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Integration Of Digital Learning Media Based On Socio-Scientific Issues On Students' Literacy Abilities At School

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Abstract. This research is a quantitative study that aims to determine the effect of implementing digital learning media based on socio-scientific issues on students' literacy abilities. The sampling technique was carried out by purposive sampling where each class consisted of 30 students. The data collection instrument used was chemical literacy test questions. Before an instrument is tested on a research sample, it must be tested. The research results showed that the literacy skills of experimental class students who had been given digital learning media based on socio-scientific issues were better than students in the control class. The average percentage score for the experimental class was 97% with a very good predicate, while for the control class, the average percentage score was 63.33% with a fair predicate. Based on the results of normality and homogeneity tests, the research data is normally distributed and has the same homogeneous variance data. There are t-test results from student test results with a sig value. (2-tailed) = 0.000. This means that in this case the sig value. (2-tailed) 0.000 < 0.05, meaning that H0 is rejected and H1 is accepted, so in this study, it can be concluded that there is an influence of the application of digital learning media based on socio-scientific issues on students' chemical literacy abilitiesKeywords: keyword 1; keyword 2; keyword 3 (List three to five pertinent keywords specific to the article yet reasonably common within the subject discipline.)

Keyword: literacy abilities; digital learning and socio-scientific issues

1. Introduction

Education is the most important factor influencing human self-regulation and habitual behavior. Based on the National Education System Law No. 20 of 2003, the challenges of skills acquired in the 21st Century are closely related to natural science (science) and technology. Science and technology play a huge role in improving human welfare [1].

Education in Indonesia, especially the level of students' scientific literacy, is still relatively low compared to other countries. Based on the results of PISA (The Program for International Student Assessment) organized by the OECD (Organization for Economic Cooperation and Development) in 2015, students' scientific literacy in Indonesia was ranked among the 10 lowest countries of all PISA member countries, where Indonesia was ranked 62 out of 70 participating countries with an average score of 403 from the average PISA score of 500 (Research & Education, 2019). Then, in the 2018 PISA results for the science competency event, Indonesia was ranked 70th

out of 78 participating countries. With an average score of 396, this score is still far below the average score for scientific ability from various OECD countries set by PISA, namely 500 [2].

The increasingly rapid development of technology is becoming a new challenge in the world of education. The paradigm shift in learning practices from just presenting information has shifted to equipping students with the ability to find out and solve problems, digital literacy, and creativity. Changes in curriculum policy also result in changes to new learning models, strategies, methods, and media. The increasingly rapid development of technology has also become a new challenge in the world of education. A paradigm shift in learning practices, which initially only presented information has now shifted to equipping students with the ability to find out and solve problems, digital literacy, and creativity. Apart from that, technological developments have resulted in changes to new learning models, strategies, methods, and media. It is possible that in the 5.0 era society will have to get used to living side by side with technology, mastering and utilizing technology. For learning to take place effectively and efficiently, it is necessary to use technology in education (Permendikbud, 2022).

In the era of globalization and internationalization, especially in the fields of science and technology development, the government through the Minister of Education and Culture Nadiem Anwar Makarim said in his speech at the 2019 National Teachers' Day (HGN) event that he initiated the concept of "Free Learning Education". This concept is part of educational institutions in improving the quality of education and must be flexible towards freedom and openness as educational institutions that can play a real role and contribute to the benefit of the people, especially in the era of industrial revolution 4.0 and society 5.0. [3][4]. The Merdeka Curriculum is a program that is expected to be able to restore learning, which offers 3 characteristics, including project-based learning, soft skill, and character development by the Pancasila student profile, learning on essential material and a more flexible curriculum structure that follows developments in technology and communication science. The Merdeka Curriculum emphasizes the urgency of integrating learning with assessment. Teaching to achieve student success. There is equality felt in real form by students, teachers, and students working together to succeed. The use of technology can be a teacher's choice to implement differentiated learning in the classroom.

The development of information technology and communication science is currently progressing so rapidly that it is impossible to avoid it. One of the current technology-based learning media is the use of Augmented Reality (AR) media. The advantage of this augmented reality media lies in its attractive appearance because virtual 3D objects can be displayed as if they were in a real environment. The use of Augmented Reality media in learning can make the learning process more interactive, interesting, and creative. Assemblr Edu is an application that supports the media creation process with Augmented Reality technology. This program was created to support teachers and students in using three-dimensional materials that can be seen in real life through Augmented Reality. Another advantage is that learning materials are more advanced using current technological developments, thanks to AR it can be a solution to overcome modules or lack of facilities that schools have by looking at real elements, but in virtual form [5].

AR technology helps teachers add digital content with lots of information that can be displayed during learning. Digital information appears on the screen when scanning any object or place using a tablet, cellphone, or smart device with AR technology. The existence of AR media allows unlimited interaction between the two real and virtual worlds to be applied in learning to help students increase the interest presented and improve their cognitive learning outcomes in realizing superior quality human resources [6].

The quality of superior and competitive human resources is realized in students who have noble character and a high level of reasoning, especially in literacy and numeracy [7]. One of the literacies that students must have is scientific literacy. Scientific literacy is the scientific ability possessed by students so that they can solve various problems and explain various phenomena scientifically [8]. The scientific literacy built in this research is chemical because learning chemistry is one part of learning science, therefore learning chemistry is also the responsibility of students to achieve chemical literacy. Chemical literacy is a student's ability to recognize, analyze, and process chemical concepts to solve problems in everyday life and communicate scientifically every chemical phenomenon that occurs around them [9].

To optimize the chemical literacy perspective that sharpens the ability to understand scientific topics in everyday life, learning is needed that uses scientific issues. Socio Scientific Issues (SSI) describe social issues in society that are related to the conceptual, procedural, and technological context of science. SSI is usually used in learning to improve chemical literacy skills, conceptual and procedural social issues related to science, and have the possibility of rational solutions that are influenced by social aspects such as culture, politics, and ethics [10]. The application of SSI in learning is to direct students to develop solutions for various aspects of life, both from chemical, cultural, and moral aspects. The goal is to address social science problems in the study of natural sciences and encourage students to make choices or make decisions. Decision-making is important for the development of students' chemical literacy, which is the most important key to students' education as well as creating solutions to problems in everyday life [11].

Based on the analysis of these conditions, it is deemed necessary to carry out research, "Integration of Digital Learning Media Based on Socio-Scientific Issues on Students' Literacy Abilities in Schools".

2. Materials and Methods

This research will be carried out at SMA N 1 Peusangan, which will be carried out from June to August 2024. The type of research that will be used is Quasi Experimental research where there are two classes consisting of an experimental class and a control class. The sampling technique was carried out by purposive sampling where each class consisted of 30 students.

In the experimental class, students will be taught using Digital Learning Media Based on Socio-Scientific Issues, and in the control class, students will be taught using expository learning strategies. The data collection instrument used was chemical literacy test questions and the data collection technique was carried out by providing literacy test questions. Hypothesis testing was carried out on pretest and posttest data. Hypothesis testing on post-test data is used to see whether there is an influence of Digital Learning Media Based on Socio-Scientific Issues on students' scientific literacy abilities, with the following hypothesis:

H0: There is no influence of Digital Learning Media Based on Socio-Scientific Issues on students' chemical literacy abilities

H1: There is an influence of Digital Learning Media Based on Socio-Scientific Issues on students' chemical literacy abilities

If the p-value (Sig. 2-tailed) > 0.05, H0 is accepted and H1 is rejected.

If the p-value (Sig. 2-tailed) ≤ 0.05, H0 is rejected and H1 is accepted.

3. Results and Discussion

This research aims to determine the effect of implementing digital learning media based on socio-scientific issues on students' literacy abilities. The influence of the independent variable, namely the application of digital learning media based on socio-scientific issues, on the dependent

variable, namely chemical literacy, can be determined by using data from the posttest scores, namely chemical literacy questions. The average calculation can be made in Figure 1 as follows:

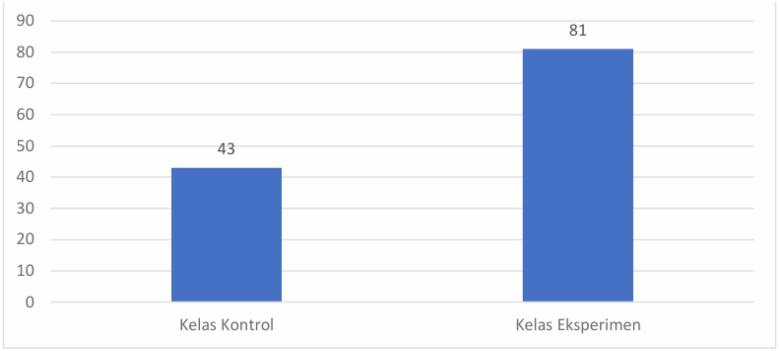

Figure 1. Average student posttest scores

Based on Figure 1 above, learning outcomes when viewed from the cognitive aspect of students, there is an average posttest score for the experimental class of 81 and the control class of 43. It can be concluded that the average learning outcomes for the experimental class are higher than the average learning outcomes in the class Control.

In this research, the literacy test was carried out by giving test questions to students to measure the students' scientific literacy abilities. Student answers will be assessed according to the assessment rubric that has been determined. The score obtained is calculated as a percentage value. The following is a classification table of assessment results:

Table 1. Classification of Assessment Results

Skor	Information
75 < X	Very good
58,333< X ≤ 75	Good
41,667 < X ≤ 58,333	Enough
25 < X ≤ 41,667	Not enough
X ≤ 25	Very less

Based on the data obtained from the results of this research, researchers found that the total scores for the experimental class were better compared to the control class, which on average only got a sufficient percentage. The following is a percentage diagram of the values:

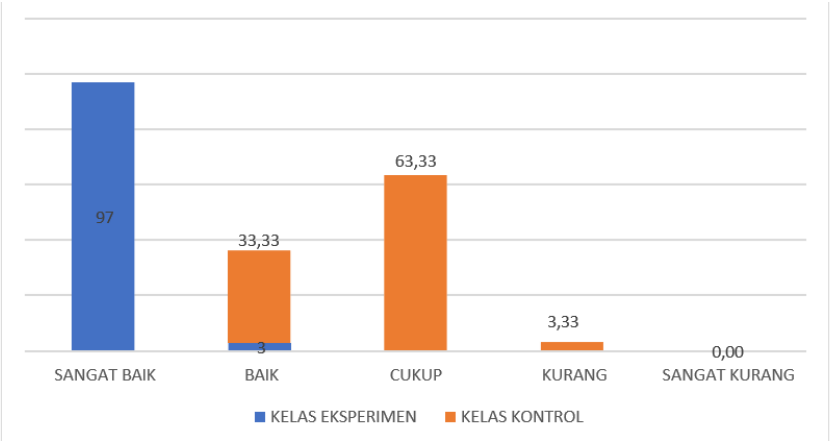

Figure 2. Percentage Diagram of Chemical Literacy Test

Based on the diagram above, the literacy skills of experimental class students using digital learning media based on socio-scientific issues are better than students in the control class. The average percentage score for the experimental class was 97% with a very good predicate, while for the control class, the average percentage score was 63.33% with a fair predicate.

In this study, two research groups were used with different treatments. There are two classes involved in this research, the first is the experimental class where this class applies digital learning media based on socio-scientific issues and the second is the control class which does not receive strategies. Based on the data that the researchers obtained and processed using SPSS version 21, shows that the two sample group data are normally distributed and homogeneous. This shows that class selection comes from a normal and homogeneous population.

Before testing the instrument, researchers validated each question item. After carrying out the validity test, the researcher carried out an instrument reliability test which aims to determine whether or not the research instrument that has been created is reliable. Based on the calculated test results, it states that the research instrument that has been tested is reliable because r11 > table, namely 0.821 > 0.444 with reliable criteria.

Instruments that have been declared valid and reliable are then tested for their level of difficulty. Based on the research that researchers have conducted, of the 10 questions that have been tested, there is 1 question in the difficult category, 5 questions in the medium category, and 4 questions in the easy category. Next, the researchers carried out a test of the different powers of the questions. The calculation of differentiating power is a measurement of the extent to which a question item can differentiate students who have mastered the competency from students who have not mastered the competency. Discriminating power can be determined by looking at the size of the item discrimination index [12]. The discriminating power of each question aims to determine the influence of each question item in differentiating between students who have good literacy skills and students who lack literacy skills [13]. Based on the different power tests of 10 questions, there are 6 questions in the good category, 1 question in the sufficient category, and 3 questions in the low category.

After carrying out the validity test, reliability test, difficulty level test, and question power test, 6 questions were declared valid and reliable. Then the six questions were tested on students. Then the normality test was carried out using the Shapiro-Wilk test technique using SPSS version 21 software. Based on the normality test, the test results obtained a significant value in the control class of 0.436 and the experimental class produced a significant value of 0.228. The test requirements, it is taken based on the probability value, namely sig > 0.05, so the data is declared normal. So it can be concluded that the control class has a significant value of 0.436>0.05 so the data obtained is normally distributed and the experimental class has a significant value of 0.228 so the data is also normally distributed.

Next is the homogeneity test to find out whether the data tested is the same or homogeneous. In this test, post-test data is calculated using the Oneway test. Anova Based on the results of the students' posttest, homogeneity test results were obtained with a significance value of 0.390, which is based on the provisions of a significance value > 0.05. From this test, the significance value is 0.390 > 0.05, so it can be concluded that the two classes, namely the experimental class and the control class, have the same or homogeneous variance. After carrying out several data tests, there is a chemical literacy test which is carried out by giving test questions to students to measure the students' scientific literacy abilities. From this research, the total scores for the experimental class were better compared to the control class, which on average only got a sufficient percentage. The percentage of scores obtained from the experimental class was that 97%

of students could answer very well, while the control class averaged a score of 63.33% with sufficient criteria. From these results, it can be concluded that experimental class students who have applied digital learning media based on socio-scientific issues are better than students in the control class.

Based on the t-test results data on the students' chemical literacy test results, there is a sig value. (2-tailed) 0.000 < 0.05 so H0 is rejected and H1 is accepted. From these data, it can be concluded that there is an influence of the application of digital learning media based on socio-scientific issues on students' chemical literacy abilities. The influence of implementing digital learning media based on socio-scientific issues can be seen from the average score of students who study using SSI learning strategies compared to students who study using conventional strategies. This can happen because the five stages of implementing digital learning media based on socio-scientific issues can stimulate students' curiosity and critical thinking about scientific issues and social problems that occur in everyday life.

The application of digital learning media based on socio-scientific issues makes students more active and think critically because students are at the core of learning. In stage 1 (problem analysis) students are given examples of pictures of social scientific problems related to social issues around them. This stage succeeded in making students think and solve problems related to social issues around them by increasing scientific literacy, especially in chemistry lessons. In stage 2 (Clarification of The Science) Educators help students understand social issues and problems from a scientific perspective based on the theories they have studied. Educators only act as facilitators in the learning process where students are required to be able to understand directly the science issues around them. In stage 3 (Refocus on the Socio-Scientific Dilemma) students focus on observing the picture and thinking about what problems could arise and create controversy. The next stage (Role Playing Task) at this stage students are formed into several groups to discuss the social problems that have been given. Then each group presented the results of their discussion. Stage 5 (Meta-Reflective Activity) is the final stage in using this strategy where students can reflect on experiences which are then linked to the issues discussed and their relationship to science.

By using digital learning media based on socio-scientific issues, all students are actively involved in the learning process. So, not only one or two people are active but all students can play an active role in the learning process. All students can think and identify scientific and social problems that exist in their daily lives. The results of this research are in line with the results of research conducted by [1] which shows that there is an influence of the application of Socio Scientific Issues on students' Scientific Literacy Ability. The research conducted by [11] concluded that learning based on socioscientific issues can optimize literacy aspects in chemistry learning.

4. Conclusions

Based on the results of the research and discussion, it can be concluded that digital learning media based on socio-scientific issues influences students' critical thinking.

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