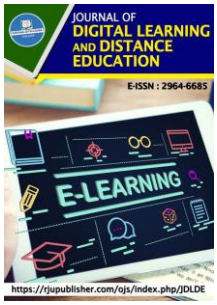

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Class XI Students' Science Literacy Ability Profile on Biology Material

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Abstract

Scientific literacy is defined by PISA as the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence, to understand and make decisions regarding nature and changes made to nature through human activities. Scientific literacy is very important, this is because first, understanding. This research is Expost Facto research. This research aims to determine the scientific literacy abilities of class XI MIPA MAN 1 KOLAKA students in Biology material. The research method used is a qualitative descriptive method. The research subjects consisted of 33 students from class XI MIPA 1 and XI MIPA 2. The research instrument used was a written test in the form of multiple-choice via Google Forms. Results of the scientific literacy abilities of class The research results showed that students' scientific literacy abilities were classified as low with an average percentage score of 47% for Class XI MIPA 1 and 70% for Class XI MIPA 2.

Keywords: 21st-century skills, Scientific Literacy Ability, PISA (Program for International Students Assessment)

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Introduction

The rapid changes of the 21st century are marked by increasingly rapid and complex world developments. Various changes occur in the fields of knowledge, technology, and information globally and these changes are aimed at improving the quality of life of modern society, such as the benefits in the fields of medicine, communications, and nanotechnology. However, along with the benefits felt by society, negative impacts also emerge, such as global warming, the energy crisis, or environmental damage(Pratiwi et al., 2019; Ananda et al., 2022).

Scientific literacy is defined by PISA as the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence, to understand and make decisions regarding nature and changes made to nature through human activities. Scientific literacy is very important, this is because firstly, understanding science offers personal fulfillment and joy, benefits to be shared with anyone (Siswanto et al., 2023); (Guimarães et al., 2019). Second, countries are faced with questions in their lives that require scientific information and scientific thinking to make decisions and the interests of many people need to be informed, such as air, water, and forests. Developed countries have been building scientific literacy for a long time, the implementation of which is integrated into learning. In PISA scientific literacy covers the dimensions of content, process, and context. Science material or content is not directly related to the curriculum in any country. The science process in PISA includes using scientific knowledge, and making decisions, in the context of the world context, including the context involving issues that are important in life in general as well as personal concerns.

Regarding scientific literacy abilities, the OECD has announced the 2018 Program for International Student Assessment (PISA) scores for Indonesia in the areas of literacy, mathematics, and science. The PISA evaluation is carried out every few years to evaluate the education system by measuring student performance in secondary education, especially in three main areas, namely mathematics, science, and literacy. The 2018 PISA results with a score of 396 ranked 70th out of 78 countries surveyed. And in 2022 Indonesia will even experience a decline compared to 2018 in the fields of mathematics, reading, and science. Several factors influence students' low scientific literacy. According to (Firdaus et al., 2023), the cause of low scientific literacy is the tendency that the learning process does not support students in developing scientific literacy skills. Apart from that, the assessment process usually carried out in schools is also the cause of Indonesia's low position in the PISA study. According to (Sedova et al., 2019) students are not used to working on questions using discourse. According to students, literacy tests are more difficult than the test questions usually given by teachers. This is proven by the results of (Darling-Hammond et al., 2020); (Lodge et al., 2018) that the scientific literacy achievement of junior high school students in the city of Padang is low, namely with a score of 26.6. Based on the PISA test results, Indonesia is below the average of other OECD countries.

The main factors are the low level of scientific literacy because students lack practice in solving PISA questions, and the availability of teaching materials to support students for higher level thinking is still rare, apart from that there are limited questions similar to PISA and students' low interest in reading. The various shortcomings found in the field should be momentum for reflection for educators and educational researchers to contribute again and focus on improving strategies in creating a literate generation as is one of the human resource needs in the 21st century. Through scientific literacy, students will later become problem-solving agents who can keep pace with developments with the 21st-century skills they have mastered (Adeoye & Jimoh, 2023); (Stehle & Peters-Burton, 2019); (Dwivedi et al., 2023). Based on this background explanation, the researcher made previous observations by conducting non-formal interviews with Biology subject teachers at MAN 1 Kolaka regarding students' high-level thinking abilities in scientific literacy using the Problem-Based Learning method.

Method

This research uses a quantitative research approach with an ex post facto research model. It is called ex post facto research because the researcher deals with variables that have already occurred and does not need to provide treatment for the variables studied. Ex post facto research is research that takes or explores data from events that have already occurred (Wahyudin,

2015:19). Ex post facto research according to Wahyudin (2015) is research where the independent variables have occurred when the researcher starts by observing the dependent variable in a study.

This research was carried out at MAN 1 Kolaka, Kab. Kolaka which is located at Jl. Tunambae No.1 Kel, Sabilambo, Kec. Kolaka, Kolaka Regency. The population in this study consisted of all students in class XI MIPA 1 and MIPA 2 MAN 1 Kolaka. The population consists of 2 classes with a total of 70 students. The number of samples obtained was 33 respondents. The data collection technique was carried out by distributing multiple choice tests regarding scientific literacy knowledge. The data in this research is in the form of students' scientific literacy ability scores obtained from tests. The analytical techniques used in this research were then analyzed descriptively and inferentially. According to Hasan, et al (2018) the assessment categories are divided into three (Table 1).

Table 1. Criteria for Achieving Scientific Literacy

Value Range	Criteria
≤ 67 – 100	Tall
33 – 66	Currently
< 33	Low

Results And Discussion

MAN 1 KOLAKA School Data

Table 2. School Data

Data	**Information**
NPSN	40405869
Name	MAN 1 KOLAKA
Accreditation	A
Address	Jl.Tunambae No.1
E-mail	Man1Kolaka@gmail.com
Level	SMA/MA
Status	Negeri
Site	https://www.man1kolaka.sch.id/index.php
Subdistrict	Kolaka
Regency	Kolaka
Province	Sulawesi Tenggara

Table 3. Research results

Component	**XI MIPA 1**	**XI MIPA 2**
The number of students	35	35
The highest score	50	100
Lowest Value	7	14
Average	4,7	7

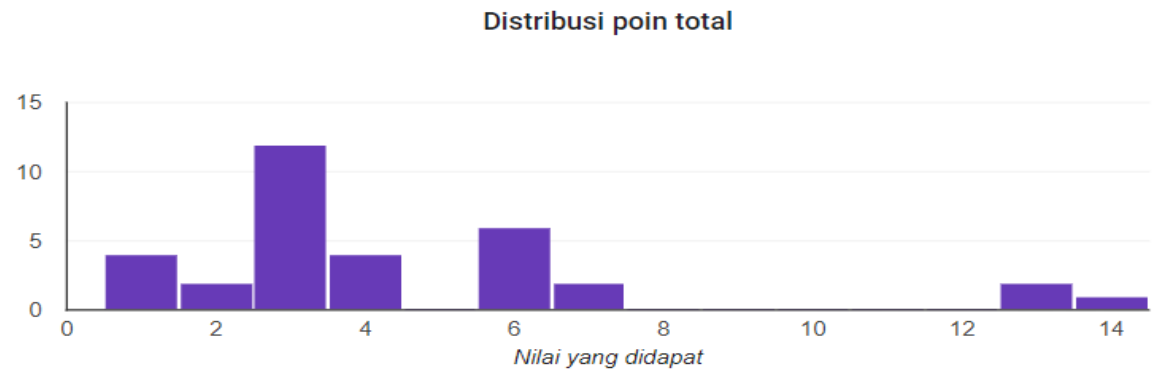

Figure 1. Distribution of total points

Discussion

Results of the scientific literacy abilities of class The research results showed that students' scientific literacy abilities were classified as low with an average percentage score of 47% for class XI MIPA 1 and 70% for Class Knowledge of scientific literacy will help students understand science and in life require scientific information and scientific thinking to make decisions. In this research, researchers conducted research at MAN 1 KOLAKA with a total of 70 students in class XI MIPA 1 and XI MIPA 2 but 33 students in class XI participated in this research. The research was conducted using a scientific literacy test instrument given via Google form to respondents.

Students' Science Literacy Knowledge

Scientific literacy is important for students to have because (Karimah et al., 2021); (Nuryanti et al., 2023); (Rahmawati et al., 2023): 1) understanding science offers fulfillment of personal needs and joy, can be shared with anyone and 2) countries in the world are faced with questions in their lives that require scientific information and scientific thinking to make decisions. and the interests of many people that need to be informed, such as air, water, and forests. Understanding science and abilities in science will also increase students' capacity to hold important and productive jobs in the future (Kolade & Owoseni, 2022); (Grassini, 2023). Having scientific literacy is very important, so it is also important to build students' scientific literacy from an early age, as the next generation in the future (Osborne & Allchin, 2024); (Santhalia & Yuliati, 2021). One effort to do this can be done by creating science learning that supports the creation of scientifically literate human resources (Pursitasari et al., 2019). Several factors influence students' low scientific literacy. According to (Valladares, 2021; Rubini et al., 2017; Yanti et al., 2022) the cause of low scientific literacy is the tendency that the learning process does not support students in developing scientific literacy skills. Apart from that, the assessment process usually carried out in schools is also the cause of Indonesia's low position in the PISA study.

Conclusion

Scientific literacy abilities generally show that students have moderate scientific literacy abilities. The results of scientific literacy measurements carried out on students at MAN 1 KOLAKA can be a reference in improving students' scientific literacy skills, especially in biology learning. A learning model is needed that suits students' needs. Further research is needed to increase scientific literacy in students by using one of the appropriate learning models, namely the

Problem-Based Learning learning model, in this case it is needed to improve students' scientific literacy abilities in the school.

Conflicts of Interest

The author declares no conflict of interest. The funders had no role in the design of the study in the collection, analyses, or interpretation of data in the writing of the manuscript, or in the decision to publish the results.

References:

Adeoye, M. A., & Jimoh, H. A. (2023). Problem-Solving Skills Among 21st-Century Learners Toward Creativity and Innovation Ideas. *Thinking Skills and Creativity Journal*, *6*(1), 52–58. https://doi.org/10.23887/tscj.v6i1.62708

Ananda, C. N., Yanti, F., & Hidayat, Y. (2022). Development Of E-Module on Regulary System Material For Class XI High School. *Journal of Digital Learning And Distance Education*, *1*(3), 94–100. https://doi.org/10.56778/jdlde.v1i3.22

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

Firdaus, L., Ibrohim, I., Lestari, S. R., Masiah, M., Primawati, S. N., & Hunaepi, H. (2023). Quantitative Study on The Scientific Literacy Skills of Prospective Biology Teachers. *Jurnal Penelitian Pendidikan IPA*, *9*(1), 80–86. https://doi.org/10.29303/jppipa.v9i1.1891

Grassini, S. (2023). Shaping the Future of Education: Exploring the Potential and Consequences of AI and ChatGPT in Educational Settings. *Education Sciences*, *13*(7), 692. https://doi.org/10.3390/educsci13070692

Guimarães, M. H., Pohl, C., Bina, O., & Varanda, M. (2019). Who is doing inter- and transdisciplinary research, and why? An empirical study of motivations, attitudes, skills, and behaviours. *Futures*, *112*, 102441. https://doi.org/10.1016/j.futures.2019.102441

Karimah, K., Jufri, A. W., & Ramdani, A. (2021). Improving Students' Scientific Literacy: Learning Studies Using Science Teaching Materials on Circulatory System Materials. *Prisma Sains: Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *9*(1), 57. https://doi.org/10.33394/j-ps.v9i1.3878

Kolade, O., & Owoseni, A. (2022). Employment 5.0: The work of the future and the future of work. *Technology in Society*, *71*, 102086. https://doi.org/10.1016/j.techsoc.2022.102086

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

Nuryanti, T., Pursitasari, I. D., & Rubini, B. (2023). Science Literacy Profile of Junior High School Students on Climate Change Material. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8390–8395. https://doi.org/10.29303/jppipa.v9i10.5218

Osborne, J., & Allchin, D. (2024). Science literacy in the twenty-first century: Informed trust and the competent outsider. *International Journal of Science Education*, 1–22. https://doi.org/10.1080/09500693.2024.2331980

Pratiwi, N. P. W., Dewi, N. L. P. E. S., & Paramartha, A. A. G. Y. (2019). The Reflection of HOTS in EFL Teachers' Summative Assessment. *Journal of Education Research and Evaluation*, *3*(3), 127. https://doi.org/10.23887/jere.v3i3.21853

Pursitasari, I. D., Suhardi, E., & Sunarti, T. (2019). Promoting Science Literacy with Discovery Learning. *Journal of Physics: Conference Series*, *1233*(1), 012074. https://doi.org/10.1088/1742-6596/1233/1/012074

Rahmawati, A. J., Gunarhadi, G., & Muchtarom, M. (2023). Self-Regulated Learning Enhancing Scientific Literacy for Higher Educations in 21st Century Education: A Systematic Literature Review. *AL-ISHLAH: Jurnal Pendidikan*, *15*(2), 2625–2635. https://doi.org/10.35445/alishlah.v15i2.2353

Rubini, B., Ardianto, D., Pursitasari, I. D., & Permana, I. (2017). Professional development model for science teachers based on scientific literacy. *IOP Conference Series: Materials Science and Engineering*, *166*, 012037. https://doi.org/10.1088/1757-899X/166/1/012037

Santhalia, P. W., & Yuliati, L. (2021). An Exploration of Scientific Literacy on Physics Subjects within Phenomenon-based Experiential Learning. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, *11*(1), 72–82. https://doi.org/10.26740/jpfa.v11n1.p72-82

Sedova, K., Sedlacek, M., Svaricek, R., Majcik, M., Navratilova, J., Drexlerova, A., Kychler, J., & Salamounova, Z. (2019). Do those who talk more learn more? The relationship between student classroom talk and student achievement. *Learning and Instruction*, *63*, 101217. https://doi.org/10.1016/j.learninstruc.2019.101217

Siswanto*, J., Suyidno, S., Mahtari, S., Fitriyani, F., Febriani, W., & Sari, E. (2023). The Barriers to Developing Students' Scientific Literacy in Learning Physics of Quantities and Measurements. *Jurnal Pendidikan Sains Indonesia*, *11*(2), 206–220. https://doi.org/10.24815/jpsi.v11i2.27767

Stehle, S. M., & Peters-Burton, E. E. (2019). Developing student 21st Century skills in selected exemplary inclusive STEM high schools. *International Journal of STEM Education*, *6*(1), 39. https://doi.org/10.1186/s40594-019-0192-1

Valladares, L. (2021). Scientific Literacy and Social Transformation: Critical Perspectives About Science Participation and Emancipation. *Science & Education*, *30*(3), 557–587. https://doi.org/10.1007/s11191-021-00205-2

Yanti, F., Elna Amatul, F., & Zikra. (2022). Website-Based Module Design on Virus Materials for Class X High School. *Journal Of Digital Learning And Distance Education*, *1*(2), 55–62. https://doi.org/10.56778/jdlde.v1i2.17