Development of e-LKPD Based on Nyeruit Ethnoscience to Train Science Literacy on Additives and Addictive Substances

Yustina Retno Kusuma Wardani(✉), Sunyono, and Viyanti

Educational Science, Lampung University, Bandar Lampung, Lampung, Indonesia
yustina.retno01@gmail.com, {sunyono.1965, viyanti.1980}@fkip.unila.ac.id

Abstract. This study aims to develop an e-LKPD Based on the Nyeruit Ethnoscience, to describe its validity, practicality, and effectiveness to train Science Literacy on additives and addictive substances. Research and Development (R&D) is used as a research method based on Thiagarajan's four-dimensional model (Define, Design, Develop, Disseminate). 30 students participated as research subjects. Questionnaires were used to obtain validation data, learning practices, student response tests, and teacher responses. Efficacy is measured by pretests and posttests. The data analysis method used SPSS 24.0. As a result of this research and development, the development of an e-LKPD based on Nyeruit Ethnoscience has proven the effectiveness of the materials and media with a very high category of 84.7%. The utility of e-LKPD reaches 91.1% which is a very high standard. The effectiveness of the e-LKPD in teaching science literacy to students in the experimental class achieved a mean N-gain of 0.72, which was highly rated compared to the control class. The average N-gain is 0.54, indicating a moderate rating. Therefore, the development of an ethnoscience-based e-LKPD provides a large category effect size for improving students' science literacy.

Keywords: e-LKPD · Nyeruit · Ethnoscience · Science Literacy · Additives and Addictive Substances

1 Introduction

The existence of the 21st century will be shaped by the era of Industrial Revolution 4.0, making the 21st century the century of openness or the century of globalization. At the moment, Indonesia has entered and is about to enter the era of Industrial Revolution 4.0. 21st century development requires a competitive workforce (HR), and HR must meet these requirements. As such, the curriculum was gradually developed in 2013 with updated applications to support the learning process [1]. Learning in the 2013 curriculum is learning that prepares students to be productive, individual, proficient and literate [2]. Scientific literacy is the ability to use scientific knowledge, formulate questions, and draw conclusions from facts and phenomena [3]. Scientific literacy includes her three main competencies: 1) explaining scientific phenomena, and 2). Interpretation of data and scientific evidence 3). Draw or evaluate conclusions [4].

R. Perdana et al. (Eds.): ICOPE 2022, ASSEHR 746, pp. 159–166, 2023.
https://doi.org/10.2991/978-2-38476-060-2_16

On the ground, Indonesian students have very little basic scientific knowledge. This is according to the 2018 PISA (International Student Assessment Program) data released in 2019. Indonesia ranks 70th out of 78 countries, or 396 out of 8 countries with low literacy rate, with an average score of 500 [5]. The low scientific literacy capacity of Indonesian students is usually caused by learning activities that are not directed at developing scientific literacy [6]. Therefore, teachers should train students in basic science teaching skills [7]. Scientific literacy can be trained by making the culture and ethnoscience of the community the source of learning [8, 9].

Ethnoscience is the original knowledge of the local culture that is traditional and hereditary [10]. Ethnoscience is also defined as learning that can design students' experiences and integrate parts of culture as a process of student knowledge [11]. Learning that links community culture with scientific knowledge is very important because it can change community knowledge that is hereditary into reliable and accountable knowledge [12–14] One of Indonesian culture that can be associated with scientific knowledge is the nyeruit culture.

Nyeruit is a tradition that belongs to the people of Lampung Province. "Nyeruit" is a term people call when eating together sambal seruit (sambal terasi and sambal tempoyak) [15]. Sambal terasi is a chili sauce that uses shrimp paste as the main ingredient. Terasi is a processed product from the fermentation of rebon shrimp and is used as a food additive that functions as a flavor enhancer (Additive Substance) [16]. Learning resources in ethnoscience learning can be implemented with the help of teaching materials. One of the teaching materials that can be used is the Student Worksheet [17].

The Student Worksheet (LKPD) is a worksheet that serves as a learning resource to support the student's learning activities and contains procedures, information and concepts given to the student [18]. Over time, LKPD may experience innovations related to presentation, one of which will be incorporated into an electronic medium or technology known as electronic LKPD (e-LKPD) [19]. Of course, the development of e-LKPD can also support modern learning by developing multimedia learning as an essential tool. Using e-LKPD in learning influences students' learning activities, makes learning more fun, makes learning interactive, gives students opportunities to practice their skills, and motivates students to learn [20].

Based on a preliminary survey of 10 science teachers from 5 public secondary schools in Regency East Lampung, teachers had learned the importance of developing students' science skills in science learning, but most teachers, has been shown not to be taught literacy in science-trained classrooms. There are still few teachers who are familiar with ethnic science. Also, most of the teachers who used the LKPD said that her LKPD was downloaded from the internet rather than created by herself. Her LKPD used is also not in the form of an electronic student worksheet (eLKPD) that can be easily accessed anytime and anywhere. The worksheets used are also not based on ethnoscientific research and do not train students in basic science education. Therefore, there is a need to develop an ethnoscientific e-LKPD [21]. Based on observations of 25 students, we know that their scientific literacy is still low. This is reflected in the science literacy entrance exam results, which are below the average PISA 2015 assessment target. The learning process is still completely dependent on the teacher. Students are not independent to learn about the science material they are studying and to seek additional information, so students

are highly dependent on the teacher's role in the classroom. Accordingly, it is one of the initiatives that can apply autonomy to student learning in order to improve the quality of student learning. Therefore, choosing the right teaching materials is very important for teachers. The e-LKPD was selected as an excellent teaching material, especially for developing an ethnographic e-LKPD.

2 Research Methodology

The research was carried out in a research and development (R&D) concept related to the 4D Thiagarajan model [22]. A 4D model consists of definition, design, development and distribution. Thirty students were included in the study. Pre- and post-tests were used as exploratory measures. Questionnaires were used to obtain validation data, learning practices, student response tests, and teacher responses. Efficacy is measured by pretests and posttests. Data analysis methods used the Statistical Package for Social Sciences (SPSS 24.0).

3 Result and Discussion

The results of this study focused on the development of teaching materials in the form of e -LKPD based on ethnoscience, to train junior high school students' scientific literacy on additives and addictive substances, which are presented in Fig. 1.

The researcher designed the e-LKPD for ethnoscience-based science learning based onadditives and addictive substances which began with the design of the parts in the e-LKPD which consisted of an introduction, content and closing part based on the story board design that had been made. The explanations for each of these sections are as follows: 1) The introduction section consists of cover, instructions for using e-LKPD, concept maps, e-LKPD identity (basic competencies, indicators of achievement 2) The content section consists of learning activities 1 containing about ethnoscience draws on additives and addictive substances, the learning stages use discovery learning; 3) The closing section consists of a bibliography and author profile.

The results of this stage, the authors packaged in the initial product draft I e-LKPD based on ethnoscience, then validated by material experts and media experts. The validation stage really needs to be done to determine that the eLKPD is feasible or not to

Fig. 1. Ethnoscience-Based e-LKPD Development Results

Table 1. Validation Results by Experts

Validation	Rating Result	Category
Material Expert	78,3%	Valid
Media Expert	91,2%	Very Valid
Total Score	169,5%	
Average	84,7%	Valid

be used as a learning support because e-LKPD is a learning tool that has an important function in achieving a learning goal [23]. The presentation of the validation results of the experts is presented in Table 1.

Based on Table 1, it shows that material experts give an assessment of the development of ethnoscience-based e-LKPD with a percentage of 78.3%. While media experts gave an assessment of 91.2%. So it can be concluded that the average score of the assessment of the development of ethnosciencebased e-LKPD reached 84.7% with a very high category. In other words, this e-LKPD is categorized as suitable for use with improvements. These results were obtained from several aspects of the assessment, including the suitability of content, clarity of material and convenience, suitability of simulations, images, and videos, display of e- LKPD, clarity of instructions and ease of use. Suggestions and input on the material validation process by experts, in order to improve the e-LKPD product so that later it is hoped that the e-LKPD produced is suitable for use and makes students interested in using this e-LKPD. As for suggestions or input from the validator, namely to make icons that characterize Lampung culture, uniform font sizes, and pictures taken directly based on the surrounding environmental conditions so that they look more real.

In addition, experts recommend conducting experiments in small groups for maximum results. The survey was conducted on her 10 respondents. A limited test of the e-LKPD product achieved an average score of 3.64 among 10 respondents, which is very good in this category. In addition, a test effectiveness analysis was conducted using the Social Science Statistics Package (SPSS 24.0) to determine student reading comprehension. The results of the validity test show that r count > r table (0.631), the significance level of this validity test is 5%, so the 20 tests of scientific literacy are included in the valid criteria. This indicates that the entire question can be used for further investigation and processing. The reliability test results showed that Cronbach's alpha value (0.98) places the test in the highly reliable category. Therefore, we can conclude that the instruments for testing scientific literacy are either highly reliable or highly reliable.

Meanwhile, to measure the practicality of the e-LKPD, three categories were applied, namely the implementation of learning using eLKPD, student responses and teacher responses to e-LKPD. All three use descriptive analysis. The product implementation test is assessed from several aspects of the activity, namely the implementation of learning, the implementation of the social system, and the implementation of the reaction principle. The results of the product implementation test can be seen in Table 2.

The results of the recapitulation test of the practicality of data analysis on ethnosciencebased e-LKPD products according to Table 2, shows that the implementation of learning e-LKPD obtains a percentage value of 90.3%, teacher responses 92.5%,

Table 2. Recapitulation Results of Practical Data Analysis

Assessment Aspect	Average Value
Implementation of *e*-LKPD Learning	90.3%
Teacher's Response	92.5%
Student Response	90.6%
Average Percentage	**91.1%**
Criteria	**Very Practical**

and teacher responses 92.5%. This means that the overall practicality test results for ethnoscience-based e-LKPD products meet the very high criteria (very practical). The results were reviewed from several aspects, namely the attractiveness, usefulness and readability of the use of e-LKPD, the authors distributed questionnaires to 30 students, and gave 17 statements to the teacher. This teacher response questionnaire was given to the science teacher who became the writer's partner during the field test. Based on these results, this condition is in line with the research of Kurniawan & Syafriani (2021) [24] which states that teaching materials that can be said to be practical are teaching materials that are easy to use or in the form of the teaching materials themselves. The teaching materials themselves can be in print and in electronic or digital form. Then the final stage of product development is a development test (Develop Stage) which is implemented on 30 students. The variable tested in the use of ethnoscience-based e-LKPD is the students' scientific literacy ability.

The effectiveness of the e-LKPD can be measured based on science literacy learning outcomes through pre-test and post-test results built on the Science Literacy Index. Table 3 shows the results of an analysis of the achievement status of each indicator for science literacy issues.

Three indices that assess the ability test of basic science literacy show different values between students in the experimental class and those in the control class. It can be seen that the experimental class has higher ability in science literacy than the control class. Indicators that explain the phenomenon show higher increases in the experimental class, indicators of interest and evaluative conclusions show higher increases, followed by the lowest indicators that interpret the data and scientific evidence. On the other

Table 3. Recapitulation of Achievement of Each Scientific Literacy Indicator

Scientific Literacy Indicator	Average (%)	
	Control Class	Experimental Class
Explaining the phenomenon	41.6	49.1
Interpreting data and scientific evidence	37.7	38.1
Draw or evaluating conclusions	25.2	48.3

hand, indicators for explaining scientific phenomena showed the highest increase in the management class, followed by indicators for interpreting scientific data and evidence, followed by indicators for drawing and evaluating conclusions, and scientific literacy. Was the smallest increase. According to (bagiarta, 2015) [25], motivation to learn also influences students' basic science education. Students in the experimental class used more interesting materials and supporting media than in the control class, so they were more engaged and motivated in the learning process. Science literacy test results for these three indices in the experimental class showed an increase in N-gain of 0.72 for high ratings compared to the control class with an N-gain of 0.54 for moderate ratings. This condition makes it clear that the use of the ethnographically based e-LKPD on toxicants and addictive substances can be effectively used to improve students' basic science education. This is consistent with (Khoiriyah et al., 2021) [26], where learning through an ethnoscientific approach provides students with new knowledge, recognizing that science is closer to their daily lives, thus helping students It can increase the learning motivation of A mix of cultures in learning helps students understand the material more easily [27].

Influence effect size values between experimental and control classes based on the above data. The effect size value for the experimental class is 0.98 for the large effect category and the effect size value for the control class is 0.92 for the large effect category. Category. Computed size of the experimental class indicates that improvement in student science literacy is influenced by the use of ethnoscience-based e-LKPD, but by conventional learning in the control class. The results of efficacy and effect size studies showed that e-LKPD learning based on the ethnography of the sciences conducted was effective and had a significant impact on improving the science literacy of students. This is consistent with research findings (Putri et al., 2022) [28] that integrating ethnoscience into learning can improve learning outcomes compared to conventional learning. In addition, learning through the integration of ethnosciences can lead to student satisfaction because learning takes place with the involvement of higher-order thinking activities [29]. Based on ethnoscience, the e-LKPD is designed to address real-world problems to help students solve problems, thus increasing students' motivation to learn. This corresponds to the opinion [30] that problem-solving skills as a form of problem-solving can be improved through the use of appropriate teaching materials.

4 Conclusion

The ethnoscience-based e-LKPD is designed to train scientific literacy on valid additives and addictive substances with a very high category, practical with very high criteria, and effective with a high category accompanied by an effect size value with a large effect category.

Acknowledgment. Thanks to the organizers of the International Conference of Progressive Education (ICOPE), the authors have the opportunity to submit articles and contributions to this conference. Furthermore, the author conveys to Pro.Dr. Sunyono, M.Si and Dr. Viyanti, M.Pd who has supported and provided the best guidance in completing this thesis, so that the author can participate in writing this article. The authors also thank all those who helped in the completion

of this article. Finally, I hope this article provides benefits and insights to readers, and can be a source of reference for further research.

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