*Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram*
*https://e-journal.undikma.ac.id/index.php/prismasains/index*
*e-mail: prismasains.pkpsm@gmail.com*

*July 2022. Vol. 10, No. 3*
*p-ISSN: 2338-4530*
*e-ISSN: 2540-7899*
*pp. 489-502*

# Profile of Students' Literature Skills and Responses to Outdoor Learning at Surabaya Submarine Monument in Archimedes Law

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Received: June 2022; Revised: June 2022; Published: July 2022

**Abstract**

One of education goals in 21st century is to improve students' literacy skills. While participating in PISA since 2000, Indonesia has always been in the last ten rankings. One of the things that can be studied in scientific literacy is physics, which is a challenge for physics teachers to improve students' physics literacy skills in various ways. Outdoor learning is one of the learning innovations that can be applied to improve students' literacy skills. This paper aims to analyze students' literacy skills profile and their response to outdoor learning. The tests used have been compiled and validated by two expert lecturers in their fields as well as the questionnaire. This research is quantitative descriptive research with purposive sampling. Data on students' literacy skills and response was collected then analyzed by percentage of literacy achievement. From the instrument questions distributed, it was found that the literacy results of students were still very low. The competence domain is 48.7%, the knowledge domain is only 10.3%, and the context domain is 30.85%. Meanwhile, from the distributed questionnaires, 80.8% of students agreed that Archimedes' law physics learning was done outdoor learning and 50% of students wanted Archimedes' law lessons at the Surabaya submarine monument.

**Keywords:** Literacy skills, domain of science literacy, outdoor learning

**How to Cite:** Allathifah, S., & Suliyanah, S. (2022). Profile of Students' Literature Skills and Responses to Outdoor Learning at Surabaya Submarine Monument in Archimedes Law. *Prisma Sains : Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram, 10*(3), 489-502. doi:https://doi.org/10.33394/j-ps.v10i3.5274

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## INTRODUCTION

The development of science and technology is running very fast, so that those of us who do not keep up with the changes will be far behind. This development will be easily pursued through education. Because one of the goals of education to hone and improve the students' literacy skills. According to Noviana, M (2017) one of the keys to successfully facing the challenges of the 21st century is "science literacy" because scientifically literate individuals are one of the human resources who can compete in the 21st century, so that later they can prepare students who are competent in their fields. and have creative thinking skills.

In the 21st century, educational institutions are required to creative thinking, critical thinking and problem solving, communication, and colaboration, where these four things are often referred to as the 4C. (Pertiwi et al, 2018). Of course, these 4C skills cannot be separated from scientific literacy skills. Literacy skills are not limited to a narrow definition of reading and writing, but develop. A broad definition of literacy skills is the skill of how a person uses the knowledge he has to solve problems in the life around him (Carlesia et al, 2021).

According to the Organization for Economic Cooperation and Development (OECD, 2015a) scientific literacy is the ability of each individual to apply knowledge in solving

problems related to science and technology in everyday life by involving discourse considerations about science and technology that require competence to explain phenomena holistically, scientific research, evaluate and design scientific investigations, and interpret data and evidence scientifically. The scientific literacy ability consists of several domains with their respective indicators listed in Table 1.

**Table 1.** The domain of scientific literacy and each indicator.

| Domain | Indicator |
|---|---|
| Contexts | By using literacy skills, students are expected to be able to solve problems both individually, locally/nationally, and globally. |
| Competencies | Explain an events scientifically. |
| | Evaluate and design research. |
| | Interprate data and evidence scientifically. |
| Knowledge | Content knowledge is the ability to explain natural and technological phenomena in real terms with some basic knowledge such as theories and existing information and facts. |
| | Procedural knowledge is the ability to support, search, collect, and analyze data or the ability to find out how the flow of something can be produced scientifically. |
| | Epistemic knowledge is the ability to explain and prove the truth produced by science and is better if it is generated from empirical experience. |

The Organization for Economic Cooperation and Development (OECD, 2018) explains that literacy skills are not only supported by one domain, but all three. Because the three domains are interconnected to form a relationship as shown in Figure 1.

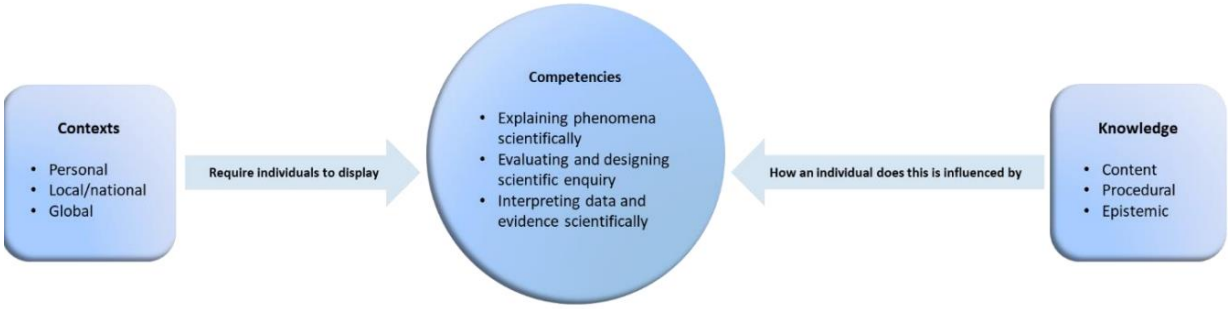



**Figure 1.** The three domains of scientific literacy that are intercinnected to each other.

According to Rusilowati et al (2017) students' literacy ability is influenced by 5 factors; teaching materials, learning models, learning media, student worksheets, and evaluation tools based on scientific literacy. Even in supporting literacy-based learning, the government establishes an integrated curriculum so students can understand lessons holistically and integratively. However, this curriculum is not accompanied by the procurement of teaching materials and literacy-based evaluation tools.

The literacy condition of the Indonesian nation is currently very weak compared to other countries. This can be proven when Indonesia participates in a scientific literacy assessment through the Program for International Student Assessment (PISA) held by the OECD (Organization for Economic Co-operation and Development). Indonesia has participated in PISA since 22 years ago, in 2000. From several evaluations, the literacy results of Indonesian students are shown in Table 2.

**Table 2**. The results of the scientific literacy of Indonesian students in international literacy assessments through PISA.

| Year | International's Average Score | Indonesia's average score | Number of countries | Position of Indonesia |
|---|---|---|---|---|
| 2000 | 500 | 393 | 41 | 38 |
| 2003 | 500 | 395 | 40 | 38 |
| 2006 | 500 | 393 | 60 | 53 |
| 2009 | 500 | 383 | 65 | 57 |
| 2012 | 500 | 382 | 65 | 64 |
| 2015 | 493 | 403 | 70 | 62 |

Based on the Table 2, it can be concluded that while participating in PISA, Indonesia has always been in the last 10 ranks. Carlesia et al (2021) in their research entitled "High School Students' Responses to Bus Science-Based Outdoor Learning to Improve Students' Literacy Skills" showed the results that the literacy profile of students in general in the Surabaya area was still relatively low.

**Table 3.** Profile of literacy skills of students in general in Surabaya (Carlesia et al 2021)

| Category | Frequency | Percentage |
|---|---|---|
| Very high | 5 | 5% |
| High | 2 | 2% |
| Moderate | 2 | 2% |
| Low | 1 | 1% |
| Very low | 90 | 90% |
| **Total** | **100** | **100%** |

In line with this, the research conducted by Mukaromah et al (2020) shows the percentage results of 52.51% of the research sample being in the very low literacy ability category, especially in the competence domain with indicators of interpreting data and scientific evidence. This can happen because students are still focused on finding fixed values, which are obtained in the process of memorizing equations, while they have difficulty in interpreting scientific data and evidence other than in the form of concrete values.

In PISA, physics is one of the branches of science that can be studied for scientific literacy. In fact, physics is often one of the subjects that students avoid and dislike. So this is a challenge for physics teachers to always develop a learning innovation that can attract students' interest.

Rusilowati et al (2019) in their research conducted interviews with several teachers from various regions; Central Java, North Sumatra, South Sumatra and even some LPTK lecturers in the field of science and showed the results: (1) almost the majority of them did not know the term of scientific literacy, (2) they do not know about international evaluation programs in scientific literacy such as TIMSS and PISA, (3) they still find it difficult to develop learning tools, especially the development of science literacy-based learning tools.

This shows that the learning model provided by the teacher does not support literacy much. Especially in science, many of the teachers still persist in using the classic method, which allows students to sit, listen, and only understand what the teacher has explained without them exploring their own thoughts.

From these explanations, it can be concluded that one of the goals of education in the 21st century is to improve students' literacy skills. One of the things that can be studied in scientific literacy is physics, but physics is not a subject favored by students so that this is a challenge for physics teachers to improve students' physics literacy skills in various ways, one of which is creating a new and fun learning atmosphere.

Learning is always identic with class, but that does not mean outdoor learning cannot be an alternative to freshen the atmosphere when students are getting bored with physics learning models so far. Learning outside the classroom, also known as outdoor learning, is a learning innovation carried out by utilizing all conditions and things in the environment or nature. The implementation of outdoor learning can be expected that students will be more motivated to create their own knowledge gained from their experiences with the environment. One of outdoor learning that can be done is to invite students to understand and examine the concept of physics, Archimedes' law in Submarine Monument in Surabaya. Implementing direct learning at the submarine monument, students are expected to maximize all their abilities, especially in supporting scientific literacy to understand the implementation of Archimedes' Law on submarines such as when the submarine is above the surface and when the submarine is under the surface.

Carlesia et al (2021) in their research obtained research results that 92% of students needed new activities in learning, 85% of students were interested if learning in the chapter of uniform straight motion (GLB) and uniformly changing motion (GLBB) is carried out on the Surabaya bus, and also 86% of students agree that outdoor learning can improve students' literacy skills, especially in the motion chapters. Another study conducted by Ismail and Suprapto (2021) found that visitors who are the general public agree that field trips activities are associated with the school curriculum, such as visiting Jatim Park for the people of Malang. That way, one of the diversity of outdoor learning is to be able to use the local wisdom of the local area as one of the learning innovations.

Therefore, researchers are interested in conducting research on students' literacy skills profile and their responses to outdoor learning in Archimedes' law at Surabaya submarine monument.

## METHOD

This study uses a quantitative descriptive method that aims to describe the literacy profile of students in the Archimedes Law as well as to explain the responses of students to learning outside the classroom. The Surabaya submarine monument was chosen as the research location by giving them a literacy instrument in the form of 4 questions to measure the literacy profile and a questionnaire to find out their response. This study did not provide any special treatment, changes in independent variables or manipulation variables so that the data obtained were collected and processed and then presented as is.

This research was conducted from November 2021 to May 2022. The population of this study were all students of class XI Science who were enrolled at SMA Hang Tuah 2 Sidoarjo in the academic year of 2021/2022 by using the purposive sampling technique, one class was obtained, namely class XI IPA-6 which consists of 32 students. Hang Tuah 2 High School Sidoarjo is one of the schools in Sidoarjo that supports and implements literacy-based learning. The three literacy domains were tested using a research instrument in the form of 4 essay questions that had a maximum score according to their respective cognitive levels according to Bloom's taxonomy developed by the researcher. This instrument has passed the validation stage by 3 expert lecturers in their field and has undergone a trial test validation.

The global description of the test instruments that will be given to students is in Table 4.

**Table 4.** General description of the essay question instrument that will be given to students.

| No. | Concept | Domain | Indicator | Cognitive realm | Maximum score |
|---|---|---|---|---|---|
| 1. | "The buoyant force on an object immersed in a liquid is equal to the weight of the liquid | a. Competence<br>b. Knowledge | a. Explain events scientifically.<br>b. The ability to explain and prove the truth | C5<br>C6 | 11<br>13 |

| No. | Concept | Domain | Indicator | Cognitive realm | Maximum score |
|---|---|---|---|---|---|
| | displaced by the object." | | produced by science. | | |
| 2. | $\sum\vec{F} = 0$<br>$\sum\vec{F} = m.\vec{a}$<br>$\sum\vec{F} = m.\vec{a} = 0$<br>Since the acceleration used here is the acceleration due to gravity, it becomes<br>$\sum F = mg = 0$<br>Because there is a gravitational force that is directed towards downwards, the upward force which is directed upwards, and the buoyant force which is directed upward as well, it can be written as<br>$F + F_B - mg = 0$<br>$F = mg - F_B$<br>For define $F_B$ we use Archimedes' law | a. Contexts | a. Ability to solve the problems locally. | C6 | 13 |
| | | b. Knowledge | b. The ability to explain and prove the truth produced by science. | C4 | 9 |
| | | c. Knowledge | c. The ability to explain phenomena in real terms with some basic knowledge such as theories and existing information | C4 | 9 |
| | | d. Contexts | d. Use the ability to solve the problems locally. | C3 | 5 |
| 3. | Object can float in fluid if $\rho_f = \rho_B$ or the density of the liquid is the same as the density of the object. And the magnitude of the upward lifting force is equal to the weight of the object or<br>$F_A = W_B$<br>An objects can floats on the surface of liquid if $\rho_f > \rho_B$ or the density of objects less than density of liquid. And the magnitude of the lifting force above<br>$F_A$ is equal to the weight of the small | a. Knowledge | a. The ability to explain phenomena in real terms with some basic knowledge such as theories and existing information | C3 | 5 |
| | | b. Knowledge | b. The ability to explain and prove the truth produced by science. | C5 | 11 |
| | | c. Knowledge | c. The ability to explain and prove the truth produced by science. | C5 | 11 |

| No. | Concept | Domain | Indicator | Cognitive realm | Maximum score |
|---|---|---|---|---|---|
| | object than the density of the liquid $F_A = W_B$ | | | | |
| 4. | To prove the crown is made of gold or not, then m is changed in the form ρ so that $w = \rho_m Vg$ (i) Since $F_B$ is bouyant force with the liquid is water so that can be written $w – w' = \rho_a Vg$ (ii) | Contexts | Use the ability to solve the problems globally. | C5 | 13 |
| | | | Total | | 100 |

The resulting data will be analyzed using the percentage of achievement of the scientific literacy domain in the physics chapter. The percentage of achievement is shown in Table 5.

**Tabel 5.** Percentage of achievement of literacy domain (Purwanto in Mukharomah et al, 2021).

| Category | Interval |
|---|---|
| Very high | 86 – 100 % |
| High | 76 – 85 % |
| Moderate | 60 – 75 % |
| Low | 55 – 59 % |
| Very low | <54 % |

In addition, the percentage of achievement for each domain will be described according to the results of the analysis using the following equation

$$Percentage\ of\ each\ domain = \frac{average\ score\ of\ each\ domain}{maximum\ score\ of\ each\ domain}\ x\ 100$$

From these results will be described again in accordance with reference Table 5. The questionnaire is given after students collect answers from the literacy profile test. The questionnaire is given in the form of a google form which 2 expert validators have validated in their field. This questionnaire aims to describe students' responses regarding the physics learning that they have experienced so far, their desire for further physics learning, and their views if physics learning about Archimedes' Law is carried out outside the classroom, at Surabaya submarine monument.

## RESULTS AND DISCUSSION

### Archimedes Law Science Literacy Test

The results and discussion contain scientific research findings and discussions. Write down scientific findings obtained from the reasearch results that have been done but must be supported by adequate data. The scientific findings referred to here are not the results of the research data obtained. The scientific findings must be explained scientifically including: What scientific findings were obtained? Why did that happen? Why are trend variables like that? All these questions must be explained scientifically, not only descriptive if necessary supported by adequate scientific basis phenomena. In addition, it should also be explained in

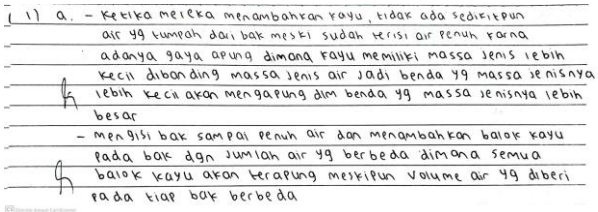
comparison with the results of other researchers who are almost the same topic. The results of the research and findings must be able to accommodate the research objectives in the introduction.

After all students in class XI IPA-6 SMA Hang Tuah Sidoarjo finished doing the science literacy test in the Archimedes law, the results were as shown in table 6. There were three domains tested with each indicator. Of the three domains, the highest value was obtained by the context domain with indicators using the ability to solve problems globally. The question that uses this domain is question number 4 in which students are asked to prove whether the crown worn by the king is made of gold or not. All students are allowed to open the learning resources they have, as a result they only look for the answer key from google without seeing first that the quantities contained in the questions and google are different even though the overall results are almost the same. However, what is meant by the question is that students must be able to prove in the sense of using their scientific abilities based on data and facts to solve problems. All students in the class have the same answer and they only get a half value of the maximum because of their negligence in understanding the question.

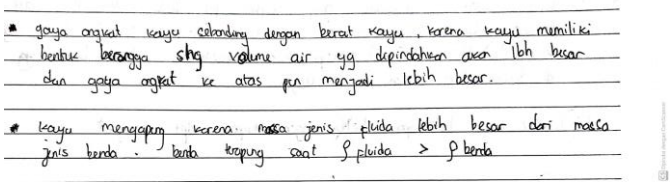
**Tabel 6.** The results of scientific literacy test for each domain.

| Domain | Indicator | Result | Category |
|---|---|---|---|
| Competency | Expalining an event scientifically | 48,7% | Very low |
| Knowledge | Explaining and proving the truth that produced by science | 10.6% | Very low |
| | Explaining the real phenomena with the basic of theories they understand by the existing data | 10.0% | Very low |
| Contexts | Ability that use to solve problem locally | 11.7% | Very low |
| | Ability that use to solve problem globally | 50.0% | Very low |

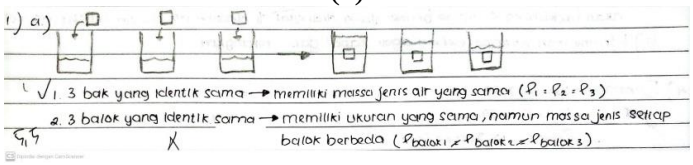
Based on table 6, it can be concluded that the highest domain results are obtained by the competence domain contained in sub-question 1a with the indicator being skills in scientifically explaining events. The maximum score in this sub-question is 11 points and only 4 out of 32 students get it, besides that some of them get a score of 8.25, a score of 5.5, a score of 2, a score of 1, and also a score of 0. This is what causes the average their grade is low even though some students managed to get maximum score. The following are the results of some of the students' answers.




(a)




(b)




(c)

**Figure 2.** (a) students sample answer that get the maximum score, (b) students answer that get score of 8.25, (c) students answer that get score of 5.5.

As for the knowledge domain with indicators of the ability to explain and prove the truth produced by science, the result is 10.6% or very low because in this domain there are four sub-questions, at numbers 1b, 2b, 3b, and 3c. Students only actively answered questions number 1b with a maximum score of 13 points, while in number 2b there were no correct answers at all, as well as numbers 3b and 3c the maximum score obtained was only 2.2 out of 11. Of the 32 students there were only 2.2 out of 11. 3 pupils answered with the maximum score. In this question 1b, students are asked to relate the scientific phenomena presented with the physics concept, Archimedes' Law. Sample answers for sub-question number 1b are shown in Figure 3 below.

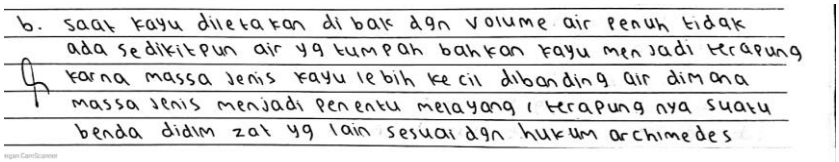
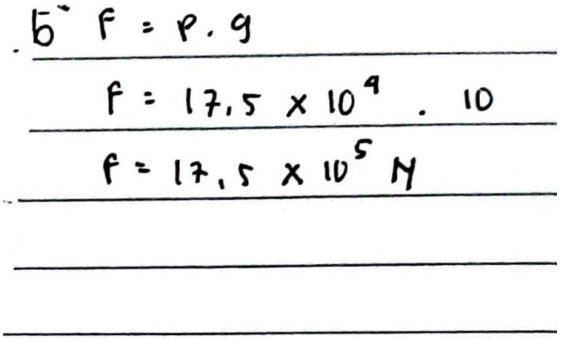

b. saat kayu diletakan di bak dgn volume air penuh tidak ada sedikitpun air yg tumpah bahkan kayu menjadi terapung karna massa jenis kayu lebih kecil dibanding air dimana massa jenis menjadi penentu melayang / terapung nya suatu benda didlm zat yg lain sesuai dgn hukum archimedes

**Figure 3**. Students sample answer for question number 1b.

In sub-question number 2b, all of the students' answers are exactly the same and totally wrong, this is the same as in question number 4 where the answers from one class are all the same. In this sub-question, students are asked to be able to describe the forces to determine the force needed by Irfan to lift the statue from the bottom of the water if the acceleration is neglected. The answers from students for this sub-question are shown in Figure 4.


b. $F = \rho . g$

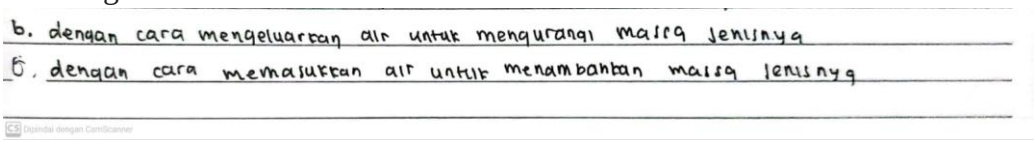
$F = 17,5 \times 10^{9} . 10$

$F = 17,5 \times 10^{5}\ N$

Figure 4. Sample answer of students that same at all.

From Figure 4 it can be seen that the answers from students are very short, while looking for the force needed to lift the statue if the acceleration is neglected. To solve the problem here, students must first connect Archimedes' law, the next step is to calculate the weight of the statue and subtract from the two results.

Meanwhile, sub-questions 3b and 3c continue the basic theoretical physics applied to submarines. Students are asked to explain how submarines move from floating to floating and vice versa accompanied by pictures and explain the function of the submarine components contained in the discourse presented in the problem. In this sub-question, no answer gets a maximum score, the maximum score of the student's answer is only 2.2 out of 11. Of the 32 students who got a score of 2.2, a total of 8 students received zero for not answering or answering very well. short and wrong. The answers from students who got a score of 2.2 are as shown in Figure 5.

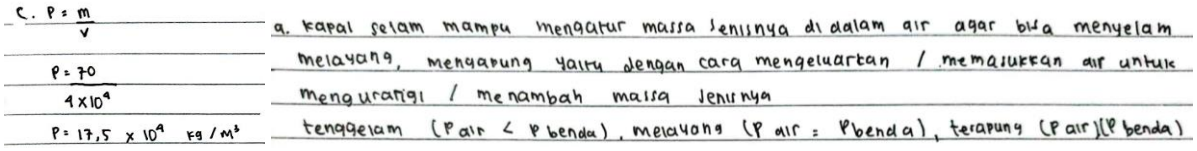

b. dengan cara mengeluarkan air untuk mengurangi massa jenisnya

b. dengan cara memasukkan air untuk menambahkan massa jenisnya

**Figure 5.** Sample answer that gets score of 2.2.

The indicator in the second domain of knowledge is the ability to explain phenomena in real terms with some basic knowledge such as theories in this case,the information lies in sub-questions 2c and 3a. In number 2c, students are asked to provide a hypothesis about the apparent mass of the statue when it is in the water with a maximum score of 9. Actually, the answer to this sub-question continues from the previous sub-question, number 2b, if the previous answer is correct. However, because all the students answered the previous sub-questions incorrectly, all of the answers in this sub-question were incorrect. This results in the literacy results of students for the knowledge domain with these indicators being very low.

As for sub-question number 3a, students are expected to be able to explain the concept of physics applied to submarines and briefly explain how it works with a maximum score of 5. Some students can do well and get a maximum score of 4 out of 32 students. While the others cheated on each other's wrong answers, they got a score of 0. Sample answers for sub-questions 2c and 3a are shown in Figure 6.




(a) (b)

**Figure 6.** (a) sample answers from students for sub-question number 2c, (b) sample answers from students who get a maximum score of 5 for sub-question number 3a

In the context domain, there are 2 indicators used, namely solving problems using scientific abilities locally and solving problems globally. The problem locally is found in sub-questions number 2a and 2d, while the problem globally is in question number 4. In question number 2a, students are asked to give consideration to theoretical studies that can be used to solve the problem, in this case the statue that sinks. The theoretical study referred to here is to link Archimedes' law with Newton's second law which has been given feedback in the discourse. In this sub-question the maximum score is 13 and no one gets it. Their highest score was 6.5 which only 1 student achieved while most of them got a score of 3.25 and 2 people got a score of 1 while the other one got 0. As for the answer to number 2d, no one answered it at all. In this problem students are asked to determine the force required to lift the statue from the water if the acceleration is not neglected. When acceleration is not neglected, the closer the statue is to the surface of the water, the greater the lift will be in contrast to the lower the pressure. However, because no one answered this question, the literacy results of students in the context domain of this indicator were very low. The best answer that gets a score of 6.5 is shown in Figure 7 below.

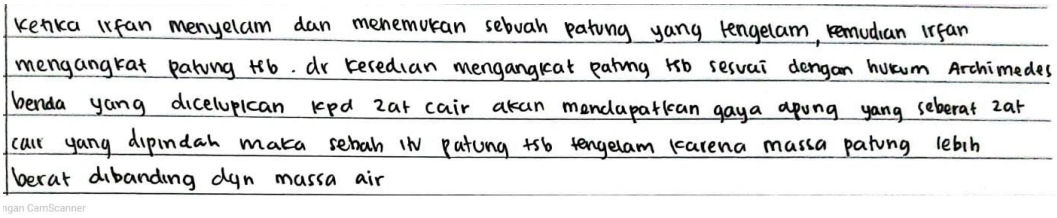



**Figure 7.** The answer to sub-question number 2a which gets the highest score is 6.5.

The last question number 4 is the context domain with indicators using scientific abilities to solve problems globally. At this time students were asked to help Archimedes determine whether the crown worn by the king was made of gold or not. All students in doing this literacy test from the beginning of work are allowed to open and read all learning resources. However, this is abused by students where they only look for answers on google. In addition, they are also not careful in determining the quantities that exist between Google and the questions even though there are differences. Although the final results are almost the

same, their initial way of explaining is not the same because they use a different google answer key from what was asked of the question. As a result, they only got half the maximum score of 6.5 and all students' answers were the same. So that in this domain the results obtained are the greatest compared to the others, which is 50%. The answer to question number 4 is shown in the image below.

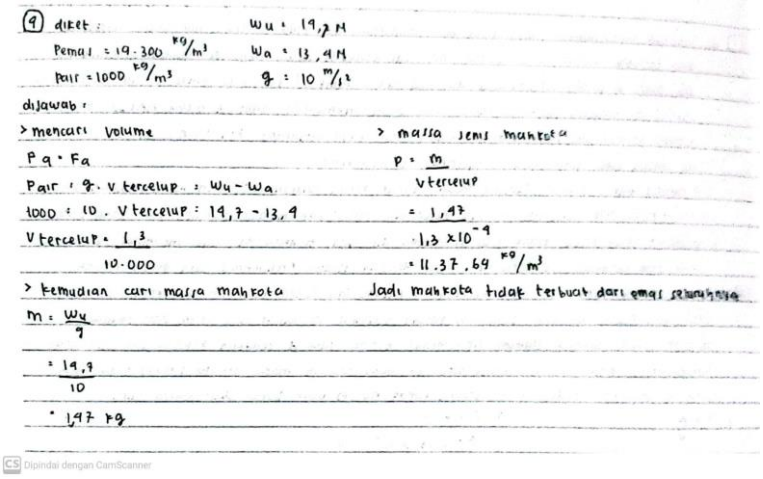



**Figure 8**. Sample answer for quesntion number 4.

From some of the sample answers, it can be judged that students are very lacking in scientific literacy. The weakness of scientific literacy of students in Indonesia is influenced by various things. In their research, Sumanik et al (2021) explained five factors that caused low scientific literacy, namely the first, the interest and curiosity of students at this time was very lacking even though the main actors of learning were the students. The second factor is the study habits of students who are not optimal. Most students in Indonesia study only when there is an exam or more often referred to as the overnight race system. In addition to the exam, they will assume that the teacher's explanation is sufficient. The third factor is the way students learn, what is meant here is that most Indonesian students learn by memorizing, not understanding. So when they are given a test that sharpens their understanding, they are often confused because it does not match what they have memorized.

The fourth factor is the lack of interest in reading by Indonesian students. This is in line with research conducted by Aditya (2014) in which students answered the test in a hurry so they did not read every detail of the discourse presented. This is also evident when students work on question number 4 who only cheated from google without paying more attention to the difference.

While the fifth factor is the teacher's technique in delivering chapters. Since physics is not an easy subject to understand, the teacher's ability to teach so that students can understand the chapters must be considered. Some physics chapters are difficult to convey using methods other than lectures. However, several other approaches can be taken, such as inviting students to learn to take advantage of the surrounding environment and others. In addition, the questions must start based on scientific literacy so that students are accustomed to dealing with similar questions and will practice analyzing, reading long discourses, and understanding important points in the discourse presented (Huryah et al, 2017).

The results of the overall student literacy test are shown in Figure 9 below.

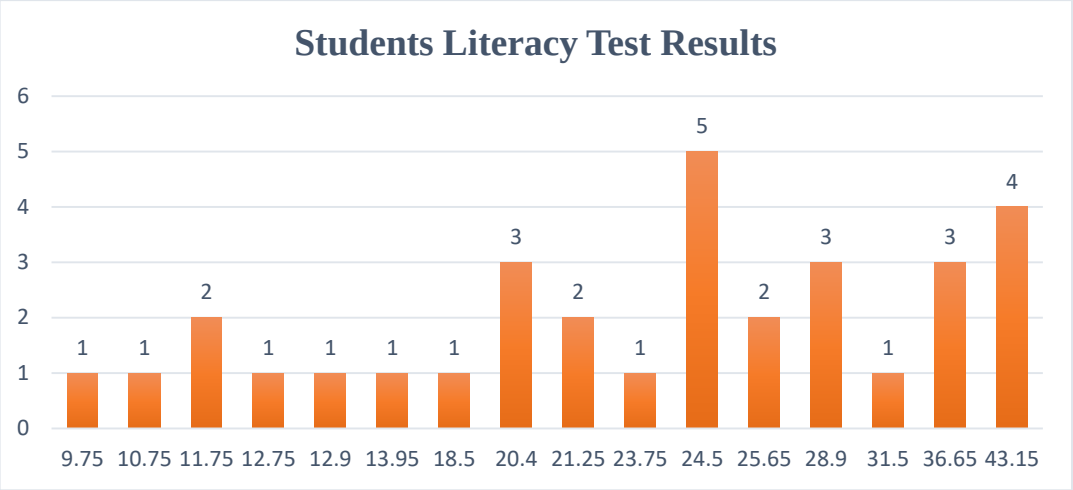



**Figure 9.** Accumulated student literacy test result.

Based on the Figure 9, it can be seen that the lowest score is 9.75 and the highest score is 43.15. Almost every student has different scores, and the highest score is 24.50, which is 5 out of 32 students. However, even though the highest score was at 43.15 the score was still in the very low category.

**Student response questionnaire results**

This questionnaire was given to students with the aim of analyzing student responses regarding learning outside the classroom in one of the physics chapters, namely Archimedes' Law at the Surabaya submarine monument. However, the previous questions were about physics learning which has been done both online and offline. As for the 32 students, as many as 16 students liked physics and others didn't. They don't like physics because it has too many similarities. Whereas physics is not about memorizing equations but how students can understand the correct concepts. The results of the student response questionnaires are listed in Table 7 below.

**Table 7.** The results of the questionnaire on student responses to outdoor learning in the Archimedes lawchapter at Surabaya submarine monument.

| Statement | DA (%) | A (%) |
|---|---|---|
| Physics learning always uses the classical method | 40.1 | 59.9 |
| Physics learning has been done outdoor of class | 61.5 | 38.5 |
| So far physics learning has never done an experiment | 48.0 | 52.0 |
| There was a project assignment in physics learning | 26.9 | 73.1 |
| Students often prove the concept of physics apart from teacher's explanation | 30.8 | 69.2 |
| The fluid chapter is explained by the classical method | 26.9 | 73.1 |
| Fluid chapter explanation has been done outside of class | 19.2 | 80.8 |
| Conducting experiments of fluid | 76.9 | 23.1 |
| Archimedes' law learning is suitable outside the classroom | 19.2 | 80.8 |
| The submarine monument is a good place to study Archimedes' law aplications | 11.5 | 88.5 |
| Archimedes' law will be easy to understand if learning is carried out outside the classroom | 19.2 | 80.8 |
| That way the ability to study and design experiments according to Archimedes' laws will increase | 23.1 | 76.9 |
| Likewise, literacy skills will improve if learning is carried out outside the classroom | 19.2 | 80.8 |

Where DA is mean disagree and A is agree. Table 7 shows that physics learning globally uses classical methods more often and 38.5% of students admit that they have studied physics outside the classroom, besides that, globally, physics learning has also conducted experiments both inside and outside the classroom, namely 48% of students admit it. As for the fluid chapter, the majority of students, 73.1% said that their learning was using classical methods and 76.9% of students said that they had never conducted experiments related to the fluid chapter.

80.8% of students agree that the Archimedes law sub-chapter is good to be carried out outside the classroom. Furthermore 88.5% of the students agreed that the submarine monument in Surabaya is very suitable as a place for learning Archimedes' law and they think that Archimedes' law will be more interesting and easier to learn. That way, a scientific approach to improve students' literacy skills can also be done, namely through learning outside the classroom (Carlesia et al, 2021).

When asked to choose the learning they want next for Aarchimedes' law, the students are as follows.

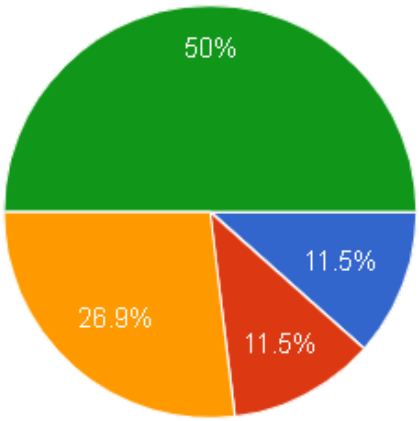



**Figure 10.** Students' interest in learning Archimedes' law.

The green color in the image shows the choice of "the teacher invites students to directly see the Archimedes law application at the submarine monument", the orange color indicates the choice of "the teacher explains with the help of media in the form of photos/videos from the Archimedes law application", the red color indicates the choice of "teacher". explain by experimentation in the classroom", and blue color indicates "the teacher explains with the classical method". Some of the reasons students choose green is because most of them don't like physics, so learning like that will make them interested in physics besides that they can also see the real application of Archimedes' law. Some students choose orange because videos/photos can be saved and played at any time and it doesn't cost much. The reason some students choose experiments is because they have difficulty understanding physics concepts if there is no practice, while the reason for students choosing to use the classical method is because they are already familiar with such learning methods.

Mundilarto et al (2017) in their research found that students who did learning outside the classroom experienced an increase in their ability in the field of physics, besides that learning outside the classroom also had a positive impact and motivated the learning process of students to be better. Students who do learn outside the classroom have a sharper memory than students who only do learning in class.

## CONCLUSION

The literacy profile of students in the 3 literacy domains is still very low and it is very necessary to get used to working on literacy-based questions. The highest score only reached 43.15% and the lowest score was 9.75%. It takes a creative effort from the teacher in carrying out learning because most students do not like physics lessons. In addition, 50% of students

also choose to do learning outside the classroom on Archimedes' law such as at the Surabaya submarine monument to improve students' literacy skills through the real application of physical theories.

## RECOMMENDATION

Teachers are required to always update creative ideas to support literacy-based learning in the 21st century in all chapters studied. This is because it is evident from many studies of student literacy profiles in Indonesia which show very low results. Therefore, if teachers are active in supporting literacy-based learning, students in Indonesia will gradually get used to dealing with questions that test their literacy skills.

## ACKNOWLEDGMENT

This research received no specific grant from any funding agency in the public, commercial, or not for profit sectors.

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