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Implementation of the Science Process Skills Approach Accompanied by the Use of Static Fluid Modules in Fish Cage Buildings

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Abstract

This study aims to investigate the impact of the implementation of the science process skills approach in conjunction with a static fluid module of fish cage buildings on the physics and science process skills learning outcomes of high school students. Quantitative experiments are used in the research method. This study used interviews, observations, tests, documentation, and data collection methods. The SMA Negeri 5 Jember class XI MIPA was the location of the study, and there were two research groups: the experimental group and the control group. The indicators of science process skills used in this study are observing, concluding, communicating, making tables, analyzing experiments, and collecting and processing data. The finding demonstrated that learning with static fluid modules for fish cages in physics and the science process skills approach significantly impacted students' learning outcomes and science process skills. The T-test that was carried out revealed that sig. 2-tailed) is 0.000, it can be concluded that the static fluid module of fish cage buildings and the implementation of the science process skills approach significantly impact students' physics learning outcomes. The study concludes that a static fluid module for fish cages in physics learning in high school and the implementation of the science process skills approach significantly impact student learning outcomes and science process skills.

Keywords: Learning Outcomes; Physics Learning; Static Fluids; Science Process Skills

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INTRODUCTION

Education has a very strategic position in national development. Teaching is a conscious and planned effort to create an atmosphere of learning so that students actively develop their potential to master religious, spiritual power, self-control, personality, intelligence, noble character, and the skills needed for themselves, society, nation, and state (Widiastuti et al., 2022). The reason for instruction is to add knowledge and information with the goal that schooling can be completed anywhere, for any reason, and whenever (Yasin, 2021).

Fakhriyah (2014) states that good people can be identified from their ability to solve problems around them by referring to different points of view. Learning is a process of changing behavior that occurs regularly in students and occurs as a result of an experience.

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Good learning is learning that can be done to train students and help them deal with all the problems of community life (Indriani et al., 2022). To grow and achieve these goals, you need to take on the role of a teacher in learning.

For students in class XI, static fluid is a physics lesson plan that teaches students how to apply the idea of static fluid in everyday life (Fanani, 2018). The students' comprehension of the static fluid physics learning concept is still far from perfect (Nurrita, 2018). Static fluid material, a sub-chapter of Archimedes' law, is the subject of numerous misconceptions. The low understanding of the concept of solving static fluid problems is because in conveying the concept of fluid, students only listen and take notes without involving students in discovering laws and understanding these legal concepts.

Learning static fluid physics must instil students' science process skills. Science process skills are a series of actions students must take to process and identify learning outcomes. This science cycle expertise is an inherent science-mastering approach that depends on the information contained in a researcher (Sitio et al., 2021).

As they can be viewed from the perspective of students' cognitive and psychomotor aspects, the science process skills of these students have been directed. Understudies can get science process abilities by preparing in physical, social, and mental capacities that can be utilized for driving understudies' logical capacities (Nosela et al., 2021). Science process skills can also be used to understand students' physics concepts in static fluid learning because students are required to actively participate in these activities. Through science process skills which is carried out with practicum, it makes it easier for students to understand the concept of learning physics indirectly (Fajaryanti & Hertanti, 2022; Magdalena et al., 2020; Ulfah et al., 2018).

Students' comprehension of concepts is sufficient for the learning process with science process skills to support student learning outcomes. According to Pangaribowosakti (2014), learning outcomes are behavioral shifts in individuals brought about by the learning process. The cognitive, affective, and psychomotor domains can be used to determine the domain of learning outcomes that students can master. With learning joined by an understudy science process abilities approach, it very well may be utilized as a support for educators in delivering understudy learning results that have top caliber. Based on this description, this study examines the effect of implementing the students' science process skills approach accompanied by the static fluid module of fish cage buildings on students' learning outcomes and science process skills.

METHOD

This study is experimental research conducted with a scientific approach with two sets of variables used. The data was obtained from experimental research by giving students static fluid problems and practicum (Suana, 2022). The research model used is quantitative. The subjects in the study took place at SMA Negeri 5 Jember, especially in class XI MIPA 3 with a total of 33 people as the control class, and in class XI MIPA 4 with 34 people as the experimental class.

The test instrument used was essay questions, totalling six questions according to aspects of the cognitive domain C1 to C6. The science process skills research instrument used consists of skills in carrying out practicum. The indicators of science process skills used are observing, communicating, making tables, concluding, analyzing experiments, and collecting and processing data. Learning was carried out using static fluid physics module teaching materials in fish cage buildings

for the experimental class, and the control class used standard teaching materials. The learning model used is Problem-Based Learning. The analytical activities used in this study were collecting data, observing data, reducing data, and presenting and drawing conclusions.

RESULT AND DISCUSSION

Science process skills and learning outcomes can be measured after implementing learning by using a post-test to determine learning outcomes and practicum to determine students' science process skills. The research results were obtained from interviews with physics teachers; data obtained so far, the learning carried out was conventional; teachers taught with lectures and rarely used discussion or practicum methods, so this was what caused the students' science process skills to be lacking.

In research on learning outcomes and science process skills, data that is diverse and in line with the actual skills possessed by each student is produced based on the results of data analysis. A T-test was used in this study's statistical analysis to determine the difference in students' science process skills and learning outcomes between the control and experimental classes.

The data for the impact on student physics learning outcomes of the science process skills approach and static fluid modules in fish cage buildings are presented in Table 1.

Table 1 Data on student physics learning outcomes

	Experiment Class	**Control Class**
Total Students	34	33
The highest Value	97.00	92.00
Lowest Value	78.00	33.00
Average	**84.79**	**60.48**

Based on Table 1, the number of students in the control class is 33, and the experimental class is 34. The highest score obtained for the experimental class is 97, in the control class 92, the lowest score is 78 in the experimental class and 33 for the control class. From these results, the average value in the experimental class was 84.79, and the control class was 60.48. Thus the average value of learning outcomes in experimental and control classes is different. In addition to these data, the average value data obtained on each indicator of cognitive learning outcomes are also obtained. A summary of learning outcomes can be seen through the graphic images in Figure 1.

Analysis of Learning Outcomes

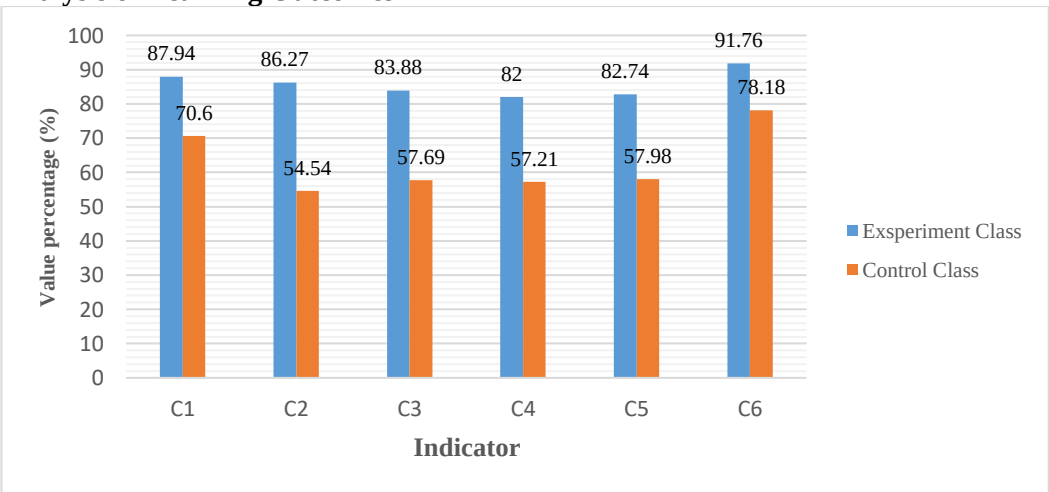

Figure 1 Graph of physics learning outcomes percentage

The typical benefit of learning results for every marker part of the cognitive domain in Figure 1 provides specific information: the C1 cognitive domain pointer in the experimental class got a level of 87.94% and in the control class 70.6%. In the C2 cognitive domain, the rate was 86.27% in the experimental and 54.54% in the control classes. For cognitive domain C3, the rate got for the trial class was 83.88% and 57.69% for the control class. In the C4 cognitive domain, the rate an incentive for the trial class was 82%, and the control class was 57.21%. In cognitive domain C5, the level of the experimental class is 82.74%, and for the control class is 57.98%. In the C6 cognitive domain marker, 91.76% was obtained in the trial class and 78.18% in the control class. These outcomes got rate contrasts between the experimental class and the control class.

The information on understudy learning results was then investigated with the assistance of the SPSS 23 application. The information was tried for normality with the Kolmogorov-Smirnov (K-S) test. The information was regularly appropriated so the measurable test could continue with the Free Example T-test.

The factual experimental outcomes in light of the measurable gathering yield table show that the learning results acquired by the experimental class are 82.44 or 82.44%. From this information, the proper class is exceptionally high. The worth in the measurable result table for the control class is 60.48 or 60.5%, and the proper standards are high.

The worth of Sig can know the consequences of the Autonomous Example T-test given in table 4.5. (2-followed) of 0.000. The Free Example T-test results got are as per the dynamic models if p (large) $\leq$ 0.05, the invalid speculation (H_0) is dismissed, and the elective speculation (H_a) is acknowledged. The goal is that there is a critical impact between the execution of science process abilities joined by static liquid modules of fish confine structures on physical science learning results in the experimental class and in the control class ($\mu_E \neq \mu_K$).

Analysis of Science Process Skills

Science process abilities information obtained in this study is understudy practicum information with an understudy science process abilities approach. Science process abilities information for every marker should be visible in rate values in Figure 2.

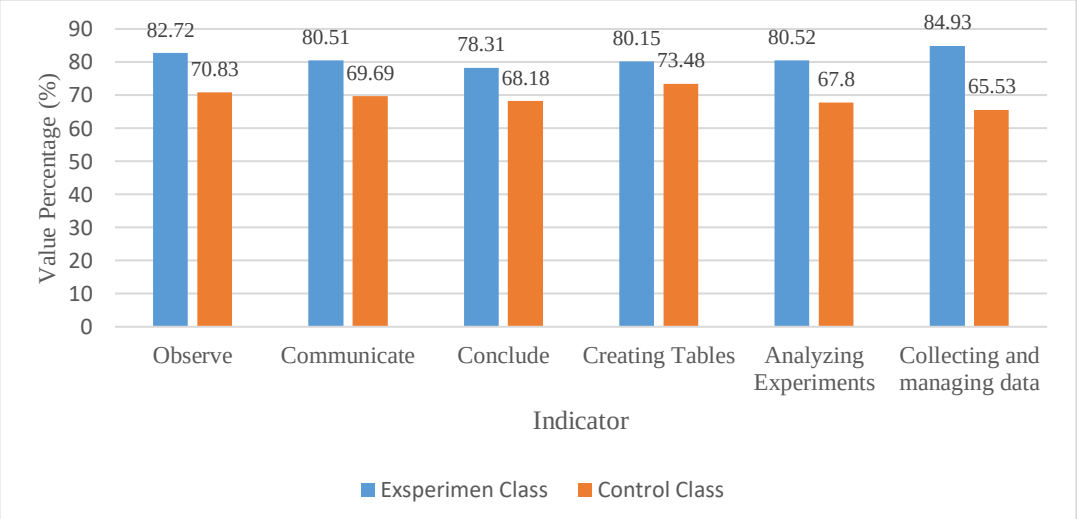

Figure 2 Graph of percentage of students' science process skills scores

Science process abilities on noticing pointers for the trial class get 82.72%, and for the control class, the rate gets 70.83%. The marker imparts the experimental class's rate of 80.51%, and the control class is 69.69%. On the science interaction abilities pointer, it was presumed that the level of the trial class was 78.31%, and the control class was 68.18%. The science cycle abilities pointer for making tables in the experimental class got a level of 80.15%, and the control class was 73.48%. In the marks of examining the trial, the rate obtained by the experimental class was 80.52%, and the control class was 67.8%. In the mark of gathering and overseeing information, the rate acquired by the experimental class was 84.93% and 65.53% for the control class. The distinction in every marker demonstrates an impact of carrying out the understudies' science cycle abilities approach joined by a static liquid module of fish confine structures on understudies' science interaction abilities.

The following investigation demonstrates the examination speculation; the worth information is analyzed using SPSS 23, with the underlying step, specifically, the normality test and the outcomes are normal. Information that is ordinarily disseminated will then, at that point, be additionally tried with the Autonomous Example T-test using SPSS.

The measurable experimental outcomes based on the factual gathering yield table show that the typical worth of science process abilities acquired by the experimental class is 19.32 or 19%. The worth in the measurable gathering yield table for the control class is 16.67 or 17%. The consequences of the measures between the experimental and control classes had a distinction of 2.65%, demonstrating the impact of carrying out the understudies' science cycle abilities approach joined by a static liquid module of fish confine structures on understudies' science interaction abilities.

The consequences of the Autonomous Example T-test were acquired as per the arrangements of the factual test, specifically the sig. (2-followed) is 0.000 in which T-test results are obtained by the dynamic measures if p (large) ≤ 0.05, the invalid speculation (H_0) is dismissed, and the elective theory (H_a) is acknowledged. So there is a critical impact between the execution of science process abilities joined by static liquid modules of fish confine structures on understudies' science cycle abilities in the experimental class and the control class ($\mu_E \neq \mu_K$).

Issues connected with static liquids in regular day-to-day existence and their peculiarities can be noticed straightforwardly with the eye. These issues don't make it hard for understudies to address them (Putri & Dwikoranto, 2022). Be that as it may, this doesn't matter to the idea of static liquid overall, yet there is an idea of static liquid which is very hard to notice straightforwardly, so this issue likewise frequently makes understudies challenging to take care of the issue. This is as per the assessment of (Amalia et al., 2021) that static liquid material will be material that is very challenging for understudies to settle, however during the time spent taking care of the issues confronted, the best learning is immediately realizing that understudies' comprehension can be gotten appropriately and as per the ideal learning results (Kaleka et al., 2020).

Learning through direct understudy experience implies that understudies are required not exclusively to notice straightforwardly, yet understudies should appreciate, take part in the consummation cycle, and be liable for the outcomes acquired (Arief et al., 2012). The immediate growing experience can expect understudies to be dynamic, find their insight and produce proper results.

The consequences of the exploration that has been done show that in the experimental class and the control class,

there are the most noteworthy scores gotten in the C6 cognitive domain, where in the C6 mental viewpoint understudies have a decent comprehension of ideas, and in the C6 perspective cognitive domain the inquiries given by understudies are inquiries of assessing the material conveyed through a science cycle abilities approach joined by a static liquid physical science module for fish confine structures.

The static liquid physical science module in the fish confine building does not just hold back material and test questions, yet in addition, it contains information about static liquid material that is connected to the neighborhood astuteness of the nearby climate, specifically to the fish confine building. The showing material for the static liquid physical science module likewise presents the idea of static liquid straightforwardly that understudies can without much of a stretch summary. So that with learning joined by a static liquid module for building fish confines, it is simpler for understudies to process the material and simple to tackle tasks.

From the information investigation's consequences, it was also observed that the benefit of learning results with the most elevated esteem was angle C6. This is likewise upheld by (Mentari & Laily, 2016), who demonstrates that picking up utilizing modules can further develop understudy learning results. Discovering that is completed utilizing fascinating modules makes understudies like the illustration and doesn't effortlessly feel exhausted while partaking in-class learning. The modules introduced are fascinating and straightforwardly connected with the neighborhood astuteness of the nearby climate (Pramana et al., 2020). The aftereffects of additionally presumed relevant based physical science modules are likewise remembered for the reasonable media classification, so they are exceptionally simple to use for understudies to learn in the growing experience (Krisnaningsih & Hariyono, 2022).

Understudy mental learning results in perspective C4 being the most minimal pointer in the experimental and control classes. Because of the consequences of the examination that has been done from the C4 perspective, understudies have not had the option to complete a cognizant investigation of the issue. Understudies are simply ready to know the fruition of the issue with brief perceptions, not with a decent degree of examination. This concentrate likewise mentioned restricted observable facts, which found that understudies favored the degree of perception questions that alluded to essential and restricted understanding. The disposition towards this part of the examination is additionally founded on the way that while learning understudies likewise will generally be less dynamic in posing inquiries to the educator, understudies are simply quiet and ask just companions. This is likewise founded on a feeling of dread toward talking, and an absence of certainty when the responses or questions submitted are not exactly right, as well as the absence of understudies' degree of precision in tackling the issues given (Ayudha & Setyarsih, 2021).

Further examination of learning results depended on post-test scores from the trial and control classes, with 34 understudies in the experimental and 33 in the control classes. In the trial class, the most noteworthy score was 97, and the least was 78, with the goal that a typical worth of 84.79 was obtained. The control class in this review showed that the most elevated post-test score was 92 and the least was 33, so the normal acquired in this control class was 60.48. The consequences of the post-trial of the two classes were tried for ordinariness. After the information was ordinary, the Free Example T-Test was then tried. This action was done with the assistance of the SPSS factual 23 application.

The consequences of the Free Example T-test given in the table should be visible by the Sig. (2-followed) of 0.000. The Free Example T-test results got are as per the dynamic standards; if p (critical) ≤ 0.05, the invalid speculation (H_0) is dismissed, and the elective theory (H_a) is acknowledged. So there is a critical impact between the execution of science process abilities, joined by static liquid modules of fish confine structures, on physical science learning results in the experimental and control classes ($\mu_E \neq \mu_K$). Likewise, as per the elective speculation in this review, the execution of the science cycle abilities approach joined by a static liquid module for fish confines affects physical science learning results in secondary school.

Science process abilities are fundamentally framed and created from a logical cycle. Understudies' science cycle abilities in this study were estimated by direct perception of understudies by doling out and finishing practicum tasks with signs of science process abilities. The markers in science process abilities utilized are a blend of signs of coordinated science process abilities and essential science process abilities. The pointers in this study incorporate noticing, conveying, finishing up, making information tables, examining information, and gathering and handling information.

The principal mark of science process abilities, specifically "Noticing", has a typical worth of 82.72 in the experimental class in the great class and 70.83 in the control class in the adequate class. The subsequent pointer, "Conveying", has a typical worth of 80.51 in the great class of the experimental class and 69.69 in the moderate classification of the control class. The third mark of science process abilities, specifically "Finishing up", got a typical score of 78.31 in the great classification of the experimental class and 68.18 in the moderate class of the control class. The fourth marker is "Making tables", and the typical worth of science process abilities is 80.15 in the trial class in the great classification and 73.48 in the control class in the great class. The science cycle ability pointer in "Breaking down tests" got a typical worth of 80.52 in the great class of the experimental class and 67.8 in the moderate class of the control class. The 6th pointer is "Gathering and handling information" the typical worth is 85 in the excellent classification of the trial class and 65.53 in the control class; the class got is very great. Science process abilities acquired from information examination, it very well may be seen that the normal request from most noteworthy to least, in the trial class comprises gathering and overseeing information, noticing, breaking down tests, imparting, making tables, and closing. While in the control class, the typical arrangement is making tables, noticing, conveying, finishing up, examining examinations, and gathering and overseeing information.

The most elevated science process abilities in the experimental class are gathering and overseeing information; this is because all the data required by understudies is in the static liquid module in the enclosure building, and understudies have a decent calculated comprehension of the material introduced using a science cycle abilities approach joined by modules static liquid of fish confine building(Husamah et al., 2022). How Understudies might interpret ideas affects how understudies oversee information effectively because understudies have dominated ideas (Nosela et al., 2021).

Science process abilities in the most noteworthy control class are signs of making tables. The mark of science process abilities in causing tables is a pointer that understudies feel is simple in taking care of static liquid material issues. Understudies dominated the clarifications given in aggregating the

trial table, so the aftereffects of science process abilities on the pointer for making tables in the control class had the most elevated typical worth. The trial class's most reduced science process abilities are signs of finishing up, and those in the control class are gathering and handling information.

Information investigation on the consequences of understudies' science interaction abilities was additionally done by dissecting the science cycle abilities of the two classes for ordinariness; after the information was ordinary, they would then be tried for the Free Example T-Test; this movement was completed with the assistance of the factual SPSS application 23.

The aftereffects of the Free Example T-test in light of the table should be visible the worth of Sig. (2-followed) of 0.000. The Autonomous Example T-test results acquired are as per the dynamic standards on the off chance that p (huge) ≤ 0.05, the invalid speculation (H_0) is dismissed, and the elective speculation (H_a) is acknowledged. With the goal that there is a critical impact between the execution of science process abilities joined by static liquid modules of fish confine structures on understudies' science cycle abilities in the trial class and the control class ($\mu_E \neq \mu_K$). This is likewise predictable with the elective speculation in this review that the execution of the science cycle abilities approach joined by a static liquid module for fish confines meaningfully affects the science cycle abilities of secondary school understudies.

CONCLUSION

In light of the consequences of the exploration and conversation that have been submitted, it very well may be reasoned that (1) The execution of the science cycle abilities approach joined by the static liquid module of fish confine structures essentially affects understudy learning results in SMA Negeri 5 Jember; (2) The execution of the science interaction abilities approach joined by a static liquid module for fish confine structures fundamentally affects the science interaction abilities of SMA Negeri 5 Jember understudies.

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