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Implementation of Photonovel Media to Promote Student Literacy Science

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Abstract: Science and technology in the 21st century is developing very fast. This requires qualified, reliable, and globally competitive human resources. One of the skills needed in the 21st century is literacy science. This study aims to promote literacy science by using Photonovel as a medium. This type of research is an experiment with the One-Group Pretest-Posttest Design model. The research sample was 21 students of class VIII of SMP Kasatrian 1 Surakarta. Data collection methods used are tests, questionnaires, documentation, and observation. Data analysis was done descriptively and inferentially. The results showed an increase in students' scientific literacy skills in the high category, the average gain test included in the medium criteria, which was 0.8. Based on the explanation above, the use of the Photonovel media can improve students' Literacy science.

Keywords: Literacy Science; Photonovel; Learning Media

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Introduction

The 21st century causes rapid development in various aspects of human life, one of which is science and technology. Learning in schools through science learning is expected to develop students' abilities in dealing with science and technology advances through science literacy learning. Scientific literacy is part of the knowledge and understanding of scientific concepts and processes needed by a person to make cultural and economic productivity (Jurecki & Wander, 2012). Furthermore, scientific literacy can support the operation of problem-solving skills personally and socially. Therefore, the importance of scientific literacy is emphasized on every individual. Every individual must have scientific literacy, including scientific knowledge, scientific process skills, and scientific attitude (Fonseca et al., 2011). The development of scientific literacy is significant because it can contribute to social and economic life and improve decision-making skills at the community and personal levels. A statement reinforces that someone who has scientific literacy skills can solve problems using scientific concepts and positively impact his social life (Lederman et al., 2013).

Scientific literacy is the ability to use knowledge, identify questions, and draw conclusions based on evidence to understand and make decisions regarding nature and the changes made to the heart through human activities (Kristyowati & Purwanto, 2019). Based on the results of the PISA (Program for International Student Assessment) study on scientific literacy conducted every three years, it was revealed that the scientific literacy of Indonesian students in 2015 was ranked 64th out of 75 countries (Rokhmah et al., 2017). This illustrates that Indonesian students' ability to compete at the international level still needs to be improved. Even in the last few periods, Indonesia has been in a position below other country. This shows that students' scientific literacy skills in Indonesia are still deficient compared to other countries.

The low level of understanding is caused by a sense of science learning which causes students to have not yet perfected the formation of students' scientific literacy

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that the teacher understands (Fonseca et al., 2011). The content aspect is caused by the science learning process, which is still focused on rote memorization so that students do not know what they are learning but only memorize. The student's activity only listens to the teacher's explanation, not being involved in the learning process. On the other hand, scientific literacy's teaching and learning phase require contact, curiosity, elaboration, decision making, and contextual phases (Yuenyong & Narjaikaew, 2009).

Many factors can affect the low scientific literacy of students. One of the factors that cause the standard ability of scientific literacy is the selection of learning media. The low level of scientific literacy of students directly and closely related to students is teaching media. In Indonesia, science literacy in science learning is still limited mainly to textbooks or texts rather than direct learning (Rahayu, 2018). So, it can be concluded that science literacy learning is more teacher-centered, and the method used by the teacher is also not far from the lecture method. This causes science lessons to feel heavy and dull, which students do not understand learning. Knowledge and application of scientific literacy that only relies on textbooks or texts have not fully touched students' souls. The lecture method used is also less relevant, which causes students only to become passive listeners. If this is continued, later students will not be able to compete in the 21st-century era (Marks & Eilks, 2009).

The use of learning media in the teaching and learning process can generate new desires and interests, create motivation and stimulation of learning activities, and even bring psychological effects on students (Widyaningrum & Prihastari, 2018). One of the characteristics of learning media is that the media contains and carries messages or information to the recipients, namely students. Therefore, it is necessary to design and develop a learning environment that can answer and meet the needs of classical learning by preparing learning activities with effective media. One of the readings that students are interested in today is comics (Rahayu, 2018). Most students prefer reading comics compared to textbooks. Comics are print media that combine text with images based on a storyline. However, the use of this comic media has a weakness, namely not all teachers can make comics, it takes a long time to make, and comic designs are imaginative and far from the daily lives of students so that new innovations are needed in the form of learning media that are almost like comics, namely Photonovel. Photonovel as are media that resemble comics or illustrated stories, using photographs instead of illustrations (Mareta et al., 2020). Photonovel is a visual media that has general characteristics, which are easy to make yourself, inexpensively, according to students' emotions, easy to prepare and use, very practical to maintain and the theme of this media is lifted from the actual conditions of students with the intention that students understand it more easily. Based on the existing problems, research needs to be done to improve the Literacy of Science students through appropriate learning media (Astuti, 2017).

Method

The research design used was Pre-Experimental Design with One-Group Pretest-Posttest Design model. This design can be described as follows:

Table 1. One-Group Pretest-Posttest Design

Pretest	Treatment	Posttest
O_1	X	O_2

O_1 = Pretest value before being given Treatment
O_2 = Posttest value after receiving treatment
X = Treatment by applying the learning process using Photonovel media

The population in this study were all eighth-grade students of Junior High School Kasatrian 1 Surakarta. Sampling was done by simple random sampling technique. Based on the simple random sampling technique, in this study, students of class VIII A were selected as the research sample, of which 21 students opened. Students are given a pretest and posttest consisting of 20 multiple-choice items. In addition, a questionnaire was distributed to students at the end of the lesson to collect students' opinions about the Photonovel media. Data collected by N-gain then analyzed descriptively and inferentially

Result and Discussion

This research was conducted on science learning material on the digestive system using photonovel as a medium. Learning begins with problem-solving activities, which are presented in the form of a photonovel. The study results showed that the Photonovel media could increase students' knowledge literacy in the learning carried out in the research sample class. This can be seen from comparing the research sample's pretest and post-test results, which are described in Table 2.

The increase in Science Literacy by using the photonovel learning media occurs because students get new experiences in receiving material. The results showed that students' pre-test and post-test scores increased by 30, with an average pre-test score of 52.5 while the post-test average score was 82.5. The following is a Figure 1 of the increase in the Science Literacy score.

Table 2. The Achievement Students' Science Literacy

Description	Pretest	Posttest
Highest Value	75.00	85.00
Lowest Value	40.00	75.00
Nilai Rata-Rata	52.00	82.50
Standard deviation	12.00	8.40
N Gain Average	0.81	
The number of students	21.00	

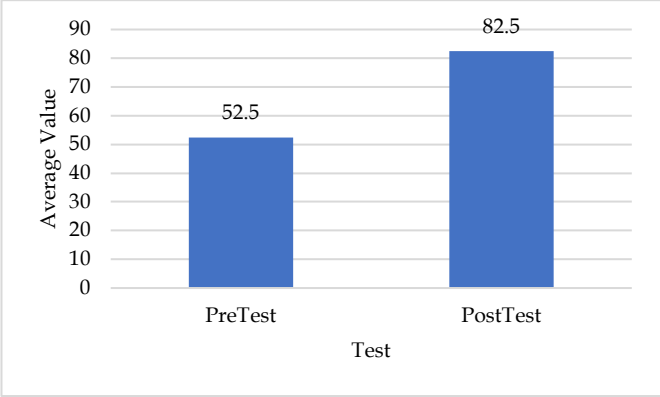

Figure 1. Graph of Science Literacy average score

The results showed an increase in scientific literacy in the high category with an average N-gain of 0.81%. The posttest value after being given treatment using the Photonovel learning media was higher than the pretest value. The application of teaching media using Photonovel during the learning process makes students more interested and easily understand the material. This is because learning the digestive system in Photonovel has explained its working steps systematically according to the existing learning objectives. Photonovel media also shows the digestive process that occurs in the human body from beginning to end. In this case, the teacher provides knowledge to students and facilitates students to build their knowledge in thinking independently. Students' scientific literacy skills can be trained in the science learning process, which provides opportunities for students to construct their understanding.

The achievement of scientific literacy according to the content/matter of science is shown in Table 3. Based on the table, all science materials show that the achievement of science literacy on the pretest is lower than the post-test. The highest achievement value of scientific literacy is in the fabric of science and technology. After finishing learning, the science literacy score increased significantly, with the highest score in science and technology material at 88 at the post-test and the lowest at Chemical Changes at 70. The lowest post-test score was obtained in the chemical change material because junior high school students were still unfamiliar with chemistry. Scores of scientific literacy results based on scientific indicators such as identifying scientific problems, explaining scientific phenomena, and using scientific evidence are shown in Table 4.

Table 4 shows the increase in science literacy scores for all indicators. The highest posttest score was obtained on the arrow of identifying scientific problems with a score of 85.00. In contrast, the lowest posttest score was obtained on the hand explaining scientific phenomena. Getting the lowest score in the indicator explaining phenomena can be because students are not accustomed to critical thinking, scientifically arguing based on their knowledge.

Table 3. The Achievement of Science Literacy in Science Materials

Science Materials	Pretest	Posttest
Health	60.00	85.00
Environment	55.00	80.00
Chemical Changes	40.00	70.00
Science and technology	60.00	88.00

Table 4. Recapitulation The Measurement Results Based On Indicators Of Science Competence

Indicator	Pretest	Posttest
Identify scientific issues	50.00	85.00
Explain phenomena	45.00	75.00
Use scientific evidence	40.00	80.00

Photonovel media is one of the learning media in the form of illustrated stories (Rahmawati et al., 2020). It can encourage students to find solutions to problems and their thinking skills in achieving learning goals. This learning is also oriented to students and the teacher only as a facilitator. With the application of the photonovel media, students receive knowledge from what is transferred by the teacher. They can provide new ideas for problems based on the images supplied through the photonovel media(Windayani et al., 2019).

Science learning in this study utilizes photonovel media combined with problem-based learning strategies. The first step in this research is to orient students to the problem by using photonovel as media. At this stage, the teacher focuses students' attention on the problem by providing an environmental problem through the media of photonovela (Brown et al., 2013). Where at this stage the role of students is to pay attention to problems and identify scientific issues. The second stage is to organize students to learn, the teacher prepares teaching materials where the picture of the problem is presented in photonovela media so that students can express various kinds of arguments in the learning process according to the problems that have been given in groups (Fonseca et al., 2011). The third stage is guiding the investigation, the teacher guides students in completing student worksheets. The fourth stage is developing and presenting the work, students present the results of their discussions about natural phenomena. The fifth stage is analyzing and evaluating problem solving, the teacher evaluates the results of student discussions. With the application of the

photonovel media, several advantages were found, namely students could find concepts which would later be summarized into a conclusion so that students' critical thinking skills would be trained and developed (Jong et al., 2008). In addition, it can provide context for understanding texts and help weak students find the concept of solving a problem, identifying scientific issues, explaining scientific phenomena, and applying scientific evidence. However, the use of this photonovel media requires the teacher's creativity to develop it so that learning will be more optimal (Clark, 1994).

Conclusion

In this study, it can be concluded that the photonovel media has promoted scientific literacy in science learning material on the digestive system. The findings in this study show that Media photonovel can improve students' scientific literacy. The results of the score, the achievement of students' scientific literacy is included in the high category. The highest scientific literacy ability in identifying scientific problems, and the lowest is in explaining scientific phenomena.

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