

# Analysis of Junior High School students' scientific literacy on simple effort and aircraft for everyday life

N I Arding<sup>1</sup> and S Atun<sup>2</sup>

<sup>1</sup>Science Education, Universitas Negeri Yogyakarta, Sleman, Indonesia

<sup>2</sup>Chemistry Education, Universitas Negeri Yogyakarta, Sleman, Indonesia

Corresponding author: nurismiyanti.2018@student.uny.ac.id

**Abstract.** Scientific literacy was the ability to solve everyday problems and provide concrete evidence in scientific resolution. This research aimed to analyse junior high school students' scientific literacy about effort and simple aircraft in everyday life. This research was included in descriptive quantitative would be using test questions. Test results will be analysed to measure students' scientific literacy skills. The subjects of research were 8<sup>th</sup>-grade students at schools of medium quality. The research population was all 8-grade students, where all classes were homogeneous and had the same average ability. The sample was chosen because there are no superior classes and academic abilities possessed by heterogeneous students (high, medium, and low). The sampling technique used a purposive sampling technique. The instrument used to measure students' scientific literacy was a scientific literacy test that matched the indicators of scientific literacy. The result of the analysis obtained from each aspect assessed namely identifying scientific issues was of 19.69% included in the very poor category, explaining that scientific phenomena were 32.19% included in the moderate category, and interpreting scientific data and evidence was 33.59% included in the moderate category. These results indicated that the literacy ability of students falls into the poor category.

**Keywords:** *analysis, scientific literacy, junior high school students, effort and simple aircraft*

## 1. Introduction

Along with the development of time, the necessities that must be owned must follow the demands of the times. The demands of today's or better known 21st century require that they are able to use media or technology in learning [1][2]. The global challenge is a challenge that must be faced so that people can understand science and technology. In the 2013 curriculum, science education in science education in schools is expected to form students who have high scientific literacy [3]. The 21st century is a challenge for all communities, in order to face these challenges, the education world needs a change in learning. So, learning can be beneficial for the community [4]. Student participation has an important role in society [5]. There are several abilities that students must possess and have been taught by the teacher, except understanding the characteristics of scientific knowledge [6]. Studying in the 21st century now requires the development of skills related to higher-order thinking [7]. Learning that can be used in the face of the 21st century is by learning scientific literacy, so that educational goals can be achieved.

Scientific literacy is one of the abilities of the 21st century that students must possess. The world of science education has a symbol in a change such as scientific literacy. Its function is to provide direction about science in learning science so that learning of science that is given can meet the demands of the age of the 21st century that must be faced and beneficial to society [4]. Scientific



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literacy is the ability to solve or solve a problem correctly and provide concrete evidence in the form of data or facts in everyday life [8]. Scientific literacy is a part of a person's ability to understand science more [8] [9]. The information obtained can be utilized to face the real world in showing one's skills and knowledge. In addition to mastering the curriculum in schools also seen based on the assessment of PISA [9]. Scientific literacy can be used as a problem solving for decision making by scientific consideration [10]. Scientific literacy is used in making decisions or actions [11] [12], to be applied in everyday life and also is basic knowledge [11]. Scientific literacy is also defined as the skills possessed by each individual in solving a problem related to science in life every day [13]. Based on the results of the study found that there are difficulties in students in using scientific knowledge in making a decision about an issue [14] [15] [16]. Therefore, scientific literacy is needed to be useful for students.

The usefulness of scientific literacy is to be able to infer, understand, identify, gain new knowledge and know the connection between science and technology [17]. Scientific literacy can be useful if the teacher uses it, so that students' scientific literacy can increase. The role of the teacher in order to increase student scientific literacy is to gather interesting topics to give to students, do guidance with students in evaluating data, provide training to students in reading tables or graphs, and provide opportunities for students to be directly involved in providing explanations regarding the relationship of social issues with the concept of science [18]. So that learning scientific literacy is useful for students in understanding the lesson [11].

Natural science (IPA) is a knowledge [19]. The main purpose of learning Natural Science (IPA) is to instill scientific literacy in daily life, it can be used as evidence that the success of a learning. In Indonesia, scientific literacy is supported by the 2013 curriculum. Scientific literacy can increase is the goal of making the 2013 curriculum [20][21][22]. Learning that can understand and use the concepts of science and technology is learning science in everyday life. But the ability of scientific literacy in Indonesia is not conducive in the learning process, because teachers are not accustomed to developing scientific questions and investigations related to scientific literacy [23]. Science can find out about nature in a systematic way because it has a close relationship with nature. Science includes knowledge that can find new discoveries [24]. Inventions that can be found such as new tools or technologies and medicines to cure diseases [25]. Science shows facts about events that occur in nature. These events can be seen by conducting experiments or observations. The goal is to collect data to find knowledge [26]. Natural science is a knowledge that is closely related to daily life and can prove an event by conducting investigations such as conducting experiments and so on. So, with natural science learning, students can link the material being taught with the surrounding environment to add or gain deeper understanding.

## 2. Research Methods

This research was descriptive research. The purpose of this research was to determine the assessment of various indicators based on aspects of scientific literacy. This research did not compare other variables, which were only focused on students' scientific literacy abilities. The subjects of research were 8<sup>th</sup>-grade students at schools of medium quality. The research population was all 8<sup>th</sup>-grade students, where all classes were homogeneous and had the same average ability. The sample was chosen because there are no superior classes and academic abilities possessed by heterogeneous students (high, medium and low). High, medium, and low ability classifications are obtained based on previous student learning achievement. The research sample was used as many as 120 students in the 8<sup>th</sup>-grade of the 2019/2020 school year. This research used an instrument in the form of test questions that would be tested with a number of items for each aspect, namely aspects of identifying scientific issued consisting of 2 indicators and 3 questions, aspects of explaining scientific issues consisted of 3 indicators and 8 questions, and aspects of interpreting data and scientific evidence consists of 2 indicators and 11 questions. This instrument was used to assessed the ability of students' scientific literacy based on aspects of scientific literacy according to the OECD [27]. Data acquisition came

from students' answers after working on the test questions given and then analyzed. Before obtaining a percentage, requires several steps as follows.

- Giving a score on the work of students in accordance with predetermined scoring
- Calculate the percentage of student acquisition results
- After the percentage was obtained, then described the data obtained in accordance with the categorization based on aspects of each indicator in scientific literacy.

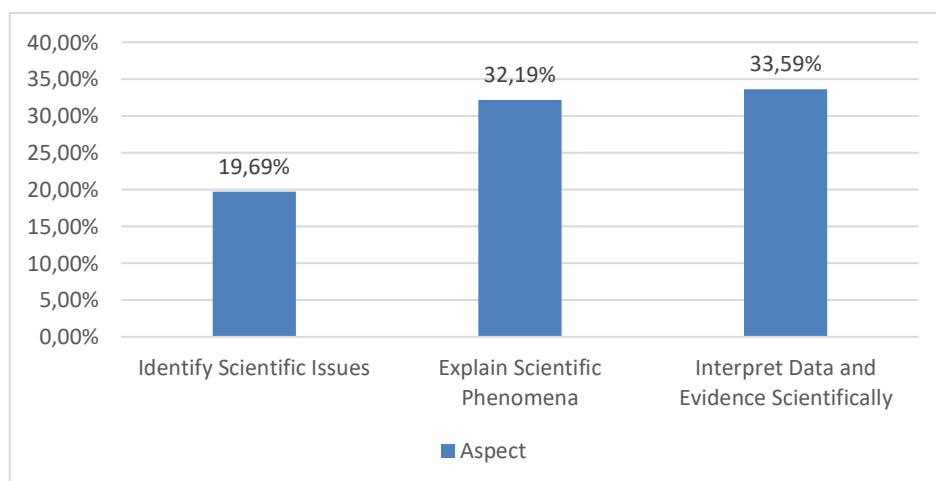
The results of the analysis that had been converted to percentage form could be known by category categorized by the percentage in table 1 [28].

**Table 1.** Percentage categories for scientific literacy

Interval	Category
81-100	Very high
61-80	High
41-60	Medium
21-40	Low
0-20	Very Low

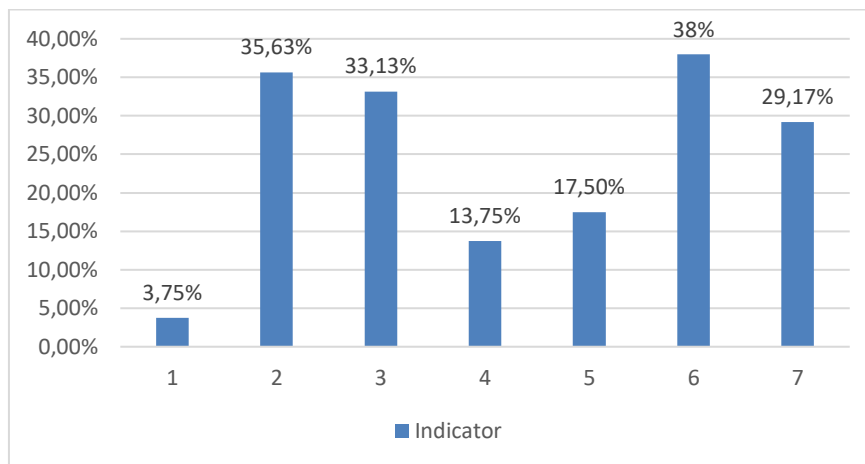
### 3. Results and Discussion

This research was conducted to analyze the scientific literacy of junior high school students. Scientific literacy was a part of ability. Scientific literacy was the ability to solve a problem correctly and provide concredited evidence in the form of data or facts in everyday life [8]. Scientific literacy was one of the entities part of the goals of science education [14], which was used in making decisions about scientific issues related to social life [29]. The results of students' scientific literacy data in the form of tests based on aspects and indicators obtained were presented in Figure 1 and figure 2.



**Figure 1.** Percentage of results of students' scientific literacy abilities based on aspects of scientific literacy

Figure 1 showed that of the three aspects of competency assessed in the science lessons on effort and simple aircraft in everyday life, there were no aspects that fall into the high or medium category, but one aspect fall into the very poor category and two fall into the poor category. The percentage obtained from aspects assessed namely identifying aspects of 19.69% included in the very poor category, explaining aspects 32.19% included in the moderate category, and interpreting aspects 33.59% included in the moderate category. The average of competency aspects, which was 28.49%, falls into the less category.



**Figure 2.** Percentage of results of students' scientific literacy abilities based on indicators of scientific literacy

Figure 2 showed that indicators achieved by students in the science lessons about effort and simple aircraft in everyday life fall into the category of very less and less. Where there were 3 indicators that fall into the very poor category and 4 indicators that fall into the poor category. Judging from the results of the percentage of each indicator, indicator 1 identified issues that might be investigated in certain scientific studies (3.75%), indicator 2 recognized the important elements in scientific investigation (35.63%, indicator 3 remembered and applied scientific knowledge in accordance with certain situations (33.13%), indicator 4 identified, used, and made a simple picture model to explain scientific phenomena encountered in everyday life (13.75%), indicator 5 made and provided explanations, predictions that were accordingly (17.50%), indicator 6 changed data from one form to another (diagrams, graphs, etc.) (38%), indicator 7 analyzed and interpreted data to draw appropriate conclusions (29.17%). The ability of students' scientific literacy had not been met based on indicators because the percentage obtained was far from good categories. If averaged, then the value of the percentage of scientific literacy of students of all indicators that was 24.42%, included in the category of less.

Figure 1 and Figure 2 were the results of the percentage of scientific literacy tests according to indicators based on aspects of scientific literacy in science lessons about effort and simple aircraft in everyday life. These results indicated that the scientific literacy of students was still in the poor category. Where students' holdings in science learning were still lacking, so students could identify, explain and interpret data properly, even though the forms of problems given were simple. Other causes were due to students' weak ability to express a discourse and their low ability to reason students. The limited thinking was possessed by students in channeling it into writing because before students answer questions students must connected a news in the form of paragraphs, charts, graphs or tables to new expressions, which students were not accustomed to doing [30]. If an individual lacks skill, the person will have difficulty in finding or using information in the form of tables, maps and graphs [31]. This showed that scientific literacy was not inherent in students, where the ability to literate such as identifying, explaining and interpreting students had weak, especially responding to a problem [32]. Therefore, teachers were expected to know about the concepts of scientific literacy and be able to apply scientific literacy in learning [33].

Today's scientific literacy in the development of education was very important and needed in every individual, because the used of this scientific literacy can be used in this era and in the future [34]. Scientific literacy was very important, so scientific literacy was needed in learning. Where, learning scientific literacy would help students to improve their thinking, in the form of knowledge and thoughts on scientific concepts, so it was necessary to included scientific literacy into the curriculum. Scientific literacy was learning that was only known by students. The learning process was also new

so that students need a long time to get literacy [35]. One the benefits that can be applied such as developing a positive attitude, curiosity and awareness of the interplay between technology, society and science. [36].

Some learning models that could be used in learning scientific literacy are problem-based learning (PBL) models [37], guided inquiry [38], science and technology society [39]. One approach that could be used in implementing scientific literacy was the scientific approach [40]. It was proven from research conducted [41] that students' scientific literacy ability after being taught learning by using a scientific approach increased. That was because the scientific approach was an approach given by the teacher to students in investigating something in the form of phenomena that exist in students' daily lives. Another way that could be used based on research results in improving student literacy was to use student worksheets using EESD [42], the used of local wisdom SSP [43].

#### 4. Conclusions

The results obtained were based on data that has been analyzed, showing that the literacy ability in science lessons about effort and simple aircraft in the daily life of junior high school students was classified as less. This was evidenced from the results of the average percentage of scientific literacy of all aspect and indicators obtained. Therefore, the lack of students' literacy skills, the teacher has an important role to design a learning, so that the learning was given to students that has a positive impact, so that students' scientific literacy skills can be improved from various indicators based on aspects of scientific literacy.

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