The Developing of e-Module Flip Pdf Professional Based on *Napai* Ethnoscience to Improve Science Literacy on Biotechnology Materials

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Abstract. This study aims to develop a Professional Flip Pdf e-Module Based on the *Napai* Ethnoscience, to describe its validity, practicality, and effectiveness, to improve Science Literacy on Biotechnology materials. Research and Development (R & D) is used as a research method refered to the 4-D model (Define, Design, Development, and Disseminate) by Thiagarajan. 32 students were involved as research subjects. The questionnaire sheet was used to obtain validation data, the implementation of learning, students' response tests and teacher's response. The effectiveness measurement is done by giving pre-test and post-test. The data analysis technique used SPSS 24.0. The result of this research and development shows that e-module development based on Napai's ethnoscience proves the validity of the material and media by 84.7% with a very high category, practicality reaches a value of 95% with very high criteria. The effectiveness of the e-module to improve students' science literacy in the experimental class obtained an average N-Gain of 0.73 with a high classification compared to the control class with an average N-Gain of 0.40 which indicated a moderate classification. In this way, the developing of ethnoscience-based Professional Flip Pdf e-module has provided an effect size with a large category to improve students' science literacy.

Keywords: Professional Pdf E-Module · Napai Ethnoscience · Science Literacy · Biotechnology

1 Introduction

An ethnoscientific approach to learning is learning that combines local culture, indigenous knowledge, and scientific knowledge. Indigenous knowledge is a form of ethnological research in which knowledge comes from communities [1]. According to [2], the knowledge of local wisdom and cultural values that we possess should be preserved and passed on to our students. can.

Moreover, the concept of ethnoscience itself, when associated with elements of learning, shapes the character of students who understand scientific literacy. So far, it is known that the Indonesian student's science literacy performance from 2000 to 2018 is

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still in the low category as the results achieved are below her PISA average completion score. increase. This indicates that Indonesian students did not understand the concepts and processes of science and could not apply the scientific knowledge they learned to their daily lives. The low scientific literacy capacity of Indonesian students is generally due to the lack of learning activities aimed at developing scientific literacy. This is caused by several factors such as: B. The state of school infrastructure, school staff, and school administration [3]. This concept is also maximized when ethnoscience is combined with more modern learning using electronic media [4].

One of the media that supports electronic-based learning is possible by using electronic modules or commonly known as e-modules. Through e-modules, learning can give an impact on students' scientific literacy skills. This is in line with research [5] which initiated the application of an Ethnoscience-based science module to train students' science literacy, which has a better literacy rate than learning without applying an Ethnoscience-based science module. Then [6] gave an opinion that the results of implementing learning using integrated science teaching materials ethnoscience of smoking fish, were proved to improve students' science literacy compared to using BSE textbooks. This concept is in line with [7] which argues that science literacy skills can be trained by applying learning that utilizes the social and cultural environment (ethnoscience) as a source of learning in daily life. In addition, the result of research [8, 9] shows that the Ethnoscience-based science module that she developed is feasible to use. [10] also argues that the developed integrated science module is effective to use in learning. Furthermore, research result [4] shows that STEM-based E-Modules with an ethnoscience approach are feasible and practical to use.

Based at the consequences of interviews, the writer located that so far, college students and technological know-how instructors in West Lampung have now no longer but acknowledged that this Napai cultural custom is a tradition that has technological know-how value (ethnoscience), which may be related to technological know-how mastering substances, specifically Biotechnology. In fact, with the aid of using linking the Napai tradition, which could be very acquainted with each instructors and college students, mastering might be less difficult and extra practical. Furthermore, the consequences of interviews carried out with the aid of using the writer with technological know-how instructors received statistics that during mastering sports, instructors discover problem to train college students take a look at independently and actively due to the fact college students are acquainted with the cloth this is at once given to them, it additionally reasons college students to be much less energetic to discover their very own information, college students are much less capin a position to narrate one idea to any other that has been studied as proven with the aid of using the lack of ability of college students to reply questions that require analytical skills. Students' technological know-how literacy cappotential and the elements that have an effect on it aren't but acknowledged due to the fact the assessment questions given with the aid of using the instructor aren't orientated to measuring clinical literacy, however are handiest restrained to measuring college students' information approximately the cloth being studied. In addition, there aren't anyt any coaching substances withinside the shape of exciting and feature e-modules, including an ethnoscience-primarily based totally technological know-how module wherein

the mastering sports contain an advent to authentic technological know-how and clinical technological know-how.

The results of a preliminary study in four public schools in West Lampung, namely, MTs Negeri 1 Lampung Barat, SMP Negeri 1 Liwa, SMP Negeri 4 Liwa, and SMP Sekuting Terpadu, achieved 0% of teachers using e-modules that were made by self. In addition, there are also no teachers who know about ethnoscience-based science e -modules and 68% stated that the textbooks used by teachers in the learning process have not emerged students' science literacy. Furthermore, 100% stated that it was necessary to develop e-module of science teaching materials based on *Napai* ethnoscience to improve students' science literacy. Then, the results of the needs questionnaire analysis conducted on each of 10 students from four public schools showed that 52.5% of the science learning that had been carried out had not been able to emerge students' science literacy, 45% stated that the printed books used had not helped students to learn independently. 57.5% stated that science learning had not yet learned to find problems and solutions and had not linked to local customs/culture. 57.5% of teachers never use other learning resources other than printed books, and 87.5% of students want other learning resources besides printed books in science learning that are more interactive.

Responding to the findings in the field described above, the author suggests that there is a need for innovation in science learning, especially biotechnology materials with the concept of renewable learning. In that way, the author tries to develop an e-module Flip Pdf Professional based on *Napai* ethnoscience to improve science literacy on Biotechnology materials.

2 Research Methodology

The research is conducted in a research and development (R&D) concept related to the 4D Thiagarajan model. Thirty-two 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. Specify pretests and posttests to measure effectiveness. The data analysis method used is the Social Sciences Statistical Package (SPSS 24.0).

3 Results and Discussion

The researcher designed an e-module for ethnoscience -based science learning on biotechnology material which begins with the design of the main menus consisting of an introduction, content and closing section based on the story board design that has been made. The explanations for each of these sections are as follows: 1) The introduction section consists of cover, table of contents, foreword, basic competencies, indicators, learning objectives, module overview, module usage instructions, study instructions, and concept maps; 2) The content section consists of two learning activities, namely learning activity 1 containing material on ethnoscience, understanding and basic principles of biotechnology, and the application of biotechnology in the food sector, as well as practice questions 1. Then learning activity 2 contains material on the application of

Fig. 1. Ethnoscience-Based Professional Flip Pdf e-module are presented in this image

biotechnology in agriculture, application of Biotechnology in the field of animal husbandry, and the impact of Biotechnology on human life, as well as practice questions 2; 3) The closing section consists of a summary, answer key, bibliography and author profile (Fig. 1).

The results of this stage, the author packs in the initial product (prototype) of the draft I e-module based on Napai ethnoscience, and then it is validated by material experts and media experts. The presentation of the results of the validation of the experts is presented in Table 1.

According to the table above, it shows that material experts give an assessment of the development of e-modules with a percentage of 72.5%. Meanwhile, media experts gave an assessment of 96.9%. So it was concluded that the average score for the evaluation of the development of the Ethnoscience -based Professional e -Module Flip Pdf reached 84.7% with a very high category. In other words, this *e* -module is categorized as suitable for use with improvement. These results were obtained from several aspects of the assessment, including suitability with the material, clarity and convenience, learning instructions, completeness of the material, visualization of the material, and the usefulness of the material. Suggestions or input on the material validation process are by experts, in order to improve the e-module product so that later it is hoped that the result of e-module is suitable for use and makes students interested in using this e-module. This is supported by research [11] which states that material expert validation validates the suitability of competencies and indicators with the developed module.

Then, to get more maximum result, the experts recommend to perform small group trials. This trial was conducted on nine respondents. The results of the limited trial of the e-module product obtained an average value of nine respondents, namely 3.8 which was in the very good category. Furthermore, to determine students' literacy skills, an

Table 1. Validation Results by Experts

Validation	**Rating Result**	**Category**
Material Expert	72.5%	High
Media Expert	96.9%	Very High
Total Score	**169.4%**	**-**
Average	**84.7%**	**Very High**

analysis of the validity test was carried out using the Statistical Package for The Social Sciences (SPSS 24.0). The results of the validity test show that the ten questions of the scientific literacy ability test are in the valid criteria because r count > r table (0.349), the significance level of this validity test is 5%. This shows that the whole question can be used for further research and processing.

Meanwhile, to measure the practicality of the e-module, three categories were applied, namely the implementation of learning using modules, student responses and teacher responses to the module. All use descriptive analysis. The product implementation test is assessed from several aspects of the activity, namely the implementation for independent 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 the ethnoscience-based Professional e-module product according to the table above, show that the implementation of the learning e-module obtained a percentage score of 93%, students' responses 92%, and teacher responses 100%. This means that the overall practicality test results for the ethnoscience-based Professional Pdf e-module product meet the very high criteria. The results were reviewed from several aspects, namely the attractiveness, usefulness and ease of use of e-modules, the author gave a questionnaire distribution to 32 students, and gave 20 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 research [12] which states that teaching materials that can be said to be practical are teaching materials that easy to use or in the form of the teaching materials themselves. The teaching materials selves 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 32 students. The variable tested in the use of this ethnoscience-based e-module is the students' science literacy ability. The results of the analysis of the achievement of each indicator of science literacy questions can be seen in Table 3.

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. There is an increase in the scientific literacy index in both experimental and control classes. In the experimental class, interesting indicators and evaluative conclusions

Table 2. Recapitulation Result of Practikal Data Analysis

Assessment Aspect	**Average Value**
Implementation of the Learning e-module	93%
Student's Response	92%
Teacher's Response	100%
Average Percentage	**95%**
Criteria	**Very High**

Table 3. Recapitulation of Achievement of Each Scientific Literacy Indikator

Indicator of Scientific Literacy Questions	**No Questions**	**Average (%)**			
		Control Class		***Experiment Class***	
		Pre-test	***Post-test***	***Pre-test***	***Post-test***
Explain Scientific Phenomenon	1	69	81	50	94
	2	59	69	47	97
	7	25	69	25	75
	9	28	75	41	81
Interpreting Scientific Data and Evidence	3	38	72	41	72
	5	22	44	47	72
	6	13	53	22	81
	8	31	72	38	84
Draw and Evaluate Conclusions	4	59	72	41	78
	10	22	63	25	81

show higher increases, followed by indicators that explain scientific phenomena and the lowest indicators that explain scientific data and interpret evidence. The indicator management class interprets the data and scientific evidence that show the highest increases, then follows indicators that explain scientific phenomena, but for interesting indicators and evaluative conclusions, there is no improvement in scientific literacy. According to [13], this condition may be due to several factors, including the student's level of enthusiasm and motivation, teaching materials and other supportive media, and level of comprehension. 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.

The results of the science literacy test based on these three indicators in the experimental class showed an increase in the high classification (N-Gain = 0.73) compared to the control class with the moderate classification (N-Gain = 0.41). This condition illustrates that the use of e-Module based on *Napai* ethnoscience on Biotechnology material is effective to be used to improve students' science literacy. This is in line with [14] that learning will run effectively if the learning is integrated with something close to the students. In line with this, learning that is integrated with ethnoscience is learning that is associated with culture and traditions that are close to the environment.

Influence effect size values between experimental and control classes based on the above data. The effect size value for the experimental class is 0.9846 for the large effect category and the control class is 0.9194 for the large effect category. category. The magnitude of the computational results in the experimental class indicates that improvement in student science literacy was influenced by the use of the Napai ethnoscience e-modules, whereas in the control class, the use of the textbook in the learning process affected by Based on the results of effectiveness tests and effect size tests, it has been shown that the implemented Napai ethnology-based e-modules are effective and have a

significant impact on improving students' scientific literacy. increase. This is consistent with research [15] showing that integrating ethnoscience into learning can improve learning outcomes compared to conventional learning. [16] also makes the same statement that introducing ethnoscience into the learning process motivates students to actively participate in the learning process.

4 Conclusion

E-module pdf flip professional based of *Napai* ethnoscience to improve scientific literacy on Biotechnology material is valid with very high category, practical with very high criteria, and effective with high category with effect size value with large effect category.

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