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TPACK's Approach to Cultivating Creative Thinking Skills of V SD Class Students on Light Materials Properties

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Abstract

This research is hampered by a lack of creative thinking skills in V-grade students, although these skills are essential in preparing for educational success in today's growing era of globalization. This research aims to find out the influence of TPACK's approach in cultivating the creative thinking skills of students of V SD class on the material properties of light. The research uses quantitative research design, experimental Quasi design through non-equivalent pre-test and post-test control group design. The population of this study is the entire student SDN Buncitan Sedati Sidoarjo, the sample of the research used included students of the VA class (control class) which totalled 30 students and VB (experimental class) that totals 30 students. Data collection techniques use test techniques consisting of 10 creative thinking skills essays. The result of this study is a sig. (2-tailed) value of 0,000 < 0.05 which means H0 rejected and H1 accepted, which means there is an influence of the TPACK approach in cultivating the creative thinking skills of students of grade V SD on the material of light properties.

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INTRODUCTION

Education is needed to provide quality learning and facilities in developing skills and high-thinking capabilities as supplies to prepare for the challenges of global life, by providing learning contributions that are consistent with technological developments. Fast-growing science requires people who are capable of developing new ideas to keep up with the developments of the times, one with creative thinking skills to help solve problems and find alternative solutions to problems in today's age of globalization.

Educators must be able to master a variety of skills in order to develop their students into individuals who have the skills in creative thinking to solve problems, collaboration, communication, creativity, innovation, as well as technology and concepts. Therefore, learning in the 21st century integrates knowledge, skills, and mastery in technology and information. (Mardhiyah et al., 2021).

Creative thinking skills are essential to being able to solve problems and create new and unique ideas. Creative thinking skills are a source for actualizing one's potential, expressing oneself and achieving success (Sholihah, Rusyana, and Toto, 2023). Creative thinking will be easily achieved through direct learning, allowing students to think openly and freely. The learning situation created must encourage students to speak and express their ideas. Creative thinking skills which include students' ability to create innovations, solve problems and find new solutions (Kodri, Budiwati, and Waspada, 2020). Therefore, creative thinking allows students to see the world truly from various points of view and produce new ways to solve real problems (Fitriyah and Ramadani, 2021).

According to Munandar (2017), there are four components consisting of the characteristics of creative thinking, namely: fluency, flexibility. originality, and elaboration. Fluency is the ability to produce ideas, methods, suggestions, questions, ideas and solutions smoothly within a certain period of time. Flexibility is the ability to express ideas, answers or questions from different perspectives. Originality is the ability to come up with new expressions, expressions, thoughts or ideas to solve problems. Elaboration is the ability to enrich, develop, elaborate an idea so that it becomes more interesting.

The learning process with creative thinking skills can involve stimulating thinking, providing opportunities for exploration, and fostering curiosity in students by providing challenges that trigger imagination, supporting students in solving problems with unconventional approaches, and encouraging them to develop original ideas. This includes a supportive learning environment, collaboration, and evaluation that pays attention to the progress and development of students' creative thinking.

In line with the goals of science education, elementary school students must be given the opportunity to experience natural phenomena and develop the ability to think and act towards nature so that they can understand natural phenomena that often occur in everyday life. Science learning in elementary schools is learning that is related to the surrounding natural environment to increase students' knowledge and involve them in various hands-on activities. Through science learning, students are asked to learn about nature through experiments, which are carried out through study, observation, or experimentation. This experiment encourages students' creative thinking and efforts to protect, care for and repair the natural damage that occurs. Science learning builds a scientific attitude aimed at preserving nature (Pratiwi and Aslam, 2021).

Students' creative thinking skills can be familiarized and grown through a learning approach that combines technology, understanding of the material, and effective pedagogical methods. Technology integration can facilitate exploration and creativity, while mastery of the material provides a strong foundation for generating new ideasBy using a learning approach that supports active involvement and problem solving, students can develop holistic creative thinking skills. The TPACK approach includes an understanding of how teachers can combine technology and

learning methods with student learning on specific material. The TPACK approach as the best framework can be distributed in different directions for teachers to solve problems related to the implementation of learning in education.

The TPACK approach is a theoretical framework for developing Pedagogical Content Knowledge (PCK). Pedagogical Content Knowledge is a combination of Pedagogical Knowledge (PK) and Content Knowledge (CK) which is needed during the learning process. Pedagogical Content Knowledge is an important factor in the learning process to create a beneficial learning environment for students. Pedagogical Knowledge includes knowledge about teaching methods and processes such as classroom management, student homework, lesson planning, and student learning activities. Meanwhile, Content Knowledge includes knowledge about concepts, theories, ideas, frameworks of thought, and methods of proof (Suharwoto, 2021).

The TPACK approach applied is able to improve skills in collaborating technology into learning. By using this approach, teachers can organize approaches that can help students understand the learning material presented by the teacher. Teachers must also always innovate in the learning process so that students always face new challenges during the learning process.

METHOD

This research was conducted with the aim of finding out whether there is an influence of the TPACK approach in fostering creative thinking skills in fifth grade elementary school students on the properties of light material using a quantitative research design with a Quasi Experimental Design through Pre-test Post-test Nonequivalent Control Group Design. In the experimental class the treatment was carried out using the TPACK approach, while in the control class the learning process was carried out without using the TPACK approach. To see more clearly the research design is presented in the following table.

Table 1. Research Design Pre-test Post-test Nonequivalent Control Group Design

Class	*Pre-test*	Treatment	*Post-test*
E	O1	X	O2
K	O1		O2

Description:
E = Experimental Class
K = Control Class
O1 = Experimental Class Pre-test
O1 = Control Class Pre-test
X = TPACK approach treatment
O2 = Experimental Class Post-test
O2 = Control Class Post-test

This research used a population of all students at SDN Buncitan Sedati Sidoarjo with the research sample used, namely students in class VA (control class) totaling 30 students and class VB (experimental class) totaling 30 students. The data collection technique in this research is using creative thinking skills test techniques. The test technique is collecting data by asking a series of questions or exercises to measure the skills, knowledge and intelligence possessed by an individual or group.

According to Munandar (2017), the research instrument is in the form of creative thinking skills test questions in the form of descriptions consisting of indicators of creative thinking skills, namely fluent thinking (fluency), flexible thinking (flexibility), original thinking

RESULTS AND DISCUSSION

The data analysis stage will be carried out on the two groups used as research samples, namely the experimental class and the control class. Before testing the hypothesis, this research conducted data analysis using prerequisite tests, namely the normality test and homogeneity test, then continued with hypothesis testing (t-test) using SPSS version 21. The data collected was processed regarding the creative thinking skills test, based on the results of the pre-test scores. - test and post-test creative thinking skills in the form of descriptions.

Table 2. Data Result Research

Data Type		N	Max	Min	Average	Standart Dev
Experiment	O1	30	67	33	48.10	10.27
	O2	30	97	60	77.83	11.82
Control	O1	30	67	33	48.60	9.37
	O2	30	83	50	66.63	10.41

Based on the research data table, the highest test scores for the experimental class and control class before being given treatment were still in the range of values below 70. This shows that the creative thinking skills of fifth grade elementary school students on the properties of light are still low. Therefore, to foster students' creative thinking skills, the TPACK approach can be applied. The results of the highest post-test score in the experimental class after being given the TPACK approach treatment reached a score of 97 while the control class got a score of 83. To prove whether there is an influence of the TPACK approach in growing the creative thinking skills of fifth grade elementary school students on the properties of light material, the stage Next, the calculation of the prerequisite tests on this research data can be stated as follows.

Normality test

The normality test was carried out using the Shapiro-Wilk test with a significance level of 0.05. The results of the normality test can be seen in the following table

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Table 3. Normality Test Results for Pre-test and Post-test Scores for Creative Thinking Skills

Data Type	*Pre-test*	Sig.	Desc
Normality test (*Shapiro-Wilk*)	Experiment	0.147	Normal
	Control	0.269	Normal
	Post-test	Sig.	Ket
	Experiment	0.055	Normal
	Control	0.090	Normal

Based on table 3 of the Shapiro-Wilk test above, it shows that the results of the calculation of the normality test for the experimental class pre-test data show a sig. 0.147 > 0.05, while in the control class pre-test data sig. 0.269 > 0.05. The results of post-test data calculations in the experimental group show a sig. 0.055 > 0.05 and in the post-test the control class group showed a sig value. 0.090 > 0.05. Therefore, it can be concluded that the data normality test in both classes shows that the data is normally distributed.

Homogeneity Test

The homogeneity test was carried out using the Test of Homogeneity of Variances test in One Way Anova with a significance level of > 0.05, so it can be said to be homogeneous. The homogeneity test results can be seen in the following table.

Table 4. Homogeneity Test Results for Pre-test and Post-test Creative Thinking Skills

Data Type	Nilai	Sig.	Desc
Homogeneity Test (*Levene Statistic*)	*Pre-test*	0.310	Homogen
	Post-test	0.243	Homogen

Based on table 4 of the Test of Homogeneity of Variances test above, it can be seen that the results of calculating the pre-test scores for the experimental class and control class have sig. 0.310 > 0.05, which means that this research data shows the same variance or is homogeneous and the post-test calculation data for the experimental class and control class has sig. 0.243 > 0.05 which means that this research data shows homogeneity.

Hypothesis Test

Hypothesis testing was carried out using the Independent Samples Test with a significance level of <0.05 using SPSS 21. The results of the hypothesis test can be seen in the following table

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Table 5. Hypothesis Test Results Post-test Scores for Creative Thinking Skills

Data Type	Value	Sig.(2-*tailed*)	Desc
Hypothesis Test *(Independent Sampels Test)*	Equal variances assumed	0.000	Significant
	Equal variances not assumed	0.000	Significant

Based on table 5 of the Independent Samples Test, it shows that the sig. (2-tailed) of 0,000. Based on the decision making criteria of 0.000 < 0.05, which means H0 is rejected and H1 is accepted, this research shows that there is a significant influence of the TPACK approach in fostering creative thinking skills in fifth grade elementary school students on the properties of light.

Based on the research results obtained from hypothesis testing (t-test), it is proven that the TPACK approach has a significant influence in developing the creative thinking skills of fifth grade elementary school students on the properties of light. This is in line with previous findings which stated that students received a new atmosphere and new understanding so that the material taught was easier to understand. They can also participate in the learning process in groups and share ideas and suggestions to achieve mutually agreed results. They can also exchange opinions with their friends during discussions. This shows that the TPACK approach can increase student creativity (Muflikha et al., 2023).

Using the TPACK approach can foster creative thinking skills because it provides a deeper understanding and innovative solutions to these concepts. This helps improve their overall understanding and provides a stronger foundation for applying concepts in real situations. The TPACK approach integrates technology through power points and learning videos which contain text, images, animations and videos so that it can be an effective tool for facilitating discussion, collaboration between students, as well as helping students visualize complex ideas better, enabling them to understand concepts more deeply and spark their imagination. This is in line with Pramestika's (2020) opinion that the use of PowerPoint technology and learning videos makes students enthusiastic about learning, because PowerPoint media and learning videos can stimulate students' thoughts, emotions, attention and desires, thus encouraging their creative thinking.

The teacher's pedagogical abilities are applied in the problem-based learning process with the material content to be taught regarding the properties of light. This is because problem-based learning can stimulate students' creative thinking abilities by providing a real context for problem solving, encouraging exploration of alternative solutions, and collaboration in finding answers and by studying the properties of light students can stimulate ideas that enable them to think. creatively. about how light interacts with surrounding objects and can encourage him to develop creative solutions in designing experiments, solving problems, or creating works that involve the use of light.

The TPACK approach applied in the learning process can enable students to be more active in creating ideas obtained through collecting information in learning videos, where students use these ideas to discover principles and

contrast knowledge to solve realistic problems. Thus, in the learning process using the TPACK approach it has an influence in growing the creative thinking skills of fifth grade elementary school students on the properties of light..

Based on the creative thinking skills test instrument which aims to provide an assessment based on a creative thinking skills matrix, namely fluent thinking, flexible thinking, original thinking and elaborative thinking. The following table shows indicator achievement data based on research results.

Indicators of Creative Thinking Skills	Presentase (%)	Category
Fluency Thingking	91	Very Creative
Flexible Thinking	84	Creative
Originality Thingking	59	Quite Creative
Elaboration Thingking	70	Creative

Based on table 5 which shows the percentage categories to determine the level of students' creative thinking competence, the first indicator is fluency. This indicator obtained a percentage of 91% in the very creative category, because they have the skills to quickly produce ideas, methods, suggestions, questions, ideas or solutions. This is proven by the students' skills in being able to fluently analyze problems in an image about a phenomenon of the nature of light through power point displays and question and answer activities aimed at exploration so that students can express their opinions with varying answers according to the students' level of understanding in everyday life, as well as students able to encourage problem-oriented thinking processes.

This category was also strengthened by Jumanto and Adi (2022) who stated that students' fluency aspect indicators had an average score in the good category. This achievement can be seen from the majority of students being able to find solutions to problems in the tests given. Only a few students had difficulty finding solutions or ideas to answer the test.

The second indicator is flexible thinking (flexibility). This indicator obtained a percentage of 84% in the very creative category, due to the skill of expressing different ideas, answers or questions from various perspectives. This was proven by students when carrying out experimental activities on LKPD, students were able to interpret other phenomena during simple experiments with the help of learning video shows. These experiments can stimulate flexible thinking skills, because students approach problems from various points of view to produce new ideas or solutions when conducting experiments.

This category was also strengthened by Hidayah, Ulya, and Masfuah, (2021) that the student flexibility aspect indicator had an average score in the good category. This achievement can be seen in students being able to solve the questions. Students are asked to create questions according to the illustrations or pictures in the questions, so that they can provide various kinds of answers.

The third indicator is original thinking (originality). This indicator obtained a percentage of 59% which was categorized as quite creative, due to the skill of expressing expressions, thoughts or ideas to solve problems or new elements that other people had not thought of. This is proven when students are trained in the learning process using problem-based learning to think of different ways when solving problems. In this phase students are expected to think original, where in the worksheet students carry out the process of experimenting with new ways and during the process of observing, discussing, gathering information and observation, students gain learning experiences that help them grow their creative thinking skills.

This category was also strengthened by Rulistiani et al, (2023) who stated that students' originality aspect indicators had an average score in the rising category. This achievement can be seen in the answers of students who are able to produce new and unique expressions and provide answers in their own way.

The fourth indicator is detailed thinking (elaboration). This indicator obtained a

percentage of 70% in the creative category, because of the ability to enrich, develop, elaborate or detail an idea. This was proven when students were able to develop and present the results of experiments with the help of teaching materials displayed on the LCD. In this phase, students are trained to explain in detail the results of experiments, provide arguments, and be able to propose new ideas or problems in learning activities and strengthen friends' answers or ideas in their own language.

This category was also confirmed by Anggela et al, (2022) that the indicator for the student elaboration aspect had an average score in the good category. This achievement can be seen in students who can explain the answers as ideas or thoughts given to answer questions with relevant concepts but still lacking in detail.

The results of the percentages on the four indicators of creative thinking skills show that the indicators of fluent thinking and flexible thinking have percentages in the same category, namely very high. This is due to students' ability to analyze and solve problems based on their ideas. They are also able to categorize objects based on the way they are used in everyday life. This statement is reinforced by Rosid (2019) who states that fluent thinking and flexible thinking are relatively easy to improve, because students are able to connect their ideas easily and can create innovative solutions.

Through the percentage results per indicator of creative thinking skills above, the learning process using the TPACK approach can influence the growth of creative thinking skills in fifth grade elementary school students on the properties of light.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the TPACK approach fosters creative thinking skills in fifth grade elementary school students on the properties of light. By combining an understanding of how to effectively use technology in learning with an understanding of appropriate subject matter and teaching methods, the TPACK approach creates a learning process that supports the important exploration, collaboration, and creation of creative thinking skills.

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