration (Utomo et al. 2014). The use of problem-based learning will increase understanding of physics concepts that have an impact on learning outcomes (Malik 2015; Halim et al. 2017; Bahri & Bakri 2018). The problem-based learning presentations are carried out in a multi-representation way to enhance students' creativity and creative thinking in learning (Sari et al. 2015; Munir 2012)

To achieve learning goals, there needs to be carrying capacity in the form of interactive and exciting learning media in the learning process. One of the alternative learning media that can be used by teachers is an interactive multimedia (Novitasari 2016). Interactive multimedia is a combination of images, video, animation, and sound in one software that allows users to interact directly (Agustina et al. 2017). The use of interactive multimedia is expected to help the problem-based learning process run more exciting and interactive. Interactive multimedia can help teachers in the problem-based learning process; for example, the first stage is problem orientation; the teacher can provide interactive videos for problem orientation.

The concept of substance pressure is one of the ideas that can be taught using PBL models assisted by interactive multimedia. That is because these concepts are more likely to physics concepts that can be found in everyday life (Agustina et al. 2017) - starting from the idea of pressure on solids, hydrostatic pressure, Pascal's Law, and related vessels. The orientation of the problems that can be raised in the concept of substance pressure. For example, why the structure of the building foundation should be shaped like chicken feet or why the construction of the lower water dam is thicker than the top. Students can elaborate on problems given by the teacher, with guidance from the teacher using interactive multimedia that has been prepared. The use of interactive multimedia so that the learning process on the concept of pressure runs more exciting than before. Besides, to stimulate students' creative thinking skills.

METHODS

This study is a quantitative study by using the experimental methods. The design study is one group of pre-experimental designs, using an innovative class without the comparison classes, as shown in TABLE 1 (Sugiyono 2011). The subjects in this study were the students of class VIII second semester of the academic year 2017/2018. The samples taken at random that is class VIII A. This study lasted from May 2018 and took place at the SMP 2 Mandalawangi.

TABLE 1. One-group pretest-posttest design

Pretest	Treatment Given	Posttest
O1	X	O2

Note :

X = treatment given (independent variable)

O1 = pretest value

O2 = posttest value

The study uses the creative thinking ability test as a research instrument, the description of the shape, which consists of 5 items. Aspects of creative thinking ability include: 1) Fluency, 2) Flexibility,

3) Originality, 4) Elaboration. The indicator of the creative thinking ability on each aspect be described in TABLE 2 below.

TABLE 2. Aspects and Indicators of Creative Thinking Skills

Aspects	Indicators
Fluency	Generate many ideas or relevant answers. The flow of thought smoothly.
Flexibility	Generate uniform ideas. Different directions of thinking. It is being able to change the way or approach.
Originality	Give answers that are unusual, different from others, which are rarely given by most people.
Elaboration	Develop, add, and enrich ideas. Breaking down the details Expanding an idea

(Putra 2012)

Improvement of students' creative thinking skills is limited to the average score before and after treatment is given in the form of problem-based learning models. The pretest and posttest data that have been obtained are then processed using the normalized gain value formula (Hake 1998), which can be seen in equation 1.

$$\langle g \rangle = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}} \quad (1)$$

Note :

$\langle g \rangle$ = Gain value score

S_{post} = Post-test score

S_{pre} = Pretest score

S_{max} = Maximum score

The n-gain value obtained from the calculation results is then interpreted as high, medium, and low classification. The classification criteria for n-gain benefits can be seen in the following table.

TABLE 3. Classification of n-gain values

n-gain $\langle g \rangle$	Criteria
$\langle g \rangle \geq 0,7$	High
$0,3 \leq \langle g \rangle < 0,7$	Medium
$\langle g \rangle < 0,3$	Low

Meanwhile, to determine the effect of problem-based learning on students' creative thinking abilities, a significance test was performed using a paired sample t-test or paired sample t-test using SPSS software. However, before the data is tested for significance, the homogeneity and normality are checked first.

RESULTS AND DISCUSSION

The results of the research data processing showed that the average score of students' creative thinking abilities pretest was 41 out of a maximum score of 100, or by 41%. While the average posttest score of students' creative thinking ability was 81 out of a maximum score of 100, or 81%, this shows an improvement in students' creative thinking skills after being given treatment in the form of a problem-based learning model assisted by interactive multimedia, as evidenced by a normalized gain value of 0.68 or 68%, which falls into the medium category. For more details, can be seen in the FIGURE 1.

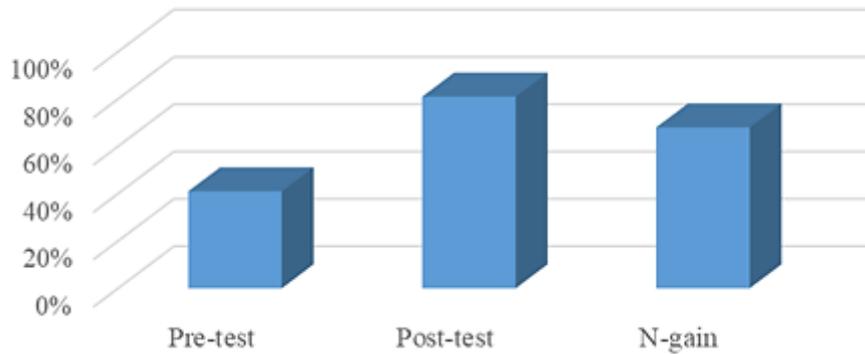


FIGURE 1. The average value of students' creative thinking skills

The improvement of students' creative thinking skills is following a previous study conducted by Liliawati (2011), which states that the problem-based learning model is more effective and significant in improving students' creative thinking skills, with an increase of 64%. In this study, the increase in creative thinking skills was higher with a percentage of 68%, this might indicate the contribution of the use of interactive multimedia in the problem-based learning process, in line with what was revealed by Novitasari (2016) which revealed that interactive multimedia could help students better understand concepts in the learning process.

More details about the effect of PBL on improving students' creative thinking skills can be seen in every aspect of creative thinking skills. FIGURE 2 shows the percentage of pretest and posttest scores, as well as improvement in students' creative thinking skills for each element.

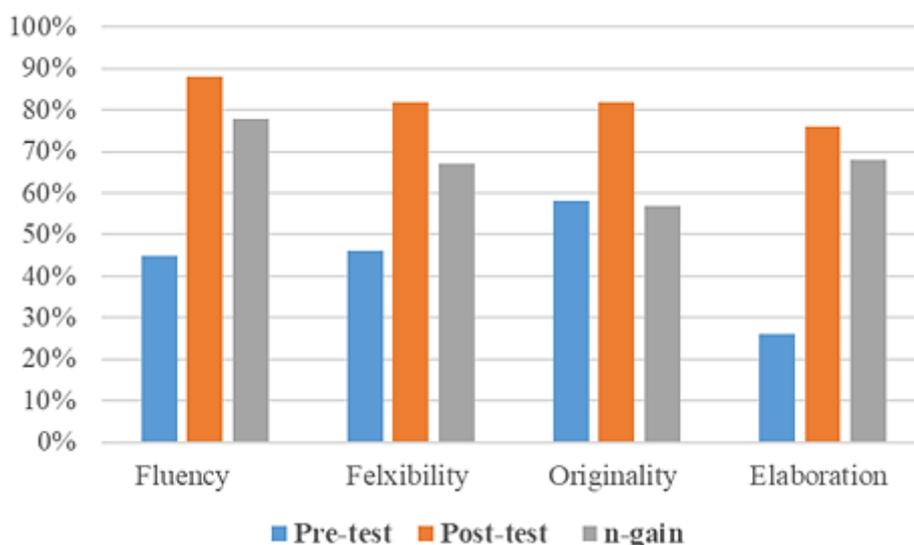


FIGURE 2. The average value of aspects of students' creative thinking skills

First, in the aspect of fluency, the research data showed an average pretest value of 45%, while a posttest score of 88%, with a normalized increase of 78%, included in the high category. Second, in the aspect of flexibility, the pretest average value is 46%, while the posttest value is 82%, or there is an increase with the gain value of 67%, which is included in the medium category. Third, in the originality aspect, the pretest score was 58%, and the posttest score was 82%, with a normalized increase of 57%. And finally, in the elaboration aspect, there was an increase from the pretest value of 26% to the posttest value of 76%, with an increase in the gain value of 68%.

The aspect of creative thinking skills that is more prominent than grade VIII students of Junior High School 2 Mandalawangi is the aspect of fluency. Even so, elements of flexible thinking skill (flexibility), original thinking skill (originality), and elements of thinking ability to elaborate are also not much different from aspects of fluent thinking (elaboration). It can be seen from the comparison of the average value in FIGURE 2. To answer the question, the skill of creative thinking must be accompanied by an understanding of a concept; however, to solve a problem, students must have a correct understanding of the idea. So as to solve the problem or the solution obtained excellent results and correct.

By using the problem-based learning models assisted by interactive multimedia can help students to get a good understanding of the concept. Because, in its implementation, the use of the problem-based learning models supported by interactive multimedia makes students more interested in participating in learning (Wenno 2010; Herman 2007). This is in accordance with the opinion of Munir (2012), the importance of learning media, including being able to bring joy for students, renew their enthusiasm, and help establish knowledge in the minds of students and animate the learning process.

As for seeing the effect of problem-based learning models on creative thinking skills, a significance test was conducted. Before the significance test, normality test and homogeneity tests were carried out. This normality test using SPSS software obtained a value of 0.73 ($0.73 > 0.05$), which indicates the normal distribution of the data, while the homogeneity test results obtained data of 0.962 ($0.962 > 0.05$) which suggests that the data are homogeneous sample.

SUMMARY

Based on the results and analysis, it was obtained that the use of problem-based learning models assisted by interactive multimedia can improve students' creative thinking skills in the concept of substance pressure in class VIII of Junior High School 2 Mandalawangi. Improved creative thinking skills to increase with the value of n-gain of 0.68 is included in the medium category. Enhanced creative thinking skills can also be seen from the increase in four aspects, ranging from fluency, which increased by 78%, flexibility, which increased by 67%, originality, which increased by 57%, and elaboration increased by 68%. The test results also show the influence of the effect of problem-based learning on creative thinking skills. The use of interactive media as a learning medium can help better improve students' creative thinking skills.

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