Bulletin of Educational Management and Innovation
Volume 3, No. 1, April 2025. pp. 62-75
DOI: https://doi.org/10.56587/bemi.v3i1.111
E-ISSN: 2986-8688 | https://journal.rafandhapress.com/BEMI

Enhancing motivation and learning achievement in ipas through the environmental science, technology, and society approach in Elementary School

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Abstract
Background: *This study addresses the low levels of student motivation and learning outcomes in the integrated science and social studies (IPAS) subject among fourth-grade students at SDN Mandungan. It aims to investigate the effectiveness of the Science, Environment, Technology, and Society (Salingtemas) approach in improving both motivation and academic performance.*
Method: The research employed a Classroom Action Research (CAR) design, implemented over two cycles involving planning, implementation, observation, and reflection. The participants were 30 fourth-grade students during the 2023/2024 academic year. Data were collected through observation sheets and tests, then analyzed using both quantitative and qualitative methods.
Findings: *The findings showed that the Salingtemas approach led to notable improvements: students' motivation increased from 61.2% at the initial stage to 73.5% in Cycle I and 79% in Cycle II. Similarly, the average learning score rose from 73.33 to 83.3, exceeding the Minimum Mastery Criteria and achieving over 80% in class-wide mastery. These results indicate that the Salingtemas approach effectively enhances both motivation and learning outcomes in elementary IPAS education. This demonstrates that the Salingtemas approach significantly enhances both motivation and learning outcomes.*

Keyword; *Salingtemas approach; learning motivation; learning outcomes; integrated science; elementary education*

INTRODUCTION

Education is a process aimed at developing the potential of learners to meet the challenges of life and to contribute actively to society (Hakim, A. R., 2023). At the primary school level, one of the subjects that play an important role in the formation of learners' basic competences is Natural and Social Sciences (NSP). NSP not only teaches conceptual knowledge, but also promotes critical thinking, problem solving and concern for the environment and society (Mawaddah, I., & Sudarsono, S., 2025). However, the reality on the ground shows that students' motivation and learning achievement in IPAS subjects are still relatively low (Efendi, M., 2021). This may be due to the lack of connection between learning materials and the context of students' real lives, as well as learning approaches that tend to be monotonous and teacher-centred. According to Lestari (2020), students with high motivation tend to be more enthusiastic about completing tasks, take responsibility for their work and respond

positively to teacher prompts. In contrast, students with low motivation often show passivity and a lack of enthusiasm for learning.

One of the main challenges faced in elementary school learning is the low motivation of students to learn which ultimately affects their learning outcomes. Motivation to learn plays a very important role in educational success because it can determine how far students actively participate in the learning process. According to Lestari (2020), students who have high motivation tend to be more enthusiastic in completing assignments, are responsible for their work, and respond positively to stimuli from teachers. Conversely, students with low motivation often show a passive attitude and are less enthusiastic in learning.

Based on the results of interviews and observations on October 16 and 23, 2023 at SD Mandungan, it was found that the motivation and learning outcomes of students in the Natural and Social Sciences (IPAS) subject in grade IV were relatively low. The low motivation of students can be seen from their lack of participation in learning and disorderly behavior such as chatting and singing during the teaching and learning process. In addition, the Mid-Semester Summative (STS) value data also shows that the average student score is below the Minimum Completion Criteria (KKM), which is 73.33 from the KKM target of 75.

To overcome this problem, various learning approaches have been tried, but the results have not been optimal. Learning approaches that are too theoretical and irrelevant to students' daily lives often fail to motivate them to learn. Science learning requires students to be able to understand themselves and nature which is useful for their lives. On that basis, students need an approach or teaching method that can explore their knowledge and attract their interest, so that the teaching and learning process becomes exciting and allows learning objectives to be achieved (Said, Utaminingsih & Kristiani, 2023). One approach that is expected to answer this problem is the Environmental Science Technology and Society Approach (Salingtemas). This approach integrates science with technology and society, so that students can learn in a more relevant way and understand how scientific concepts can be applied in real life (Negara & Hanin, 2022).

Motivation is a psychological drive that directs a person towards a particular goal (Rahman, 2021). In the context of education, motivation is very important because it plays a role in encouraging students to achieve optimal learning outcomes. Motivation consists of components of needs, drives, and goals that all work together to influence how intensely students make learning efforts (Arianti, 2018). Learning motivation is divided into two main factors, namely intrinsic and extrinsic. Intrinsic factors include the desire to succeed, encouragement in learning, and expectations of ideals. While

extrinsic factors include verbal rewards, interesting activities, and a conducive learning environment (Mangedong et al., 2023). If these influencing elements exist, the child will have high motivation.

Learning outcomes are the output of the learning process that is influenced by psychological and environmental factors. Internal factors such as motivation, intelligence, and attitude play an important role, while external factors including the social environment and physical conditions also affect learning outcomes (Wicaksono & Iswan, 2019). Learning outcomes are assessed through several indicators such as intellectual skills, cognitive strategies, attitudes, verbal information, and motor skills (Syahrudin, 2020). A comprehensive assessment of all these indicators helps measure student development more comprehensively.

IPAS is a combination of IPA and IPS introduced in the Merdeka Curriculum as part of post-pandemic education recovery efforts (Andreani & Gunawan, 2023). Natural and Social Sciences (IPAS) is a field of science that studies living things, inanimate objects in the universe and the interactions between the two, and examines human life as individuals and social beings who interact with their environment (Viona, Utaminingsih & Nisa, 2023). IPAS learning helps students understand the relationship between nature and social life through an integrated approach, which includes natural, technological, and social materials (Anggita et al., 2023).

The Environmental Science Technology Society (Salingtemas) approach applied in the teaching of science combines science, environment, technology, and society to provide practical solutions to environmental problems. This approach emphasizes the importance of scientific understanding that can be applied for the benefit of society through active learning steps such as identifying environmental issues, using simple technology, and evaluating learning outcomes (Syofyan, 2018).

Previous studies have shown the effectiveness of contextualised learning approaches in improving student learning outcomes. The Science, Environment, Technology and Society (Salingtemas) approach has been widely applied to science subjects. Research by Aditia, M. T., & Muspiroh, N. (2013) developed a Salingtemas-based module - integrating Islamic values into the Salingtemas approach - in ecosystem learning at the high school level. The results showed that the use of the module could significantly improve students' learning outcomes compared to the control class, and received positive responses from students. Meanwhile, another study by Sugiyanto, S., et.al., (2012) developed a Salingtemas-based integrated science module on biogas technology for junior high school students. This module was highly rated by experts and teachers and received positive responses from students, indicating that integrating environmental and technological aspects in a real-life

context can increase the effectiveness of science learning. Both studies confirmed the relevance of the Salingtemas approach in developing modules and strengthening science learning outcomes at secondary level. However, both still focus on the aspect of developing teaching materials in the form of modules and have not specifically investigated the impact on student motivation and learning outcomes at the same time. In addition, no studies have been found that apply the Salingtemas approach to IPAS subjects (science and social studies) at the primary level, which has different learner characteristics from the upper level. Thus, there is still a research gap that needs to be filled, namely the application of the Salingtemas approach in IPAS learning in order to increase the motivation and learning achievement of primary school students in an integrated and contextualised way.

In this study, the Salingtemas concept is applied through science teaching that encourages students to observe natural phenomena and utilize simple technology to understand the concept of energy. Students are also faced with environmental problems around them, such as energy use and are invited to provide science-based solutions.

METHODS

The type of research conducted is Classroom Action Research with four stages, namely planning, action, observation, and reflection. The planning stage is to prepare research instruments and learning tools. The implementation stage is to carry out learning with the Environmental Science Technology Community approach. The observation stage is to make observations related to problems in the classroom. The reflection stage is to evaluate the implementation based on the results of observations and find alternative solutions to problems that arise. This research was conducted in class IV of Mandungan Elementary School located at Jl. Mandungan No. RT. 03, RT.3 / RW.2, Mungur, Srimartani, Kec. Piyungan, Bantul Regency, Special Region of Yogyakarta. This research was conducted in the 2023/2024 academic year. The subjects of the research were 30 students in class IV of Mandungan Elementary School. The object of the research is to increase motivation and learning outcomes of Science through the Environmental Science Technology Community Approach in Class IV of Mandungan Elementary School Piyungan Bantul Yogyakarta. Data collection was carried out by observation and testing. Observations were conducted to collect information involving direct observation to find out the problems that were occurring in the classroom. Tests were conducted to evaluate the level of students' thinking skills. Data analysis techniques in this study used quantitative and qualitative techniques to support and enrich the results of the analysis.

RESULTS AND DISCUSSIONS

Pre-action

This research was conducted at SD Negeri Mandungan, Bantul, Yogyakarta, with 30 fourth grade students as subjects. The researcher conducted initial observations and interviews with the fourth grade homeroom teacher, Wita Alfi Wulandari, S. Pd., to understand the problems in science learning, such as lack of motivation and varying student learning outcomes. The main challenges faced were students who lacked focus, especially during the day, and behavior that did not support learning such as chatting, singing, and lack of self-confidence.

Based on observations and interviews, it was found that students' motivation and active involvement in learning were still low, which resulted in suboptimal learning outcomes. The average class score was 73.33, with most students (50%) not yet achieving the Minimum Completion Criteria (KKM) of 75. Although there were some students who achieved scores above 80 (36.67%), there was still much room for improvement, especially for students who scored below 75.

Cycle I

Cycle I was implemented on April 29, 2024 and May 2, 2024, through four stages: planning, action, observation, and reflection. In the planning stage, researchers and educators prepare learning, including how to implement it and the time needed. The instruments prepared include a learning implementation plan on stored energy, with two meetings; learning materials from teacher and student books of the Merdeka curriculum; LKPD for group discussions; guidelines for observing student learning motivation; and evaluation questions for learning outcome tests.

In the implementation stage, the first meeting was held on April 29, 2024. Learning began with an introduction in the form of greetings, prayers, checking attendance, and singing the song "Garuda Pancasila." The teacher then linked the material to everyday life, followed by questions and answers and encouragement to learn. In the core activity, students were encouraged to think about stored energy through questions and answers about objects such as catapults or batteries. They were formed into groups, given LKPD, and played role-plays related to stored energy in scenarios of the school environment, home, and others. Learning ended with a joint conclusion and announcement of tomorrow's learning, then closed with prayer and greetings.

The second meeting was held on May 2, 2024, with a similar flow of activities. After the introduction, the teacher connected the material with potential energy, showed examples of events, such as falling rocks, and directed the discussion to a

simple pendulum experiment. Students prepared tools and materials, conducted experiments, and discussed the results. The learning ended with conclusions, evaluation tests, reflections, and prayers.

The observation stage is carried out to determine the extent of students' learning motivation during the learning process. Based on observations of students' learning motivation, the table 1 showed the results.

Table 1. Student learning motivation in cycle I

No	Student Learning Motivation	Cycle I		Amount
		Part 1	Part 2	
1	Average value	66.6	73.5	70.5
2	Number of motivated students	10	12	22
3	Percentage of success	33.33%	40%	73.33%
4	Category	Pretty good		

The table 1 shows the increase in motivation from the first meeting to the second. The average learning motivation reached 70.5 with a success percentage of 73.33% in the fairly good category. The value of the results of learning IPAS in cycle I can be presented in the table2.

Table 2. Student learning outcomes scores in the cycle I

No	Amount	Cycle I
1	The highest score	90
2	Lowest Value	60
3	Average value	77.4
4	Students who have completed	22
5	Students who do not complete	8
6	Average percentage of completion	73.33%
7	Average percentage of incomplete	26.66%

The learning outcomes showed an average student score of 77.4, with the highest score being 90 and the lowest being 60. A total of 22 students achieved completion, while 8 others had not completed it, resulting in a completion percentage of 73.33%.

Reflection on cycle I shows that learning is in accordance with the procedure, but there are some shortcomings, such as passive students, less attention to the teacher, and unevenness in group formation. Although the average value has met the minimum requirements, cycle II will still be carried out to ensure further improvement and ensure that all students achieve optimal understanding.

Cycle II

Based on the results of reflection in Cycle I, the classroom action research conducted still found problems that affect student motivation and learning outcomes.

The teacher and researcher made efforts to improve the deficiencies found in Cycle I in the hope that they could be improved so that the success indicators could be achieved. Based on several things that happened in Cycle I, this was used as a reference for improving action materials in Cycle II. The solutions to overcome these obstacles are: (a) Providing students with motivation, enthusiasm, and encouragement to be more confident and always ask questions; (b) Reforming groups so that everyone can actively discuss; (c) Making the class more conducive; (d) Ensuring that students are actively involved in discussions; (e) Providing opportunities for students to ask questions; (f) Providing rewards to students who successfully answer the questions given.

At this stage, learning activities were again carried out using the Environmental Science Technology Society (Salingtemas) approach as planned. The researcher held two meetings, with the implementation of the meetings based on the results of the reflection of cycle I by correcting deficiencies. The first meeting was held on Monday, April 6, 2024, with learning activities starting at 10.00-11.20 WIB. Learning activities at the first meeting consisted of the introductory, core, and closing stages. The introductory activity began by greeting and inviting students to pray together. The teacher checked the neatness and attendance of students and sang the song "Garuda Pancasila" together. Before learning began, the teacher conducted an apperception by linking the material to be studied with everyday life, then explained the learning objectives for that day, and conducted a question and answer session to encourage students to continue learning. The core activity began by building students' thinking and facilitating them to think about the stored energy material in the surrounding environment. The teacher showed pictures or objects that are often encountered, such as batteries, and conducted questions and answers about the object and its relationship to the energy stored in batteries and flashlights. Students were then formed into 5 groups consisting of 5-6 people. They are given Student Worksheets (LKPD) and listen to the teacher's instructions. Students conduct experiments related to the energy stored in flashlight light. After the experiment, they discuss and play roles in front of the class, which ends with a question and answer session about stored energy and its applications. The closing activity begins by making conclusions together, then the teacher reminds the learning material for tomorrow and closes the learning by reading a prayer and saying hello. The second meeting was held on Monday, May 8, 2024, with learning activities starting at 10.00-11.20 WIB. The learning activities at this second meeting also consisted of the introduction, core, and closing stages. The introduction activities were carried out the same as the first meeting, and the core activities began by building students' thinking about stored energy related to

energy sources around them. After that, students were formed into groups and given LKPD to work on case studies on stored energy. The closing activity began by summarizing the learning outcomes, followed by distributing evaluation tests to students, and ending with reflection and closing.

Observation is used to collect information about the learning process using the following student observation sheet.

Table 3. Student learning motivation in cycle II

No	Student Learning Motivation	Cycle I		Amount
		Part 1	Part 2	
1	Average value	76.5	79	77.75
2	Number of motivated students	12	13	25
3	Percentage of success	40%	43.33%	83.33%
4	Category		Good	

The observation results showed that students' learning motivation in cycle II increased. The percentage of success reached 83.33% with a good category and had met the predetermined completion criteria. The learning outcome test was conducted at the second meeting of Cycle II, with an average score obtained by students of 83.33. The results of learning in science in cycle II can be presented in the table4.

Table 4. Student learning outcomes in cycle II

No	Amount	Cycle II
1	The highest score	93
2	Lowest Value	73
3	Average value	83.33
4	Students who have completed	25
5	Students who do not complete	5
6	Average percentage of completion	83.33%
7	Average percentage of incomplete	16.66%

Based on the implementation of actions in Cycle II, it can be concluded that the science learning activities using the Environmental Science Technology Society (Salingtemas) approach have been running well in accordance with the learning plan and improvements from the reflection of cycle I. In this study, the learning of science content using the Environmental Science Technology Society (Salingtemas) approach has increased, so this study is considered successful up to Cycle II.

Discussion

Salingtemas has different terms from one country to another. In English, Salingtemas is known as "science, technology, society and environment (STSE)", some just call it "science, technology and society (STS)". Other names for Salingtemas are

science-environment-technology-society, science to understand society, citizen science, functional science literacy, and cross-cultural science (Surata & Arjaya, 2018). The characteristics of the Salingtemas approach are aimed at providing contextual science learning. Students are brought into situations where they utilize the scientific concepts around them into forms of technology for the benefit of society.

The advantage of learning with the Salingtemas approach compared to others is how to make students able to conduct investigations to gain knowledge, science, environment, technology, and society that are interrelated, so that it is expected to be able to solve problems that are expected to arise around their lives (Suriyanto & Alinata, 2015). Putra's research (2021) shows that Environmental Science Technology and Society can improve students' motivation and learning outcomes by integrating scientific concepts with their implications for the environment, technology, and society.

Motivation to learn

Strong motivation will help someone to be more focused, diligent and enthusiastic in the learning process, so that the results achieved are more optimal. Sulthon (2024) found that teacher-centered learning will cause student involvement and activity in learning to be less, children only memorize and are passive so that science learning does not develop critical thinking, caring, and scientific attitudes (high curiosity, honesty, accepting opinions, diligent, and acting in solving a problem systematically through scientific steps) so that learning is less meaningful. According to Sulthon (2024) science learning is learning that prioritizes children's activities to actively investigate phenomena that occur by observing, researching, analyzing, discussing, and communicating the results with the ability of the five senses, the ability to connect events, being able to create and understand events and master the concept of objects and events that occur so that the benefits are that children will develop a scientific attitude that has an impact on attitudes of awareness, concern, and responsibility. Therefore, in order for children to have this attitude, science learning must be able to connect the concepts of science, technology, and the environment.

Salingtemas is here to be able to connect learning materials with real problem situations that exist in the community environment. According to Aslam et al. (2021), learning with the Salingtemas approach has advantages compared to other learning approaches because it can guide students in conducting investigations to gain knowledge about science, environment, technology, and society in an integrated manner which is expected to help children to apply and integrate the concepts they find in solving problems that may arise in their lives.

Putra's research (2021) shows that Environmental Science, Technology and Society can improve students' motivation and learning outcomes by integrating scientific concepts with their implications for the environment, technology, and society. Research Gunardo et al (2023) also showed that the Environmental Science, Technology and Society Approach has a great influence and effectiveness on the learning process, where almost half of the research data shows that this approach is in the category of having a very large effect on learning outcomes, so it is relevant to be given to students during the learning process.

Based on the results of learning motivation observations, in cycle I, students have not fully participated in learning activities with the Environmental Science Technology Society (Salingtemas) approach. Students seemed less attentive, busy playing, and passive in groups. However, in cycle II, students' learning motivation increased, with almost all students actively involved in discussions, enthusiastic about participating in learning, and able to ask questions and respond to discussion results. The results of the comparison of learning motivation observations can be seen in the following figure:

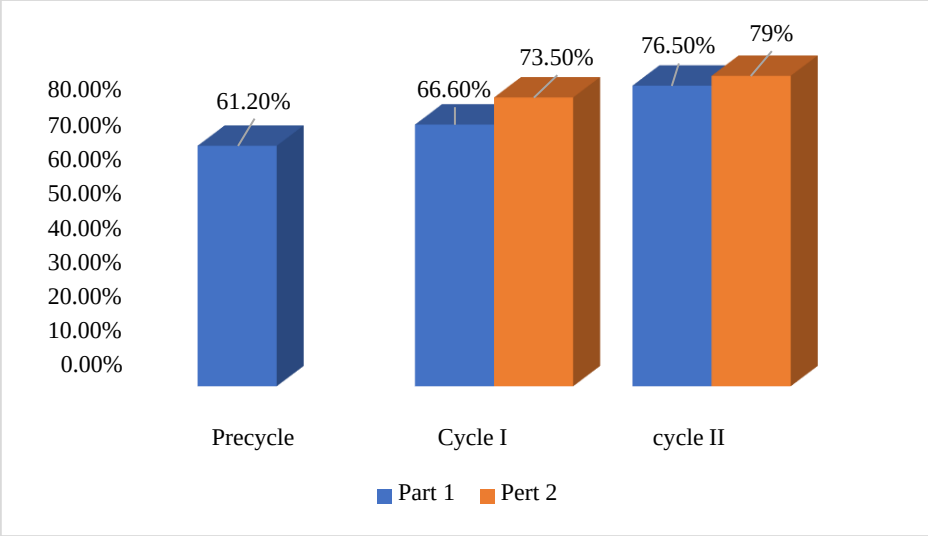


Figure 1. Comparison of Learning Motivation Observation Results

As described in Figure 1, the average value of students' learning motivation increased from pre-action to cycle I and cycle II. The average student learning motivation in cycle I was 73.5% and in cycle II the student learning motivation was 79%. Although in cycle I the learning motivation had not reached the success indicator of 75%, the increase in cycle II showed the success of this approach in increasing student learning motivation.

Learning outcomes

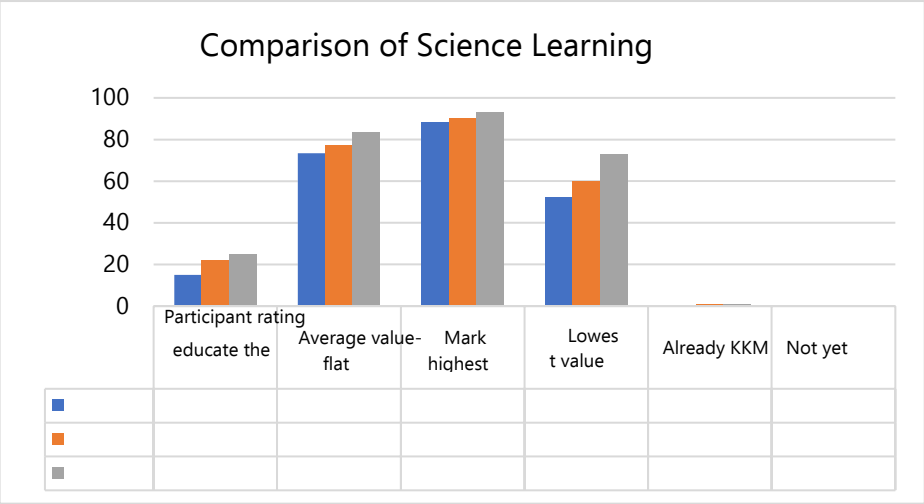
A person will get the desired results in learning if there is a desire to learn in him, a person will do an activity because there is motivation in him, high motivation in learning will achieve optimal results (Rahman, 2021). When students are motivated, they tend to try harder, be more consistent in learning, and be more focused which ultimately improves their academic achievement. Research by Acut & Antonio (2023) shows that the Science Technology Society approach significantly and positively improves student learning outcomes, especially in the development of psychomotor skills, affective domains, and cognitive skills. In addition, research by Megantari, Surata, & Arjaya (2023) shows that the Salingtemas approach has a positive impact and has been proven to significantly improve students' communication, collaboration, critical thinking, and creativity skills. Research by Fazrina, Hidayat, & Hasanah (2023) also shows that the Science Technology Society approach. The Community Technology Environment in science learning is able to improve science learning outcomes, also make it easier for students to understand the subject matter, make them aware of things in society, and train them in making decisions regarding problems that occur.

The improvement of students' learning outcomes in science learning with the Salingtemas approach can be seen from the students' learning outcomes before and after the action. In the pre-action, the students' scores were on average 73.33. The students obtained the highest score of 88 and the lowest score of 52. In cycle I, the average score was 77.4 and increased in cycle II, which was obtained by students with an average score of 83.3. Although in cycle I, the learning outcomes had exceeded the specified KKM of 75, the learning process was continued to cycle II because the classical Learning Completeness (KB) set was at least ≥80% of students who completed it. In cycle II, the improvement in learning outcomes was seen from the average score which increased to 83.3, indicating that this approach was successful in improving learning outcomes and achieving classical learning completeness. The figure 2 is a comparative image of learning outcome data.

CONCLUSION

Based on the results of the study, it can be concluded that the application of the Science, Environment, Technology and Society (Salingtemas) approach is proven to be effective in improving student motivation and learning outcomes in IPAS subjects in SDN Mandungan Class IV. This approach is able to link learning materials to the context of students' real lives, thus encouraging active participation and more meaningful understanding. The consistent increase in learning motivation from cycle to cycle, as well as the achievement of classical learning completeness that exceeds

the KKM, shows that this approach can be an alternative learning strategy that is relevant and applicable at the primary school level. The implications of these findings point to the importance of teachers adopting contextualised approaches such as Salingtemas to create a more engaging and meaningful learning experience for students. Future research is recommended to explore the application of the Salingtemas approach in other subjects or at different grade levels, and to more comprehensively investigate its impact on students' critical thinking, collaboration and environmental literacy skills.



	finished					
Pre Cycle	15	73.33	88	52	50%	50%
Cycle I	22	77.4	90	60	73.33%	26.66%
Cycle II	25	83.3	93	73	83.33%	16.66%

Figure 2. Comparison of Science Learning Outcome Data

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