JOURNAL OF DIGITAL LEARNING AND DISTANCE EDUCATION (JDLDE)

ISSN: 2964-6685

https://www.rjupublisher.com/ojs/index.php/JDLDE

Student Process Skills on Temperature and Heat Materials

AZHAR[a*], Ruth Rize Paas MEGAHATI S[b]

[a]*Physics Education Study Program, Universitas Riau, Pekanbaru, Riau, Indonesia*
[b]*Medical Laboratory Engineering Study Program, Politeknik Kesehatan, Bandar Lampung, Lampung, Indonesia*

*Corresponding author: azhar@lecturer.unri.ac.id

Abstract

The low learning outcomes for Physics subjects where the learning outcomes of students' Physics process skills cannot be said to be fully successful. However, students listen more, write what the teacher informs them, and do practice questions based on the examples given by theteacher. Learning is also filled with teacher lectures. so this happens because most students come to school empty. This study aims to determine the differences between students' physics process skills through the LKS based on Natural Exploration (JAS) on the subject matter of temperature and heat at Senior High School 1, Pekanbaru. The sampling technique was carried out by conducting a normality test and homogeneity test in the population. From the test of the twoclasses, data was obtained which stated that the two classes were normal and homogeneous, which were the experimental class and the control class. The determination of the experimental class and the control class was determined by random sampling, namely by lottery. In classical completeness, the indicator of process skills in the experimental class is declared complete and the control class is declared incomplete.

Keywords: student process skill, learning outcome, physics learning

Acknowledgments: Thank you to the Principal of Pekanbaru 1 High School, Riau, Indonesia for granting research permission.

For citation:
Azhar. (2022). Student Process Skills on Temperature and Heat Materials. *Journal of Digital Learning and Distance Education, 1*(4), 110-114. https://doi.org/10.56778/jdlde.v1i4.29.

Introduction

Science process skills (KPS) are fundamental skills that every student should have (Farida et al., 2023). Thesebasic skills include the skills of observing, making hypotheses, planning research, controlling variables, interpreting data, drawing up tentative conclusions, predicting, applying, and communicating which is also called the scientific approach. Physics is knowledge that studies physical events that include processes, products, and scientific attitudes that are cyclic, and interconnected, and explains how natural phenomena are measured through observation andresearch (Marianus & Laira, 2021); (Kumar et al., 2021). A product is a collection of knowledge that can be in the form of facts, concepts, laws, principles, and theories (Stamenkovic, 2023). The process is the steps that must be taken to acquire knowledge for example observing, interpreting observations, clarifying, predicting, applying concepts, planning experiments, communicating, and concluding (Pedaste et al., 2015); (Oo et al., 2021); (Collins & Stockton, 2018).

Based on observations and interviews with teachers of Physics studies conducted by the author on February 27, 2015, information was obtained, in class X semester II SMA N 2 XIII Koto Kampar found problems about the low learning outcomes for Physics subjects where students' learning outcomes of Physics process skills have not can be said to be completely successful. The problem is, as follows:

1. When studying students have not learned the lesson to be learned. So that when studying students only listen to lectures from the teacher.
2. The teacher pursues the next target material, the teacher does not give students many opportunities to ask the extent of students' understanding of the material that has been studied.
3. Judging from the results of the minimum criteria completeness (KKM) only a small number of students can complete (40%). Physics at the high school level is one of the important science branches because it provides knowledge to students and fosters thinking skills that are useful for solving problems in everyday life. Physics learning is closely related to how to find out about natural phenomena systematically so that physics learning is not just mastering a collection of knowledge in the form of facts, concepts, or principles but also a process of discovery. But in reality, students listen more, write what the teacher informs them, and do practice questions based on the examples given by the teacher. Learning still emphasizes learning outcomes and not activities to master the process. This study aims to determine the differences between students' physics process skills through the LKS based on Natural Exploration (JAS) on the subject matter of temperature and heat at SMAN.

Methodology

The sampling technique was carried out by conducting a normality test and homogeneity test in the population. From the test of the two classes, data was obtained which stated that the two classes were normal and homogeneous, which were the experimental class and the control class. The determination of the experimental class and the control class was determined by random sampling, namely by lottery. This lottery technique is carried out to avoid subjective elements, namely by giving equal rights to each subject to have the opportunity to become an experimental class or control class. Class X IPA 1 as the experimental class and class X IPA 2 as the control class.

Results

The data collected in this study is data on students' physics process skills on the subject matter of temperature and heat which includes the experimental class and control class consisting of process skills test scores which are carried out after the end of the teaching and learning process through LKS learning based on Natural Surroundings (JAS). Learning outcomes of students' physics science process skills on the material of temperature and heat through LKS Based on Natural Exploration. After the implementation of the learning, it was found that the absorption capacity of the two classes was good with effective effectiveness. The classical completeness of the experimental and control classes was both incomplete because classically they had to reach 85%. The completeness of the process skill indicator items after the implementation of the experimental class learning is complete while the control class is not complete because it is less than 85%.

After obtaining the test data for learning outcomes after learning the LKS Based on Exploration of the Environment (JAS), a normality test was carried out. By using SPSS 16 as shown in Appendix 12, it can be seen that the experimental class and control class data are normally distributed. In Q-Q plots, the sample points are attached to a linear line. Linear line is an ideal reference for data distribution which is normally distributed. In the Q-Q plots, the data on temperature and heat test values meet the criteria so that the data for both classes are normally distributed. Then the homogeneity test was carried out, it was found that both classes had homogeneous variance. This is shown in the test table of homogeneity of variances that the significance value is > 0.05 (0.820 > 0.05). After the prerequisite tests are met, this hypothesis testing is carried out in two ways, namely through the calculation of the statistical value of the t-test manually with the formula t-test polled variance and through the SPSS 16 (Independent-Sample T-Test) program as shown in Appendix 14. Hypothesis testing aims to see whether there are differences in learning outcomes between the experimental class and the control class, where the proposed hypothesis is:

1. Ho: There is no significant difference between students' physics process skills throughLKS based on Exploring the Surroundings (JAS) and conventional LKS
2. Ha: There is a significant difference between students' physics process skills through the LKS based on Exploring the Surroundings (JAS) and conventional LKS

The t-test was conducted to test the Ho hypothesis. From the results of calculations using the t-test polled variance formula and using the SPSS 16 program, the results of the t-calculation are t-count = 2.167. Based on the calculation of the t-table value under the provisionsof the t-test formula polled variance for the 95% significance level and Degree of Freedom = n1 + n2 – 2 obtainedttable = 2.012. Based on the test criteria for the t-value, the results obtained are t-count > t-table or (2.167 > 2.012), so based on the comparison of the t-value, Ha is accepted. So, it can be concluded that there is a difference between students' physics process skills through natural exploration-based worksheets (JAS) and conventional worksheets.

Discussion

Student learning absorption is an index or level of student understanding in learning, responding, and practicing what is taught, read, heard, and learned (Dwivedi et al., 2023). Many process skills are taken from everyday life (Umisaroh, 2022); (Siahaan et al., 2017). The absorption of the implementation of learning is not only obtained by students from the daily lives of students but also from the learning that has been carried out at school. The results of this study indicate that the absorption capacity of each student is different. This is due to differences in the ability of students to receive and absorb learning materials, differences in the seriousness of students, differences in student activity in answering teacher questions, and the level of difficulty of different materials (Lodge et al., 2018); (İlçin et al., 2018); (Lala & Hagishima, 2023).

The average absorption after the implementation of learning in the experimental class is 80% while the average posttest absorption in the control class is 74% with a difference of 6%, meaning that there is a difference between the experimental class and the control class but not too different. This is because the experimental class uses JAS-based worksheets while the control class only uses ordinary worksheets. The experimental class obtained higher results than the control class because the experimental class conducted experiments at home using existing media at home to find out the concepts of temperature and heat. While the control class only uses ordinary worksheets without doing any experiments.

We can see that the JAS components of exploration, constructivism, and biocontainment have been well-trained. The exploration component can be seen when students explore their environment (Liquin & Gopnik, 2022); (Darling-Hammond et al., 2020); (Skalstad & Munkebye, 2022); (Keller, 2018). Students discover experiences and raise questions or problems. And solve the problem with scientific reasoning (Putri et al., 2020); (Jirout, 2020). The constructivism component can be seen when students interact with their environment through their senses, seeing, hearing, touching, smelling, and feeling to find problems with scientific reasoning. Bioedutainment components can be seen fromthe cognitive, affective, and psychomotor aspects (Mensah, 2015).

Conclusion

Classical student learning completeness in the experimental class was 84% and in the control class was 62.5% otherwise incomplete. The classical completeness of the process skill indicator in the experimental class is 100% and the control class is 75%. In classical completeness, the indicator of process skills in the experimental class is declared complete and the control class is declared incomplete.

Conflicts of Interest

The authors declare no conflict of interest.

References

Collins, C. S., & Stockton, C. M. (2018). The Central Role of Theory in Qualitative Research. *International Journal of Qualitative Methods*, *17*(1), 160940691879747. https://doi.org/10.1177/1609406918797475

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, *24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., … Wright, R. (2023). Opinion Paper: "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, *71*, 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Farida, L., Suryajaya, S., & Suyidno, S. (2023). Profile of Basic and Integrated Science Process Skills in Science Learning at Madrasah Ibtidaiyah Negeri. *SEJ (Science Education Journal)*, *7*(2), 99–109. https://doi.org/10.21070/sej.v7i2.1644

İlçin, N., Tomruk, M., Yeşilyaprak, S. S., Karadibak, D., & Savcı, S. (2018). The relationship between learning styles and academic performance in TURKISH physiotherapy students. *BMC Medical Education*, *18*(1), 291. https://doi.org/10.1186/s12909-018-1400-2

Jirout, J. J. (2020). Supporting Early Scientific Thinking Through Curiosity. *Frontiers in Psychology*, *11*, 1717. https://doi.org/10.3389/fpsyg.2020.01717

Keiler, L. S. (2018). Teachers' roles and identities in student-centered classrooms. *International Journal of STEM Education*, *5*(1), 34. https://doi.org/10.1186/s40594-018-0131-6

Kumar, R., Verma, A., Shome, A., Sinha, R., Sinha, S., Jha, P. K., Kumar, R., Kumar, P., Shubham, Das, S., Sharma, P., & Vara Prasad, P. V. (2021). Impacts of Plastic Pollution on Ecosystem Services, Sustainable Development Goals, and Need to Focus on Circular Economy and Policy Interventions. *Sustainability*, *13*(17), 9963. https://doi.org/10.3390/su13179963

Lala, B., & Hagishima, A. (2023). Impact of Escalating Heat Waves on Students' Well-Being and Overall Health: A Survey of Primary School Teachers. *Climate*, *11*(6), 126. https://doi.org/10.3390/cli11060126

Liquin, E. G., & Gopnik, A. (2022). Children are more exploratory and learn more than adults in an approach-avoid task. *Cognition*, *218,* 104940. https://doi.org/10.1016/j.cognition.2021.104940

Lodge, J. M., Kennedy, G., Lockyer, L., Arguel, A., & Pachman, M. (2018). Understanding Difficulties and Resulting Confusion in Learning: An Integrative Review. *Frontiers in Education*, *3*, 49. https://doi.org/10.3389/feduc.2018.00049

Marianus, M., & Laira, A. (2021). Description and analysis of physics process on island hilly land for learning the availability of clean water for junior high school students. *Journal of Physics: Conference Series*, *1968*(1), 012020. https://doi.org/10.1088/1742-6596/1968/1/012020

Mensah, E. (2015). Exploring Constructivist Perspectives in the College Classroom. *SAGE Open*, *5*(3), 215824401559620. https://doi.org/10.1177/2158244015596208

Oo, T. Z., Magyar, A., & Habók, A. (2021). Effectiveness of the reflection-based reciprocal teaching approach for reading comprehension achievement in upper secondary school in Myanmar. *Asia Pacific Education Review*, *22*(4), 675–698. https://doi.org/10.1007/s12564-021-09707-8

Pedaste, M., Mäeots, M., Siiman, L. A., De Jong, T., Van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, *14,* 47–61. https://doi.org/10.1016/j.edurev.2015.02.003

Putri, L. H., Siahaan, P., & Hernani. (2020). Students' scientific reasoning and argumentative abilities through levels of inquiry models based on socio-scientific issue. *Journal of Physics: Conference Series*, *1521*, 042100. https://doi.org/10.1088/1742-6596/1521/4/042100

Siahaan, P., Suryani, A., Kaniawati, I., Suhendi, E., & Samsudin, A. (2017). Improving Students' Science Process Skills through Simple Computer Simulations on Linear Motion Conceptions. *Journal of Physics: Conference Series*, *812,* 012017. https://doi.org/10.1088/1742-6596/812/1/012017

Skalstad, I., & Munkebye, E. (2022). How to support young children's interest development during exploratory natural science activities in outdoor environments. *Teaching and Teacher Education*, *114*, 103687. https://doi.org/10.1016/j.tate.2022.103687

Stamenkovic, P. (2023). Facts and objectivity in science. *Interdisciplinary Science Reviews*, *48*(2), 277–298. https://doi.org/10.1080/03080188.2022.2150807

Umisaroh, A. A. (2022). Analysis of Science Process Skills through Blended Learning in Science Subjects. *Journal Corner of Education, Linguistics, and Literature*, *2*(1), 1–8. https://doi.org/10.54012/jcell.v2i1.48