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The Implementation of Guided Inquiry Learning Model to Improve Students' Creative Thinking Skills in Physics

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Abstract: The aim of this research was to find out the improvement of students' creative thinking skills by using guided inquiry learning model. The research was classroom action research which held on 3 cycles. Each cycle consisted of four steps that are Planning, Action, Observation, and Reflection. The data collecting technique was carried out through ten creative thinking skills tests in essay form and also questionnaire to evaluate students' response to the learning activities. An expert validation test was first was first run before the instrument test was tested on the students. Analysis data technique used descriptive analysis. The results of research showed that there was an improvement in each of these aspects of students' creative thinking skill from cycle I, cycle II until the cycle III. Average percentage improvement of students' creative thinking skills where the highest indicator score was fluency while the highest score attitude aspect of creative thinking was curiosity. From the result, it can be concluded that guided inquiry learning was able to improve students' creative thinking skills especially in physics.

Keywords: Creative thinking skills; Guided inquiry; Physics

Introduction

Creative thinking skills are one of the important skills in 21st century learning in the era of the industrial revolution 4.0. This is because the 4.0 industrial revolution emphasizing the digital economy, artificial intelligence, big data and robotics, it calls for creativity, critical thinking, mastery of technology, and acquisition of digital skills in the world of education. The current changes in education affect the concept of education and also bring about a change in perspective on the concept of education (Surani, 2019). Creative thinking has a very important role in enabling students to solve real-life problems and flexibly adapt to new demands.

Creativity is demonstrated in the generation of new and unusual ideas that are the result of original problem-solving thinking (Cohen et al., 1999). Creative thinking is facilitated in a learning environment that directly provides students with the opportunity to think openly and flexibly without fear or embarrassment. For example, educated learning situations should foster discussion and encourage someone to voice their ideas and ideas (Anjarsari, 2014).

Creative thinking skills are higher-order thinking skills that stimulate the emergence of new ideas by non-routine problems (Puspitasari et al., 2018). Creative thinking is also a person's ability to solve a problem from various solutions (Armitage et al., 2015; Qadri et al., 2019). Meanwhile, according to Naimnule et al. (2020) creative thinking skills are skills in solving complex and complicated problems. Aspects in creative thinking skills are originality, fluency, flexibility and detail (Nehe et al., 2017).

Based on the results of observations that have been done, it shows that the learning process still does not pay attention to students' creative thinking skills. The percentage of students who ask questions during the lesson is 10.5%. the percentage of students who are able to answer the questions given by the lecturer is 8.7%. In addition, during the presentation activity, 53% of students delivered material only reading presentation slides and smartphones so that the presentation was still general and no new ideas emerged from students.

One of the efforts to improve creative thinking skills is through a guided inquiry learning model. Kuhlthau et al. (2007) said that the guided inquiry learning model

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can help students think creatively and find creative solutions to problems. The guided inquiry learning model motivates students to learn through topic verification activities or through investigation. Aspects of creative thinking can be improved through the stages of the guided inquiry learning model. Previous research conducted by Nisa (2013) concluded that teacher and student activities, cognitive, affective, and psychomotor learning outcomes as well as students' creative thinking skills increased by using the guided inquiry learning model.

Based on the description above, the researcher wishes to conduct further research on the guided inquiry learning model on momentum and impulse material. The material is one part of the school physics study course taught to students majoring in physics education at USK. The activeness and creativity of students in teaching and learning activities are expected to be able to generate various ideas and be able to solve problems in a creative way.

Method

This research is classroom action research which consists of three cycles. The research data collection technique used a descriptive test to measure students' creative thinking skills and a creative attitude observation sheet to measure students' creative attitudes. The indicators of creative thinking skills measured in this study are fluency, flexibility, originality and elaboration.

The data analysis technique refers to Miles et al. (2007) which is carried out through 3 components, namely: data reduction, data presentation, and drawing conclusions. Furthermore, the research data were analyzed descriptively qualitatively. The score obtained is percentage and categorized creative thinking according to Denzin et al. (2006) namely: Very creative (86-100), creative (72-85), Quite creative (57-71), less creative (41-56), less very creative (< 40). The research procedure selected followed the model of Kemmis and Mc. Taggart using a reflection spiral system (Rupalestari et al., 2020). The research steps include the stages of preparation, planning, action, observation, and reflection.

Result and Discussion

The results of the research in the form of quantitative data consist of creative thinking skills and students' creative attitudes. The results of the research and discussion are as follows.

Creative Thinking Skills

The implementation of the guided inquiry learning model in the learning process of the school physics study course II shows an increase in students' creative thinking skills gradually in cycle I, cycle II and cycle III. The average results of the creative thinking skills test increased in each research cycle from 25.8% in the first cycle, then increased to 43.2% in the second cycle and increased again to 69% in the third cycle.

Based on these results, it can be seen that there is a difference in the percentage increase that varies in each cycle, that are 17.4% from cycle I to cycle II, and 25.8% from cycle II to cycle III. The average results of creative thinking skills in each cycle are presented in Figure 1.

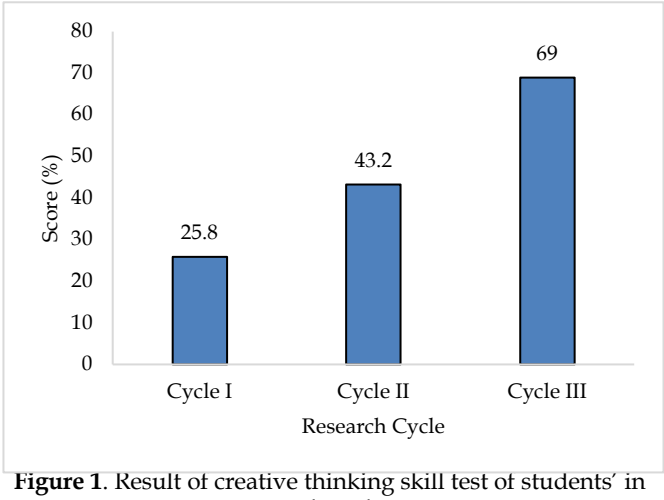

Figure 1. Result of creative thinking skill test of students' in each cycle

Figure 1 shows that students' creative thinking skills are in different categories in each cycle. Based on the categorization of creative thinking that in the first cycle creative thinking skills are still included in the category of low creative thinking, which is at a percentage of <40%. While in the second cycle is in the less creative category, which is in the 41-56% interval. In cycle III creative thinking skills have reached the category of creative enough because the percentage is in the 57-71% interval.

Creative thinking ability consists of four aspects (indicators), namely: fluency, flexibility, originality, and elaboration. The score of each aspect of creative thinking ability in each cycle is presented in Figure 2.

Figure 2 shows that all aspects have increased in each aspect with a different percentage. The fluency aspect increased by 19.1% from Cycle I to Cycle II, and 25.1% from Cycle II to Cycle III. Flexibility aspect increased by 16.2% from Cycle I to Cycle II, and 26.9% from Cycle II to Cycle III. The originality aspect increased by 16.9% from Cycle I to Cycle II, and 27.2% from Cycle II to Cycle III. The elaboration aspect increased by 17.7% from Cycle I to Cycle II, and 23.9% from Cycle II to Cycle III.

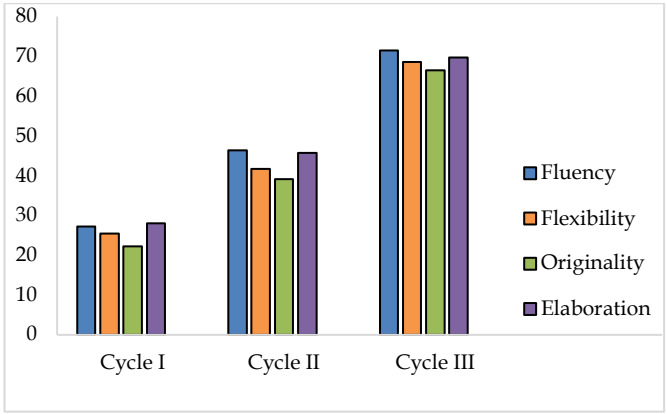

Figure 2. Comparison every cycle of creative thinking aspect (indicators)

Every aspect of creative thinking skills always increases every cycle. However, from all indicators of creative thinking aspects, the highest increase was found in the fluency indicator, which was 44.2%. This is because at this stage students try to provide many ways or suggestions for what they observe by providing a number of ideas, problem solving answers, or questions.

Saputri et al. (2022) states that Highest fluency is when students are generally able to generate many ideas, answers and solutions to problems, have many possibilities and suggestions for many things, and always have multiple ideas. Ritter et al. (2020) also suggested that practicing creative thinking in learning can improve students' ideation skills and cognitive flexibility.

The implementation of the guided inquiry model can train flexible thinking aspects (flexibility) at the stage of building a hypothesis on the formulation of the problem. The high flexibility ability of students is characterized by the ability of students to think of various ways to solve a problem (Fitri et al., 2013).

Aspects of original thinking can be improved in the guided inquiry model through the stages of planning and conducting an investigation. This is because at this stage students always try to think of new, unique, and unusual ways that other people do in conducting investigations to prove the hypotheses that have been previously made. Originality aspect obtained as lowest indicators of students' creative thinking skills because students have not been able to express the novelty of their ideas in solving problems, the ideas given are still general in nature (Fatmawati et al., 2022).

Principals of thinking in detail (elaboration) can be improved on the guided inquiry model through the stages of planning and conducting investigations and data analysis. This is because at this stage students always try to enrich or develop existing ideas and analyze more detailed data from existing data.

Creative Thinking Attitude

The assessment of students' creative thinking attitudes is carried out using an observation sheet that refers to aspects compiled by Munandar (2009), namely: Dare to take risks, are imaginative, curious, feel challenged by pluralism, and respect. The results of the average observation of students' creative thinking attitudes showed an increase in each cycle. The results of the average observation of students' creative thinking attitudes are presented in Figure 3.

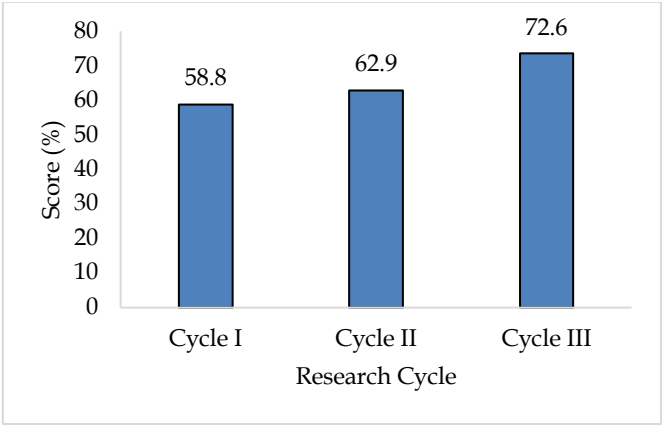

Figure 3. Result of attitude observation of students' creative thinking in every cycle

Figure 3 shows that the creative thinking attitude from Cycle I to Cycle III has increased. Cycle I to cycle II is 4.1 and cycle II to cycle III is 10.6%. Based on the categorization, the creative thinking attitude in Cycles I, II and III was already in the quite creative category because it was in the 57-71% interval. The results of observations per aspect of creative thinking attitude are presented in Figure 4.

Figure 4 shows that there is an increase in each cycle per aspect of creative thinking attitude. The highest increase from cycle I to cycle III is curiosity aspect by 44.2%. This is related to the test results of students' creative thinking skills at the highest increase in the fluency indicator. This happens because students who have a strong curiosity can generate ideas or ways to solve problems smoothly. The characteristic of the aspect of curiosity is always driven to know many things. This behavior is able to train students to think fluently (Shoit et al., 2021).

Every aspect of creative thinking attitude has a relationship with one's creative thinking ability (Munandar, 2009). The aspect of daring to take risks has the characteristics of a person's behavior, namely not being hesitant because of ambiguity and daring to defend his ideas or opinions despite challenges and criticism. This behavior will train students in original thinking, so that students will be able to give birth to new ideas or expressions.

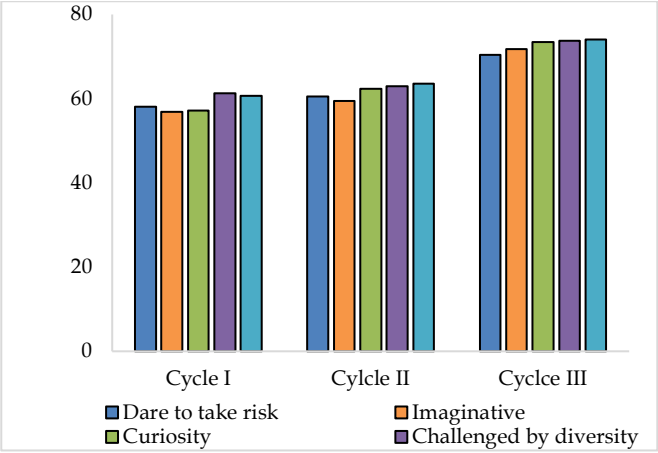

Figure 4. Result of attitude creative thinking aspect in every cycle

The characteristic of the imaginative aspect is being able to think about what if you do something that has never been done before. This behavior trains students in flexible thinking, so that students can generate varied ideas, answers, or questions and are able to see a problem from different perspectives. It also in line to Auliya et al. (2022) that students who have high imagination will make these students have high creative thinking skills.

The characteristic of the aspect of feeling challenged by diversity is always being driven to overcome difficult problems. This behavior is able to train students in thinking in detail (elaboration), so that students are able to solve a problem in more detail. The characteristic of the appreciate aspect is always respecting the ideas or works of others. This behavior is able to train students in thinking in detail (elaboration), so students are willing or want to add other people's ideas or products in more detail to make them more interesting.

Conclusion

The guided inquiry learning model is able to improve creative thinking skills of physics education students' at USK with an increase of 43.2% (25.8% increase from cycle I to Cycle II, and 17.4% increase from Cycle II to Cycle III). Fluency is an indicator of creative thinking skills that have the highest increase and curiosity is the highest aspect of creative thinking attitudes.

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