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Develop Critical Thinking Skills through Steam Learning in Grade 5 at SD Negeri 2 Sawal Banjarnegara

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ABSTRACT

This study examines the effect of STEAM-based learning on the critical thinking skills of fifth-grade students at SD Negeri 2 Sawal, Banjarnegara. With the need for 21st-century education to develop critical, creative, and innovative thinking in young learners, a quasi-experimental design was used with Pretest-Posttest Nonequivalent Control Groups. Fifth-grade students were divided into experimental and control groups through purposive sampling. A critical thinking test based on Higher Order Thinking Skills (HOTS) was administered before and after the intervention. The results showed a significant improvement in critical thinking skills in the experimental group ($p < 0.05$). STEAM-based learning effectively enhances critical thinking and is suitable for integration into 21st-century education.

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1. INTRODUCTION

Education has been around for thousands of years, humans have had a strong drive to learn and develop themselves. Education, in its simplest form, has become an integral part of our evolutionary journey. In the past, education focused more on the transmission of knowledge and skills needed to survive. In the modern era, the goal of education is often related to the advancement of problem-solving and critical thinking abilities. In addition, education also aims to create responsible citizens and lifelong learners. Education in the 21st century faces a fundamental paradigm shift.

It is no longer enough for students to only master factual knowledge or conceptual memorization, but are required to be able to think critically, creatively, and innovatively in solving complex and multidimensional problems. Higher Order Thinking Skills (HOTS) such as critical thinking are now widely recognized as the main key in preparing the younger generation to face the challenges of the era of globalization, the industrial revolution 5.0, and the accelerating digital transformation . Critical thinking skills not only refer to the ability to draw logical conclusions, but also include a healthy skeptical attitude toward information, the ability to evaluate evidence objectively, and the ability to reflect one's own and others' mindsets.

Therefore, the strengthening of these skills should be carried out as early as possible, including at the elementary school level, as part of a long-term investment in the formation of the character and intellectual prowess of the learners . Education is currently undergoing a significant transformation in an effort to prepare future generations who are competent in various aspects of life. One of the approaches that is increasingly being

adopted is the STEAM approach, which is an acronym for Science, Technology, Engineering, Arts, and Mathematics. This approach not only emphasizes mastery of science and technology, but also integrates the arts to develop creativity and critical thinking in students.

At the elementary school level, especially in grade 5 of SD Negeri 2 Sawal, the application of STEAM is very relevant considering that this period is a critical period in children's cognitive and emotional development. STEAM-based education can encourage learners to think holistically and interdisciplinary, which is desperately needed in the face of the challenges of the 21st century. However, the reality on the ground shows that the learning approach in many elementary schools is still teacher-centered, exam-oriented, and lacks stimulation for critical thinking. The dominance of lecture and evaluation methods that focus on single answers makes students passive and unfamiliar with exploratory, argumentative, or collaborative activities.

Therefore, it is necessary to reform the pedagogical approach that is able to provide space for students to learn contextually, integrated, and creatively.One approach that is gaining global attention is STEAM-based learning (Science, Technology, Engineering, Arts, and Mathematics). STEAM combines exact disciplines with artistic creativity and design, creating a learning process that fosters collaboration, exploration, and innovation. This approach is in line with the principles of constructivism, where learners actively build knowledge through direct experience and social interaction. In this context, STEAM is an ideal vehicle to develop critical thinking skills from an early age.

STEAM learning designed on a project-based basis has been proven to increase students' learning motivation, collaborative skills, and analytical thinking skills. Through the development and completion of real projects, students are not only applied theoretical concepts but are also invited to think solutively and reflective of the problems they face. A study by Mariana and Kristanto (2023) confirms that the integration of computational thinking in the STEAM model improves students' ability to strategize, evaluate decisions, and hone systematic thinking logic.This research was carried out at SD Negeri 2 Sawal, an elementary school where STEAM-project-based learning began to be integrated into the 5th grade curriculum.

Using a qualitative approach and case study design, this study not only captures the technical implementation of learning, but also examines in depth how cognitive changes and critical thinking dispositions arise as a result of learners' involvement in STEAM projects. Data was collected through classroom observations, teacher interviews, and analysis of documentation of students' work. Initial results show a significant change in the way students interact in the learning process. They become more courageous to express their opinions, be critical of information, and be more reflective in evaluating the solutions they offer.

These results reinforce the evidence from international studies that STEAM can be an effective medium in the formation of a generation of critical and adaptive thinkers, who are not only capable of learning, but also capable of learning to learn . As such, it is important for educators and policymakers to consider the broader application of the STEAM approach, not only as a teaching method, but as a holistic, transdisciplinary, and learner-centered educational paradigm. This is in line with the direction of the transformation of national and global education towards education for human flourishing.

2. RESEARCH METHOD

This study was conducted out using a quantitative approach with a quasi-experimental design of the Protest-Posttest Nonequivalent Control Group Design. The research was carried out at SD Negeri 2 Sawal, Banjarnegara, with the research subject of 5th grade students. Subjects were divided into two groups, namely the experimental group that followed STEAM-based learning, and the control group that followed conventional learning. The selection of subjects was carried out through purposive sampling techniques, taking into account the active involvement of students in learning activities. The independent variable in this study is STEAM-based learning, while the bound variable is the critical thinking skills of students.

Data collection was carried out through the provision of a critical thinking skills test based on Higher Order Thinking Skills (HOTS) questions, which consisted of multiple-choice questions and a brief description. The test is given in the form of a pretest before treatment and a posttest after treatment. The data obtained were analyzed using a normality test to determine the distribution of data, a homogeneity test is conducted to assess the similarity of variances across different groups, while an independent sample t-test is utilized to evaluate the differences in average critical thinking skills between the experimental group and the control group. With this approach, a valid and reliable empirical picture was obtained regarding the influence of STEAM learning on the improvement of critical thinking skills of elementary school students.

1.1 Research Objectives

This study aims to examine the influence of STEAM (Science, Technology, Engineering, Arts, and Mathematics) based learning on the critical thinking skills of grade V students at SD Negeri 2 Sawal, Banjarnegara. Specifically, the objectives of this study are to:

a) To find out the level of students' critical thinking skills before and after participating in STEAM-based learning.
b) Analyze the difference in critical thinking skills between students who participate in STEAM-based learning and students who participate in conventional learning.
c) Identify how much the STEAM learning approach affects the improvement of critical thinking skills of elementary school students.

1.2 Research Hypothesis

In this study, the hypotheses proposed are as follows:

a) Hypothesis Nol (H_0)

No significant difference was observed in critical thinking skills between students engaged in STEAM-based learning and those involved in conventional learning.

b) Alternatif hypothesis (H_1)

A significant difference exists in critical thinking skills between students engaged in STEAM-based learning and those involved in conventional learning.

Table 1.

Component	Explanation
Types of research	Kuasi-eksperimen (quasi-Eksperimental Design)
Experimental design	Pretest-Posttest Nonequivalent Control group design
Research location	SD Negeri 2 Sawal, Banjarnegara
Research subjects	Grade 5
Subject selection techniques	Purpose Sampling (Based on active involvement in learning)
Experimental groups	Students who get STEAM learning
Control group	Participants who received conventional learning
Independent variables	STEAM-based learning
Related variables	Students' critical thinking skills
Data collection instruments	Critical thinking skills test in the form of HOTS questions (multiple choice and description)
Data analysis techniques	Normality test, homogeneity test and independent sample t-test

This study uses a quasi-experimental approach with a Pretest-Posttest Nonequivalent Control Group Design. The research subjects consisted of grade V students at SD Negeri 2 Sawal, Banjarnegara, who were selected purposively based on their active involvement in learning. The experimental group received treatment in the form of STEAM-based learning, while the control group followed conventional learning. Data were collected using a critical thinking test in the form of Higher Order Thinking Skills (HOTS) questions before and after treatment, and analyzed with appropriate statistical techniques to ensure the validity of the results.

The operational definition in this study is designed to clearly measure the correlation between STEAM-based learning and students' critical thinking abilities.. STEAM learning is understood as a learning process that combines five disciplines to produce a creative and meaningful learning experience. Meanwhile, critical thinking skills are operationalized through students' achievements in the HOTS test, with indicators including the ability to analyze, evaluate, infrere, and reflect on contextual problems.

Table 2.

Variabel	Conceptual Definition	Operational Definition	Indicator
STEAM Learning	A learning approach that integrates science, technology, engineering, art, and mathematics holistically.	Project-based learning activities that emphasize the integration of STEAM disciplines to encourage creativity, collaboration, and real problem-solving.	a. Integration of 5 disciplines b. Project-Based Learning c. Focus on creativity, collaboration, and innovation. d. Analytical skills
Critical Thinking Skills	High-level thinking ability to analyze, evaluate, and make decisions logically and reflectively.	Students' skills in solving HOTS questions that test their ability to analyze, evaluate arguments, make inferences, and conduct critical reflection.	a. Ability to evaluate evidence and information b. Ability to make logical inferences c. Thinking reflection skills.

Table 3. Research Hypothesis

Jenis Hypothesis	Rumusan Hypothesis
Hypothesis Nol (H_0)	No significant difference in critical thinking skills was found between students who participated in STEAM learning and those who participated in conventional learning.
Alternatif Hypothesis (H_1)	Significant differences exist in critical thinking skills between students who engage in STEAM learning and those who undergo conventional learning.

This study tested two hypotheses, namely the zero hypothesis (H_0) and the alternative hypothesis (H_1). The zero hypothesis states that there was no significant difference in critical thinking skills between the experimental group and the control group. In contrast, an alternative hypothesis states that there is a significant difference after the implementation of STEAM-based learning.

Table 4. Data Analysis Techniques

Stages of Analysis	Techniques Used	Purpose
Normality Test	Kolmogorov-Smirnov / Shapiro-Wilk Test	Know if the data is normally distributed.
Homogeneity Test	Levene's Test	To test whether the variance of data from both groups is homogeneous or uniform.
Differentiation Test (Inferential)	Independent Sample t-Test	Tested the difference in mean critical thinking skills between the experimental and control groups.

The data analysis in this study commenced with a normality test to verify the distribution of the data, followed by a homogeneity test to assess the equality of variances between groups. Subsequently, an independent samples t-test was conducted to examine the effect of STEAM-based learning on students' critical thinking skills by comparing the post-test mean scores of the experimental and control groups.

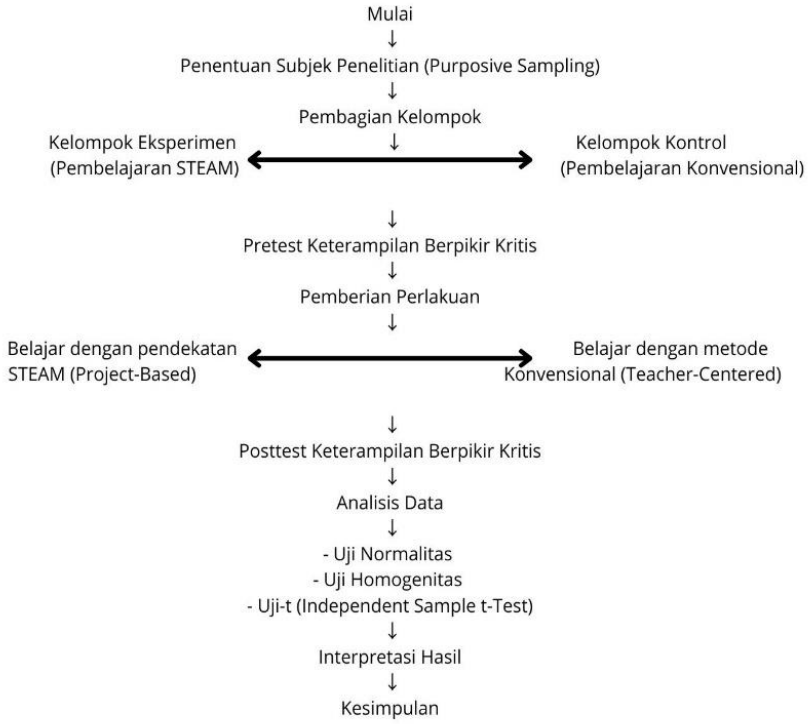

Figure 1. Flow Diagram of the Experimental Process

3. RESULTS AND DISCUSSIONS

1.3 Definition of Steam

The stem approach is an innovation in the world of education that can produce graduates who not only master basic science, but also have the practical skills needed in the 21st century. By integrating various disciplines, stem encourages students to think critically, creatively, and collaboratively. In addition, stem also helps students to understand how science and technology can be applied to solve problems [1]. [2] STEAM as STEM learning that is integrated with art. In[3] fact, STEAM is one of the breakthroughs in education in Indonesia that aims to improve the ability of individuals to support a technology-based economy.

Meanwhile[4], STEAM is an educational approach that integrates five disciplines, namely Science, Technology, Engineering, Art, and Mathematics. This approach is used to help students solve problems thoroughly by connecting concepts from different fields of knowledge. The main goal of implementing the STEAM method is to produce students who dare to take risks, are active in experiential learning, are persistent in problem solving, are able to collaborate, and are involved in the creative process. This is all done to prepare learners to face real-world challenges with innovative skills and thinking.

So it can be concluded that STEAM is an educational approach that integrates five disciplines into a holistic unit in learning and teaching that aims to improve students' understanding of the relationship between science, technology, engineering, art, and mathematics in a real-world context, along with enhancing essential abilities and honing problem-solving skills. The following are the main aspects or components in the field of science:

a. Science

Science is the study of nature, encompassing the fields of physics, chemistry, and biology, as well as the application of related facts, principles, and concepts. Science is divided into three types, namely physical, life, and antarctic earth.

[1] Rr. Yuliana Purwanti Nasrah, Rifqah Humairah Amir, "The Effectiveness of the Steam Learning Model (Science, Technology, Engineering, Art, and Mathematics) in Grade IV Elementary School Students," *JKPD) Journal of Basic Education Studies* 6 Number 1 (2021): 1–13, https://journal.unismuh.ac.id/index.php/jkpd/article/view/4166.

[2] Berliany Nuragnia, Nadiroh, and Herlina Usman, "Steam Learning in Elementary Schools: Implementation and Challenges," *Journal of Education and Culture* 6, no. 2 (2021): 187–97, https://doi.org/10.24832/jpnk.v6i2.2388.

[3] Nurhikmayati, "The Implementation of STEAM in Mathematics Learning."

[4] Pria Gunawan, "STEAM (Science, Technology, Engineering, Art, Mathematics) Learning Model with a Scientific Approach," *STEAM Learning Model*, 2019, 1–64.

b. Technology

Technology includes all systems consisting of people, organizations, knowledge, processes, and devices used to create and operate technological tools. Technology is not always related to software, but also includes the skills of students in using tools and products that they produce themselves.

c. Engineering (*Rekayasa*)

Engineering is the knowledge of the design and creation of products and processes for solving problems, using concepts of mathematics, science, and technology. Engineering is not always related to electricity and focuses more on design activities for problem solving or product manufacturing.

d. Art

Art in STEAM plays an important role in developing creativity and innovation in students. The integration of art in art into the learning of science, technology, engineering, and mathematics provides a holostic approach that focuses not only on technical and logical aspects, but also on aesthetics, imagination, and creative expression. Art is divided into four fields, namely fine arts, music arts, dance, and drama.

e. Mathematics

Mathematics is the study of the relationship of numbers, numbers, and forms, encompassing theoretical and applied mathematics [5]

1.4 Character Statistics Steam

In an effort to answer increasingly complex global challenges, the world of education continues to innovate. One of the innovations that stands out is the STEAM approach. So, what is the difference between the STEAM approach and the conventional or traditional learning methods that we have known so far? To achieve more comprehensive learning objectives, the STEAM learning model with a scientific approach adopts a set of specific characteristics. These characteristics focus not only on material mastery, but also on the development of high-level thinking skills. The scientific approach in STEAM provides a strong framework for active, learner-centered learning. The following are some of the key characteristics that distinguish the STEAM learning model from other approaches:

a. Teach learners to learn in an active way, such as observing things, asking questions, finding out, connecting information, and communicating what they learn.
b. Teaching a variety of subjects at once, such as science, technology, engineering, art, and math, in an interconnected way.
c. Using the natural environment as the main medium to introduce learning that contains STEAM elements.
d. All activities are adapted to the existing learning plan and topics that have been determined by the institution.
e. All children's activities are designed to support their growth and development, and use STEAM learning methods that prioritize observation, questions, and experimentation.
f. Experiment-based STEAM learning becomes a regular part of daily activities, always related to predetermined topics.
g. Learning is carried out using items that are easy to find around us, and the learning material is related to nature, society, and culture [6].

1.5 Benefits of Steam Learning

Education in the 21st century places great emphasis on developing essential skills needed by learners to face the challenges of the times. Her main focus is on critical thinking, communication, cooperation, and collaboration skills [7]. STEAM education is essential in elementary school because it provides a solid foundation for children to face an increasingly complex and technology-based future. In [8], the STEAM learning approach provides significant benefits, including improved critical thinking skills, creativity, and the ability to collaborate. In addition, STEAM also assists students in solving complex problems using technology and interdisciplinary approaches. Here's the explanation:

a. Develop critical and creative thinking skills

STEAM helps learners to critically analyze and evaluate information, as well as solve problems with a systematic approach and by integrating the arts, STEAM encourages learners to think outside the box and find innovative solutions.

[5] Nuragnia, Nadiroh, and Usman, "Steam Learning in Elementary School: Implementation and Challenges."
[6] Gunawan, "STEAM (Science, Technology, Engineering, Art, Mathematics) Learning Model with a Scientific Approach."
[7] Teti Rostikawati et al., "Implementation of STEAM-Based Project Learning Model to Improve Elementary Student's Learning Outcomes," *Pedagonal : Scientific Journal of Education* 8, no. 1 (2024): 10–19, https://doi.org/10.55215/pedagonal.v8i1.9564.
[8] Rahmatul Hayati et al., "STEAM (Science, Techonology, Engineering, Art, and Math) Learning Models in Elementary School Mathematics Learning: Differentiated Learning," *Educational : Journal of Educational Science* 5, no. 6 (2023): 2591–2603, https://doi.org/10.31004/edukatif.v5i6.5723.

b. Interdisciplinary Learning

STEAM connects different disciplines so that students can see the connections between different concepts. This approach allows learners to understand how science, technology, engineering, art, and mathematics are intertwined and can be applied in real life.

c. Improve collaboration and communication skills

STEAM often involves collaborative projects where learners work in teams to achieve a common goal. Through teamwork, students learn to communicate, share ideas, and collaborate with their peers.

d. Preparing Students for the Future

With a focus on technology and engineering, STEAM prepares learners to face the challenges of an ever-evolving world. They learn practical and technical skills needed for future careers in science, technology, and engineering.

e. Increase Student Motivation and Engagement

STEAM projects tend to be more engaging and fun, which increases learners' motivation and engagement in learning. Project-based learning allows learners to learn through hands-on experience, which makes the learning process more meaningful and relevant.

1.6 Steam Learning Principles

The foundations of STEAM learning are built on a number of interrelated principles. These principles serve as a guideline in designing and implementing effective and meaningful learning activities. According to [9], the principles of STEAM learning include:

a. *The* Principle Of Interdisciplinary

Educators who apply STEAM learning methods should not focus only on one specific subject. Instead, they need to emphasize the integration of various disciplines of science, technology, engineering, art, and mathematics in the problem-solving process that suits real-life situations.

b. The Principle Of Contextualization

The application of the STEAM curriculum is based on relevant or similar social contexts. Therefore, teachers need to provide real situations that are in accordance with the characteristics of the child and close to the reality of the world, so that children can learn to solve the problems they face in daily life.

c. The Principle Of Interest

The design of the STEAM curriculum for children should be appropriate to their stage of cognitive development and presented in a fun form. The purpose of the curriculum design is to create interesting and fun learning, as well as develop children's thinking skills through interactive learning activities.

d. The Principle Of Inquiry

Children convey their conclusions through a variety of ways to improve early problem-solving, creativity, community, and positive emotional experiences. The application of the STEAM learning approach provides an opportunity for children to think broadly in finding solutions during learning activities, so that they can have a meaningful learning experience through the surrounding environment.

e. Iii-Defined Task And Well-Defined Outcome

In carrying out STEAM educational activities, teachers must provide certain problems with clear goals to be achieved, but they must not limit the way they are solved. This provides space for children to explore and find their own answers.

1.7 Steps in the Steam Learning Approach

The learning system that is generally applied is that the teacher gives explanations while students listen. This approach is teacher-centered, thereby reducing student participation and activity in learning. To achieve learning effectiveness, teachers need to guide students and use a variety of learning models to improve interaction between teachers and students in the teaching and learning process. Structured learning models require attention to interaction, and these interactions cannot be ignored. Therefore, this learning model cannot be replaced by another model. The learning model is very effective in improving the quality of learning because it encourages learners to actively participate, think critically, and work together in a team [10]. The steps that need to be taken in the STEAM learning approach:

a. Observe

Students are invited to pay attention to interesting things around them that are related to science lessons.

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[9] Nurlina, *Implementation of Science, Technology, Engineering, Art, Mathematics (STEAM) Approach in Science Teaching*, *Sustainability (Switzerland)*, vol. 11, 2024, http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI.

[10] Rostikawati et al., "Implementation of STEAM-Based Project Learning Model to Improve Elementary Student's Learning Outcomes."

b. Discovering new ideas
After observing, learners dig deeper and try to find creative ideas based on what they observe.
c. Create a plan
Learners think about how to turn their creative ideas into reality
d. Create a work
Students turn their ideas into real works
e. See the benefits
Students think about how their work can benefit others or the surrounding environment [11].

1.8 Advantages And Disadvantages Of Steam

Each learning approach has unique characteristics, including advantages and disadvantages when applied in the learning process. Here are some of the advantages of STEAM learning [12] :

a. Honing critical thinking skills: STEAM learning combines five disciplines, namely science, technology, engineering, art and mathematics, which help students develop critical thinking skills.
b. Encourage creativity: the existence of an art component in STEAM learning aims to encourage students' creativity.
c. Broaden perspective: STEAM learning helps students see problems from a broader and deeper perspective, so they can make more informed decisions.
d. Encourage careers in the field of stem: STEAM learning encourages students to pursue careers in stem (science, technology, engineering, mathematics).

In addition to advantages, STEAM also has disadvantages according to [13]:

a. Lack of understanding of teachers: many teachers still do not understand the application of STEAM learning in the classroom because this model is still relatively new.
b. Students have less appreciation for other subjects: students tend to have less appreciation for other subjects such as music, literature, language, and writing if the elements of art are not included well in learning.
c. Requires adequate facilities and infrastructure: STEAM learning requires adequate learning facilities and resources, often difficult to find in some schools.

1.9 Research Results

This study was conducted to determine the influence of STEAM-based learning on the critical thinking skills of grade V students of SD Negeri 2 Sawal, Banjarnegara. Data were obtained through a pretest and posttest of critical thinking skills in two groups, namely the experimental group and the control group.

a. Pretest Results

Before the treatment was given, a pretest was conducted for both groups to measure initial critical thinking skills. The results of the pretest showed that the average critical thinking skills scores of the experimental and control groups did not differ significantly, which means that the initial conditions of the two groups were relatively equal.

Table 5.

Group	Average	Information
Experiment (STEAM)	60,4	Keep
Control (Conventional)	61,0	Keep

b. Posttest Results

After treatment, a posttest is given to measure the improvement of critical thinking skills. The posttest results showed that there was a higher improvement in the experimental group than in the control group.

Table 6.

Group	Average	Information
Experiment (STEAM)	83,2	Tall
Control (Conventional)	70,5	Medium-High

[11] Nasrah, Rifqah Humairah Amir, "The Effectiveness of the Steam Learning Model (Science, Technology, Engineering, Art, and Mathematics) in Grade IV Elementary School Students."
[12] Wilman Juniardi, "STEAM Learning: Definition, Purpose, and Examples of Its Application," Quipper Blog, 2023, https://www.quipper.com/id/blog/info-guru/pembelajaran-steam/?form=MG0AV3.
[13] Harisah Anis, "STEAM Learning," Tripven, 2021, https://www.tripven.com/pembelajaran-stem/?form=MG0AV3; Wilman Juniardi, "STEAM Learning: Definition, Purpose, and Examples of Its Application."

c. Statistical Test
To find out the significant differences, an analysis was carried out using an independent sample t-test.

1. The normality test showed that the data was distributed normally ($p > 0.05$).
2. The homogeneity test showed the variance of the two homogeneous groups ($p > 0.05$).
3. The results of the t-test showed a significance value (p-value) of 0.003 ($p < 0.05$).

Interpretation:

Since $p < 0.05$, the null hypothesis (H_0) is rejected. This means that there are significant differences in critical thinking skills between students who learn with the STEAM approach compared to conventional learning. The results of this study show that the application of STEAM-based learning significantly improves students' critical thinking skills compared to conventional approaches. This increase was characterized by a significantly higher average posttest score of the experimental group than that of the control group. STEAM as an integrative approach encourages learners to develop high-level thinking skills through creative projects that connect science, technology, engineering, art, and mathematics. Through this learning model, students are more trained to:

a. Analyze the problem in depth,
b. Developing innovative solutions,
c. Critically evaluate the results of their work,
d. Think reflectively on various possible solutions.

In addition, project-based learning in STEAM also encourages collaboration between students, increases confidence, and accustomes them to arguing logically and systematically. This is different from conventional learning which is more teacher-centered and tends to limit students' exploratory activities. These findings are in line with previous research [14] that shows that the STEAM approach is able to improve students' critical thinking skills and problem-solving abilities. Thus, STEAM learning deserves to be used as an alternative to innovative learning models to develop 21st century competencies, especially at the elementary school level.

4. CONCLUSIONS

The findings from the conducted research indicate that STEAM-based learning significantly enhances the critical thinking skills of fifth-grade students at SD Negeri 2 Sawal, Banjarnegara. Students who engaged in STEAM-based learning demonstrated greater improvements in critical thinking compared to those who experienced traditional learning methods. The STEAM approach, which combines science, technology, engineering, art, and mathematics, encourages students to approach problems with analytical, reflective, and innovative thinking. Additionally, the active and collaborative environment fostered through STEAM projects boosts student participation and emotional engagement in the learning process. Therefore, STEAM-based learning proves to be an effective and innovative method for improving critical thinking skills at the elementary school level.

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