



PRE-SERVICE PHYSICS TEACHER FROM ISLAMIC EDUCATION CAMPUS VS. NON-ISLAMIC EDUCATION CAMPUS: WHICH ONE IS MORE SCIENTIFICALLY LITERATE?

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ABSTRACT

This study is intended to examine the level of scientific literacy of pre-service physics teachers in Islamic and non-Islamic educational institutions. The research method used document review studies, tests, and observations. The sample selected was 70 pre-service physics teachers consisting of 35 pre-service physics teachers from an Islamic education university and 35 from a non-Islamic educational university. The results of the test show that pre-service physics teachers in an Islamic educational institution have a lower average score than pre-service teachers studying in a non-Islamic educational institution. Through document review and observation, several factors causing the low scientific literacy ability of pre-service physics teachers in Islamic educational institutions were revealed, including the proportion of credits for science courses, supporting facilities and infrastructure, and the quality of teaching staff. This finding is expected to be an evaluation material for policy makers, especially in Islamic educational institutions to make improvements in a structured and systematic way.

CALON GURU FISIKA DARI UNIVERSITAS PENDIDIKAN ISLAM VS. UNIVERSITAS NON-PENDIDIKAN ISLAM: MANA YANG LEBIH BERLITERASI SAINS?

ABSTRAK

Kata Kunci:

Lembaga pendidikan islam

Calon guru fisika

Literasi sains

Penelitian ini dimaksudkan untuk melihat pengetahuan literasi sains calon guru fisika di lembaga pendidikan Islam dengan pendidikan non-Islam. Metode penelitian menggunakan studi telaah dokumen, tes, dan observasi. Sampel yang dipilih berjumlah 70 calon guru yang terdiri atas 35 orang calon guru fisika dari universitas pendidikan Islam dan 35 dari universitas non pendidikan Islam. Hasil tes literasi sains menunjukkan bahwa calon guru fisika di lembaga pendidikan Islam memiliki nilai rata-rata yang lebih rendah dibandingkan dengan calon guru yang belajar di lembaga pendidikan non-Islam. Melalui telaah dan observasi dokumen, beberapa faktor yang mendukung rendahnya kemampuan literasi sains calon guru fisika di lembaga pendidikan Islam terungkap, seperti proporsi sks mata kuliah IPA, sarana dan prasarana pendukung, dan kualitas tenaga pengajar. Temuan ini diharapkan menjadi bahan evaluasi bagi pengambil kebijakan khususnya di lembaga pendidikan Islam untuk melakukan perbaikan secara terstruktur dan sistematis.

1. INTRODUCTION

In the Industrial Revolution 4.0 era, scientific knowledge is still the main indicator to see the quality of a nation [1]. This is because having scientific knowledge is the key to the development of Science and Technology [2]. Based on this, science is an aspect that must be continuously improved by a nation. One important aspect that must be improved in science learning is scientific literacy skills [3]. The importance of scientific literacy skills is supported by the statement that scientific literacy can be used as an indicator to see the quality of education and human resources in a country [4].

Scientific literacy is not only the ability to read and understand science [5], but also the ability to understand and apply the basic principles of science [6], [7]. Programme for International Student Assessment (PISA) defines scientific literacy as an individual's capacity to use scientific knowledge, identify questions, draw conclusions based on evidence [4], [8], in order to understand and help make decisions about nature and human interactions with nature itself [9], [10].

Scientific literacy is very important for students, especially in Indonesia, because it is the basic competence of students in understanding their living environment and various daily problems which are very dependent on the progress of science and technology [11], [12]. Scientific literacy is expected to help students adapt to advances in science and technology, especially to face challenges in the future [13]. However, in reality, scientific literacy of Indonesian students is still far below the average [14]–[18]. The average scientific literacy score of Indonesian students from the results of the PISA study can be seen in Figure 1.

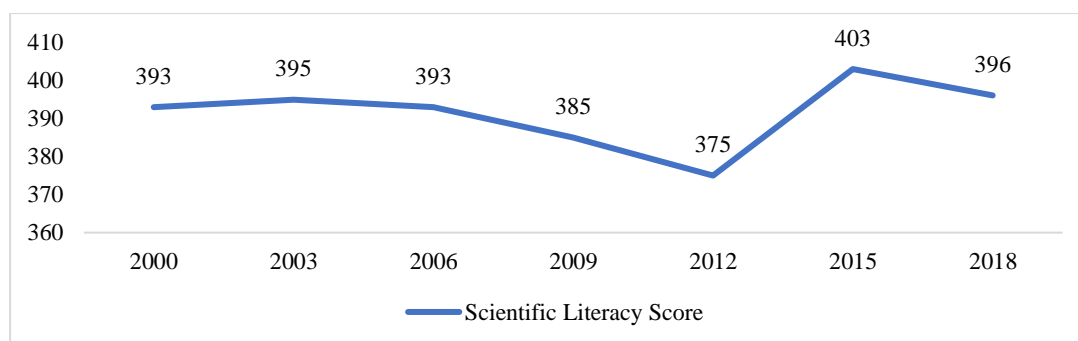


Figure 1. Indonesian Students' Scientific Literacy Score in 2000–2018 [19]

The results of the survey every three years by PISA as shown in Figure 1 shows that the scientific literacy scores of Indonesian students continue to decline. Meanwhile, the latest results of the PISA study on scientific literacy in 2018 showed that Indonesia was ranked 70th out of 78 countries [21]. These results indicate that the students' scientific literacy is still relatively low.

When compared to other countries in Southeast Asia, Indonesia is still below Singapore, Malaysia and Thailand. Meanwhile, when compared to countries with a majority Muslim population, the scientific literacy ability of Indonesian students is still below Turkey, Iran, and Saudi Arabia. Based on Figure 2, it can be seen that more than 95 percent of Indonesian students are only able to reach the intermediate level, while nearly 40 percent of Taiwanese students are able to reach high and advanced levels. With the belief that all children are born equal, it can be assumed that the quality of test practice in Indonesia is not balanced with the quality of international tests. It should be noted that many factors determine the quality of education. Likewise, with the low average score of students' scientific literacy in Indonesia, of course there are also many factors that

influence it [20]. Without ruling out other factors, teachers are an essential factor in determining the quality of education, as Mc Kinssey said that "The quality of the education system cannot exceed the quality of the educators" [22]. Teacher is a determining factor in the creation of good and quality educational services, and it cannot be forgotten that what students learn is influenced by the way of teaching [22]–[24]. From this statement, it can be said that the low quality of science education, in this case students' scientific literacy skills, is largely contributed by the quality of science teachers.

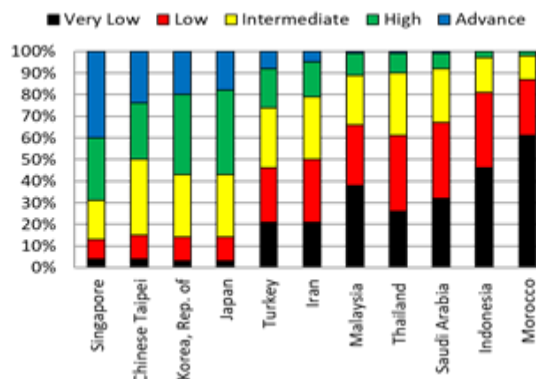


Figure 2. Graph of Comparison of Indonesia's Scientific Literacy Ability with Other Countries in Asia

The quality of science teachers is inseparable from the quality of pre-service science teachers' training. Pre-service science teachers must be prepared to have an in-depth understanding of science. In addition, pre-service science teachers are expected to have good scientific literacy skills so that they are ready to teach students and are able to shape their students with scientific literacy insight. Therefore, it is important to increase the competence of pre-service science teachers, including pre-service physics teachers, in scientific literacy skills. Preparing pre-service physics teachers who are scientifically literate is a big task for higher education in Indonesia [25], no exception in Lampung Province. In Lampung, there are several universities, both campuses with Islamic and non-Islamic educational backgrounds, which provide Science Education study programs, especially Physics Education. One of the visions of this study program is to produce professional and competent teachers, especially in the field of physics education.

Based on the results of the pre-study through the distribution of questionnaires and interviews with Physics Education students, it was found that students really wanted to become competent and professional teachers in the fields of physics and science. According to students, it is necessary for them to have an understanding of science or have scientific literacy skills. The response is further supported by the results of relevant research such as literacy of high school students is still mostly in low percentage [26] and scientific literacy in students are relatively different by gender [27]. Based on this, researchers are interested in examining the scientific literacy skills of students, in this case pre-service physics teachers on campus with Islamic and non-Islamic educational backgrounds.

Previous studies have analyzed various treatments to enhance scientific literacy. There are also study that described students' prior science literacy skills [28], analyze the scientific literacy skills of teachers and students, and how scientific literacy is trained in learning [24], explore students' scientific literacy skills on science concepts [4], and observing the achievement of scientific literacy skills in various aspects of scientific literacy [29].

However, it is important to analyze the scientific literacy level of college students as pre-service physics teachers. And the previously mentioned studies have not provided this information. So that this research is here to bring new findings that inform the literacy level of pre-service physics teachers from Islamic education campus backgrounds and pre-service physics teachers from non-Islamic campus backgrounds. From this research, we will look at the scientific literacy level of prospective physics teachers on campus with Islamic and non-Islamic educational backgrounds, especially in Lampung province.

2. METHOD

This research is a type of field research conducted through document review, tests, and observations [30]. The test is used to see the average score of science literacy ability of physics teacher candidates in Islamic and non-Islamic Education Universities. Document review and observation are used to find out more about the characteristics of the institution and to obtain conclusions that support the results of the tests.

The research population is all pre-service physics teachers who are currently studying in the Physics Education Study Program, both Islamic and non-Islamic Universities in Lampung Province. While the research samples were taken from two representative study programs, Physics Education from Universitas Islam Negeri Raden Intan Lampung (Raden Intan State Islamic University Lampung) as a representation of Islamic universities, and Physics Education from Universitas Lampung which represented non-Islamic education universities. The selected samples were 70 pre-service physics teachers, 35 from Islamic education campuses and 35 from non-Islamic education campuses. The distribution of the sample is prospective teachers who have studied at least 40 credits, where they have taken basic science courses (Basic Physics, Chemistry, and Biology).

The data collection technique used is a test instrument. Pre-service physics teachers were asked to work on scientific literacy questions. The test instrument used was a multiple-choice scientific literacy question, which consisted of 30 questions. These questions were constructively and substantially validated by experts. The questions are then presented through a google form so that respondents can easily fill it out.

To strengthen the research data through the scientific literacy test, documentation and observation studies were carried out on the curriculum of each study program. Documentation study aims to see the differences between each and what are its characteristics. Observations were made to verify and corroborate the study documentation.

The test results are then processed and the average score is calculated. The average score was made to compare the scientific literacy scores of pre-service physics teachers in Islamic and non-Islamic educational institutions. These results are then strengthened by the findings of the document study and observation. Broadly speaking, the research flow is shown in Figure 3.



Figure 3. Research Flow

3. RESULTS AND DISCUSSION

The total respondents in this study amounted to 70 people consisting of 10 men and 60 women. They were given a scientific literacy test in a google form. A total of 30 items are done in 100 minutes. Based on the results of the scientific literacy ability test, the following data were obtained.

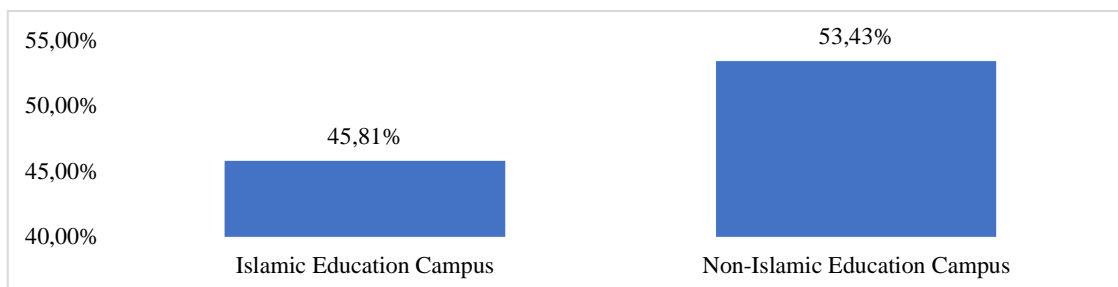


Figure 4. Average Score of Scientific Literacy on Pre-service Physics Teachers

Based on Figure 4, the average scientific literacy score for pre-service physics teachers from the Universitas Lampung, which represents non-Islamic education institutions, is 53.43. This score is higher than the score obtained by the pre-service physics teacher from UIN Raden Intan Lampung, a representative of Islamic educational institutions, which only scored 45.81.

The lower average score obtained by the pre-service physics teacher from the Islamic education university became the basis for conducting further investigations. The researcher then conducted a documentation study on the two study programs. The documents studied are accreditation forms, curriculum, and study program data in the Ministry of Research, Technology and Higher Education database. Based on the results of the document study, several interesting findings are summarized in the following comparison.

Table 1. Document Study Summary

Aspect	UIN Raden Intan Lampung Physics Study Program	Universitas Lampung Physics Study Program
Study Program Age	8 years	29 years
Accreditation Status	B	B
Lecturer to Student Ratio	1:45	1:26
Number of Doctors	2	7
Number of Professors	0	2
Number of Laboratories	1	3
Total number of credits for science courses	12 credits	15 credits

Based on Table 1, it can be concluded that there are many factors that cause the low value of scientific literacy skills obtained by pre-service physics teachers in Islamic educational institutions, including:

3.1 Study Program Age

Physics education study programs at Islamic university is still relatively young compared to non-Islamic university. Based on the document study, the age of the sample study program at the Islamic education campus is quite young, which is under 10 years old, in contrast to physics education study programs from non-Islamic education campus, which are close to 30 years old. Age factor has an influence on service and experience. So it can be concluded that the low scientific literacy value of prospective physics teachers in

Islamic education university is influenced by the age of the study program which is quite young.

3.2 Lecturer to Student Ratio

Based on the data, the ratio of lecturers to students on the Islamic education campus tends to be less than ideal. It can be seen that the number of lecturers in the physics education study program on Islamic campuses is still lacking, while the number of students is in excess. In contrast to the non-Islamic education campus where the ratio of lecturers to students is already considered ideal.

3.3 Quality of Lecturers

The number of lecturers who hold doctoral degrees in physics education study programs on Islamic education campus is still less than that of non-Islamic education study programs. The physics education study program at the Islamic education campus does not yet have professors. The quality of teaching staff affects the quality of teaching in the classroom. So this can also be considered as one of the factors for the low scientific literacy ability of pre-service physics teachers in physics education study programs at the Islamic education university.

3.4 Facilities

The laboratory is a must-have facility for physics education study programs. Based on the results of observations, the physics education study program from the sample non-Islamic education university has a fairly complete infrastructure and a fairly representative laboratory. Meanwhile, in the physics education study program at the Islamic education campus, the sample is still relatively incomplete.

3.5 Curriculum

Islamic education campuses have a different curriculum structure from non-Islamic education campuses. The difference lies in the more Islamic subjects. The number of Islamic courses has an impact on the elimination of important physics courses. The physics education study program has 3 basic science courses such as Basic Physics, Basic Biology and Basic Chemistry. Physics education study program at the Islamic education campus has a total of 12 credits consisting of Basic Physics 1 and 2 (3 credits each), Basic Biology 3 credits, and Basic Chemistry 3 credits. Meanwhile, physics education study programs on non-Islamic education campuses have a total of 15 credits consisting of Basic Physics 1 and 2 (4 credits each), Basic Biology 4 credits, and Basic Chemistry 3 credits. More credits on non-Islamic education campuses have an impact on the science learning process for prospective physics teachers to be better than Islamic education campuses. This is one of the factors for the higher scientific literacy ability of prospective physics education teachers in non-Islamic education campuses.

The overall data on scientific literacy skills on Islamic and non-Islamic education campuses shows a significant difference. In accordance with the purpose of this research, we want to see how far the scientific literacy ability of prospective teachers is seen from the basis of non-Islamic universities and Islamic universities. Judging from the factors that can affect the scientific literacy ability of pre-service teachers, several factors were found as follows. The age of the study program and the ratio of lecturers describe how the experience of the learning process occurs in building students' scientific literacy skills. In addition, the factors that affect the scientific literacy ability of pre-service teachers also come from the quality of lecturers, where teaching techniques and the use of materials that

train scientific literacy are very necessary so that pre-service teachers are trained to analyze, reason and get used to critical thinking [31]. Other external factors that also influence are the availability of teaching materials, access to learning, learning platforms, and a conducive learning environment related to facilities and infrastructure [32]. Other internal factors such as interest in learning, learning methods, and interest in reading can also influence [31]. Scientific literacy questions have long readings so that they require sufficient time to read and understand the questions with critical thinking, therefore internal factors originating from prospective teachers also influence.

Based on the information obtained from the results of research and analysis, solutions can be found to improve scientific literacy skills from several previous research literacy, by implementing strategies that connect to actual phenomena [8], support awareness of educators in conducting learning [33], procurement of supporting modules and teaching materials [9], [34], [35], use the right approach in teaching [3], and the support for facilities and infrastructure from the educational environment itself [36].

4. CONCLUSION

Based on the results of the study, it was concluded that the scientific literacy scores of pre-service physics teachers in Islamic educational institutions were still lower than those in non-Islamic educational institutions. Some of the factors that cause low scientific literacy skills in Islamic education campuses are the relatively young age of the study program, the quality of teaching staff, facilities and infrastructure that are not yet ideal, and the condition of the curriculum or the number of credits of courses that support scientific literacy are relatively few compared to physics education study programs. in non-Islamic education campuses. This research can be used as a reference for research that requires data on scientific literacy skills of pre-service physics teachers. However, this research is limited in the number of samples, so it is necessary to do research with more samples to represent the results of a wider study.

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