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# Application of STEAM Approach in Improving Science Process Skills With Lesson Study Pattern in SD Unggulan Hamzanwadi

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**Abstract:** This study aims to improve SCIENCE process skills with the STEAM (Science, Technology, Engineering, Art, Mathematics) approach based on Lesson Study in grade 4 SD Unggulan Hamzanwadi. This research is a type of classroom action research based on Lesson Study with activity stages including Plan (Planning), Do (Implementation) and See (Reflection). The subjects of the lesson study activities were all students of grade 4 SD Unggulan Hamzanwadi in IPAS subjects. The data sources in this study are the results of observations of student activity during learning and documentation. The results of the study showed that: the implementation of the STEAM model based on lesson study can improve the science process skills of 4th grade students of Hamzanwadi Unggulan Elementary School from cycle 1 to cycle 2.

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## Introduction

Science process skills are a process skill that includes cognitive or intellectual manual, and social skills (Maranan, 2017). Science process skills are one of the skills that can develop knowledge that can develop students' knowledge in the learning process (Hall & Smith, 2006).The new focus in education requires application, creation and ingenuity. In one of the initiatives to promote creativity among students, STEAM involves critical processes, creativity and innovation. Innovative learning is learning that emphasizes freedom for students in learning, one of which is learning with the STEAM approach (Kamil & HR, 2023; Rokhman et al., 2014).

STEAM is an approach that brings together various knowledge into one learning process that connects academic concepts or lessons in everyday life experienced in society, school, work and others (Babaci-Wilhite et al., 2019). Education that was originally STEM, then combined with one more element, namely Art, to become STEAM (Lestari et al., 2023). The STEAM component integrates an integrated learning approach that requires a complex relationship between standards, assessment and learning design. STEAM education is not just



 

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a theory, but rather a philosophy and approach that involves balancing skills and knowledge that include social, research skills, communication, self-management, and improved thinking skills (Maranan, 2017).

In implementing the STEAM approach, teachers work together to design and implement lessons that integrate Science, Technology, Engineering, Arts and Math. The process of science is the focus, with teachers jointly observing student responses, analyzing learning outcomes and detailing successful teaching strategies (Gencoglu et al., 2023). This collaboration allows for the development of innovative teaching practices and customization to learner needs, creating a more immersive and powerful learning experience through the lesson study pattern (Onu et al., 2023; Qadir, 2023).

Lesson Study is a teacher professional development method that originated in Japan (Makinae, 2019). It involves collaboration between teachers in planning, observing and analyzing learning together (Inganah et al., 2023). The ultimate goal is to improve the quality of learning through reflection and discussion among teachers (Huang et al., 2023). The process includes planning, implementation, observation and reflection, among others (Motta & Galina, 2023).

Researchers are interested in knowing more about how to improve SCIENCE process skills through the STEAM approach with Lesson Study patterns (Wong et al., 2023). The results of this study are expected to contribute to the world of education and the development of more effective learning methods for students. provide an overview to the government, people who move and explore the world of education in particular, about the problems faced by teachers in schools.

Based on the above background, to improve science process skills, the author uses the STEAM approach with Lesson Study pattern.

## Research Method

This lesson study activity was carried out in two cycles where the first cycle will be held on Monday, January 8, 2024 and the second cycle will be held on January 15, 2024 at SD Unggulan Hamzanwadi. The lesson study activity time that takes place in each cycle has been carried out with the Plan, Do, and See stages. Details of the lesson study activity time can be explained in the following activity table.

Table 1. Time of Lesson Study Activities

| Activities | I | II |
|---|---|---|
| Plan | December 26 2023 | January 13, 2024 |
| Do | January 8, 2024 | January 15, 2024 |
| See | January 8, 2024 | January 15, 2024 |

The techniques used to collect data in this study are adjusted to the type of data taken, namely (1) observation, is a direct observation of science process skills that arise during the application of the STEAM approach, this observation will include interactions between learners, learning methods, as well as the achievement of practical results in the context of



 

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science, forming a relevant basis for evaluation. (2) tests, data will be obtained from the results of LKPD tests specifically designed to measure understanding and application of science process skills. This test provides a concrete picture of learners' progress in the context of the STEAM approach. (3) documentation, taking pictures taken by researchers to strengthen the data obtained in learning activities.

Data analysis techniques used in this study include quantitative analysis, such as descriptive statistics to measure test results and comparisons between control and experimental groups. In addition, qualitative analysis was carried out through participant responses that provided in-depth insight into the experience of students with the application of the STEAM approach through the lesson study pattern. The integration of these two approaches can present a comprehensive picture of the impact of the STEAM approach on science process skills.

Observation and data recording methods carried out in this activity during the learning process took place through observation using observation sheets and video recording. In its implementation, the technician recorded using a cellphone. Recording is done thoroughly and then editing will be done on several events that are considered important.

## Result and Discussion

Based on the findings of the research that has been conducted in grade 4 of Hamzanwadi Unggulan Elementary School in IPAS subjects. The following are the data findings obtained by researchers from learning observations during implementation in the field.

### Implementation of Cycle 1

The action in cycle 1 begins with the "Plan" stage, which is the activity of designing predetermined learning. The next stage "Do" (Implementation) is the application of the STEAM (Science, Technology, Engineering, Art, Mathematics) learning model using the Lesson Study pattern. This activity is carried out for one meeting or 2 hours of learning. The implementation of this learning is carried out by one model teacher who is tasked with teaching or being a learning facilitator and 4 observers who are tasked with observing learning. The last stage is the "See" (reflection) stage, which is the stage of reflecting on the learning outcomes.

#### a. Plan

At the plan stage or Cycle I planning was carried out on December 26, 2023. The plan stage begins with preparing a learning design that will be implemented based on the initial data on the condition of the students delivered by the model teacher in the implementation of this lesson study activity. The learning design is made by focusing on learning the effect of force on objects to see the application of STEAM in improving science process skills. Based on the design made, the implementer of lesson study activities to do in cycle I requires learning equipment including: LKPD, observation sheets, experimental tools and materials (ice-cream sticks, skewers, hot glue, baseballs) to see the process of force through group cooperation and discussion, because in the learning process will make triangles, cubes, to check which plane is easier to move with the help of force. After analyzing the needs, it was determined what main tasks should be made and divided to each group member. The division includes: Risa Febriana Putri: Model Teacher, Nurfathiyah Hariyati: Observer, Nengah Wardatul Uyun: Observer, Yulia Nurmalasari : Observer, Mulyadi Irwan: Observer.



 

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Figure 1. Cycle I Plan Stage Activities

**b. Do**

Through the do stage or the learning implementation stage in cycle I, it was carried out on January 8, 2024, where learning activities began with the model teacher opening the lesson. After the lesson was opened, the activity continued with the model teacher explaining about the material of the Effect of Force on Objects, then checking the students' understanding directly, after that the model teacher formed students into several groups, then each group sat based on their respective groups. After that the model teacher helps students to prepare experimental tools and materials and explains the stages of group assignments to students who will be made such as triangles and cubes, while the ball is ready to use a baseball.

After completing the group assignment, the model teacher asks each group to come forward to see the extent of the effect of force on objects when thrown to the floor which is the fastest speed, whether triangles, cubes or balls, while other group members observe what happens then answer the questions in the LKPD according to the phenomena found.

Figure 2. Stage Activities Do Cycle



 

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**c. See (Reflection)**

The see stage or learning evaluation was conducted directly after the do stage was completed, on January 8, 2024. At the see stage, the lesson study implementation team discussed all the activities that had been carried out at the do stage. Based on the observations made by the observer, the do stage that has been implemented still has some shortcomings, among others: 1) Exploration Limitations: in the implementation of cycle I tends to provide an initial exploration that may not cover all aspects of the desired learning. 2) Focus selection challenge: determining the right focus for the first cycle can be challenging, and failure to select a focus can affect the success of the learning. 3) Reliance on the initial plan: reliance on the initial plan may inhibit flexibility in responding to actual student needs that may arise during learning.

Based on the results of the lesson study implementation group discussion, it was found that there are some shortcomings that need to be improved and more mature learning planning for cycle II, so that in cycle II it can run well and be able to achieve the planned objectives as expected.

Figure 3. Stage See Activities Cycle

**Implementation of Cycle 2**

The implementation of cycle II is more focused on learning the science process towards the integration of the STEAM approach carried out by paying attention to the details of the integration of science concepts and STEAM elements. Teachers interact with learners, facilitate understanding of science concepts, and encourage the application of this knowledge in collaborative projects by forming learners into groups to work together to complete tasks and group activities given by the teacher.

Cycle II was implemented during one face-to-face meeting in class 4 (Al-Lathif) and was carried out by one model teacher who was in charge of teaching and as a facilitator during the learning process then there were and four observers who were in charge of observing the learning process.



 

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**a. Plan**

The planning stage in cycle II was carried out on January 9, 2024. First of all, this stage reflects on the activities that have been carried out in cycle I as a reference for improvement and preparation of learning designs that will be implemented. The learning design for cycle II focused on learning the science process towards the integration of the STEAM approach carried out by paying attention to the details of the integration of science concepts and STEAM elements. Based on the design made in cycle II, the model teacher opens the lesson as usual and prepares the readiness of students to learn, then stimulates students by asking questions to ensure students' understanding of the subjects that have been obtained yesterday, after that the model teacher does ice-breaking with students to build enthusiasm for learning, because judging from the activities that will be carried out by students are more varied than cycle I, where in cycle I requires learning equipment including: LKPD, observation sheets, experimental tools and materials (ice-cream sticks, skewers, hot glue, baseballs) to see the process of force through group cooperation and discussion, and while in cycle II the learning equipment prepared includes: LKPD, observation sheets, experimental tools and materials (glue gun, nail iron, candles, matches, used plastic bottles, used plastic bottle caps, skewers, pipettes / straws, scissors, as well as secret tools prepared by the group to give the creation of an artistic impression in projects that are adjusted by the creativity of students) based on these tools and materials, teachers and students will create integration projects based on subject matter through STEAM.

Figure 1. Cycle II Plan Stage Activities

**b. Do (Implementation)**

The implementation stage of cycle II was carried out on January 15, 2024 at 10.30 in class IV (Al-Lathif) HAMZANWADIULAN Elementary School. Based on cycle II planning, the model teacher opens the lesson with greetings and prepares students' learning readiness, then tells the learning objectives to be achieved before reviewing the next material, the model teacher interacts by conducting questions and answers with students as a reminder of the previous material and reinforcement for the next material. After that, the model teacher explains what learning steps will be carried out in cycle II. The model teacher asks learners to sit according to the groups that have been formed during cycle I to complete the STEAM integration project.



 

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The teacher gives LKPD group assignments to students then asks students to prepare tools and materials that have been brought by each group on their respective group tables and asks students to work together to complete the project. Judging from the results of the STEAM integration project including Science: seen from the material and function of the project results in the form of a toy car in the context of real life can help facilitate human work to carry or move objects without requiring such a large force, because it has been easily carried by a car with the help of wheels. Then Technology: seen from the project results that show the ease for humans to move objects without requiring a lot of force in it as a form of technology or innovation. After that, Engineering: the resulting project illustrates how toy cars can be driven easily by adding machines in them which certainly help make work easier. Then Art: the impression of art is seen from the creations of students in giving a touch of art to the results of their projects so that there is an element of beauty in it such as cars in reality have colors, breakthroughs and a luxurious impression of the results of design and a beautiful impression with the addition of stickers according to the wishes of the car owner. And finally the integration of Mathematics: namely the elements that build the results of students' projects seen from the elements of flat and spatial shapes in it.

The teacher also reminds students not to forget to answer the LKPD that has been distributed to each group as teacher evaluation material to see the level of understanding of students, then asks students to come forward to present the results of their respective group work and collect LKPD. After that the model teacher concludes from the learning activities that have taken place and appreciates the work of the students' groups that are well done, creative and innovative and fun, then the teacher before closing the class provides learning motivation to students then reflects on the learning experience of students by giving constructive questions to students then the teacher says thank you and greetings.

Figure 2. Stage Activities Do Cycle

**c. See (Reflection)**

The reflection stage of the cycle II implementation activities was carried out after the end of the cycle. At the reflection stage, the implementation team discussed all the implementations that had been carried out at the do stage. Based on observations made by observers, it appears that the material of the integrated science process with STEAM elements is appropriate through the practice of making projects by answering LKPD as a guide for students in group work activities and is well implemented. The expected results



 

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have been achieved to the maximum and are the fruit of effective communication in solid group cooperation between students which greatly affects the color of learning interactions.

Figure 3. Stage See Activities Cycle

## Conclusion

Based on the implementation of IPAS learning with STEAM learning methods that have been carried out, it can be concluded that: a) Increased learner involvement and motivation STEAM integration in lesson study can create learning that is more interesting and relevant to learners, thus increasing learner involvement and motivation. b) Development of collaborative and communicative skills Lesson study that applies the STEAM approach can improve collaborative and communicative skills both among learners and teachers. learners can learn to work together in teams and communicate effectively. c) Improved understanding of concepts through a multidisciplinary approach STEAM integration allows learners to connect concepts from different disciplines, deepening their understanding of the learning material. d) Development of creativity and innovation The STEAM approach emphasizes creativity and innovation, helping learners develop creative ways of thinking and innovative solutions to problems. e) Improving problem solving skills The STEAM approach can improve learners' ability to solve problems, because they are invited to face real challenges that require critical thinking and creative solutions. f) Teacher professional development For teachers, lesson study with STEAM approach can improve teaching skills, curriculum understanding, and adaptability to innovative teaching methods. g) Measurement of learning impact Conclusion can also involve evaluating the learning impact of learners, the extent to which STEAM learning objectives are achieved, and how effective lesson study is in achieving these objectives.

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