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Validity of the Digital Module Exploration of Physics Concepts in Making "Jember Batik Crafts" as an Effort to Support Local Wisdom-Based Multicultural Education

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Abstract

The prospective physics teachers was very important to be provided with an understanding regarding the local potential of an area that is integrated into the physics learning process as a strengthening of multicultural education. The use of digital modules in physics learning contains the concept of local Jember wisdom, namely making Jember batik crafts that have never been developed before. This research aimed to examine the validity of digital physics modules containing local wisdom "making batik crafts" to facilitate students' scientific and digital literacy skills. The research method used is research and development with the ADDIE development model. The study enlisted three expert validators who utilized a validation sheet as their instrument. The method for analyzing the validation data was through descriptive percentage analysis. The results of the validation by the validator showed that the construct aspect showed 90.29% (very good), the content aspect was 85% (very good) and the language aspect was 92.22% (very good). The validation results from the development of this digital module as a whole show that the digital module based on the local wisdom of Jember Batik crafts achieves a validity score of 89.17% which is in the very good category and is very feasible to use. Thus, digital modules based on local wisdom in Jember Batik crafts can then be used in the physics learning process as an alternative to innovative solutions for learning resources based on local wisdom.

Keywords: batik craft, digital literacy, digital module, local wisdom, scientific literacy

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INTRODUCTION

Education has an important role in creating a learning atmosphere and learning process so that students can actively develop their potential. The purpose of education is contained in the SISDIKNAS Law No. 20 of 2003, which is to facilitate the potential of students to become human beings who believe in and fear God Almighty and have noble character, are capable, creative, independent and responsible. In addition, in accordance with the curriculum implemented in schools referring to SISDIKNAS Law No. 20 of 2003 Chapter X article 36 paragraph 3 point d concerning curriculum, it states that the curriculum is prepared according to the level of education within the framework of the Unitary State of the Republic of Indonesia which pays attention to the diversity of regional and environmental potentials found in each region as a means to better introduce students to their environment, so that they have skills that are in accordance with the local potential of their region (Hunaepi et.al., 2016). Local wisdom encompasses basic knowledge gained through life experience and contains valuable moral messages. Maintaining local wisdom so that it remains sustainable is not a simple thing and in

this era of globalization, without realizing it, progress in the fields of science and technology also plays a role in weakening these values. Transformation in the era of globalization often finds that local wisdom is maintained but combined with elements of foreign culture, so to ensure the sustainability of local wisdom, it is important to develop it through knowledge and integrate it with technology that helps maintain human life (Shufa, 2018). A wise teacher must be able to insert local cultural values into the science or non-science learning process (Rahmatih et al., 2020). Therefore, it is very important for students, especially prospective physics teachers, to be equipped with an understanding regarding the local potential of an area that is integrated into physics learning process as a strengthening of multicultural education.

Physics is a branch of science that studies natural events and the process by which they occur and learns how to think and work scientifically with the ability to think logically, critically, creatively, rationally and dynamically (Nurvirani, et al., 2019). One of the efforts that can be made is through the use of technology-based learning media to support learning activities such as the use of digital modules based on local wisdom (Pela, 2021). The digital module used is interactive which can stimulate the thoughts, feelings, interests and attention of students in the learning process.

The use of digital modules in physics learning contains the concept of Jember local wisdom, namely making Jember batik crafts. UNESCO (2009) has confirmed that batik belongs to Indonesia as a cultural heritage on October 2, 2009. Since this inauguration, batik has begun to grow rapidly throughout Indonesia, especially in Jember. Jember batik motifs have experienced significant development with inspiration coming from exploration of natural resources. Jember has good coffee and cocoa production and beautiful beaches. This natural wealth is used as a variety of batik motifs, including various coffee and cocoa motifs, stone motifs, snake scale motifs, wave motifs, water motifs, and mbok herbal motifs (Sari et al., 2019). Apart from that, there are also turtle and dragon fruit motifs (Fibriany et al., 2019). Therefore, the learning process by linking local wisdom is one way to teach physics material so that it is interesting and more easily accepted by students.

Education will be more meaningful if students are brought directly into real life in the learning process. The environment provides a stimulus to the individual and vice versa the individual responds to the environment (Badawi & Qaddafi, 2015). This research is in line with the research roadmap of the Physics Learning Strategy research group in the Physics Education Study Program, which is about science and technology-based learning media and RIPP University of Jember 2021-2025 related to strengthening multicultural education based on local wisdom. This research was supported by previous research which states that a Digital Module with the POE2WE Model has been developed as an Alternative for Online Learning in the New Normal Period which is suitable for use (Nana, 2020). Research conducted by Amelia, et.al. (2023) stated that a STEM-based digital fluid module (MD-FISTEM) has been developed as a physics teaching material that is suitable for use and is able to increase student motivation. Other research also states that a digital module on earth materials has been produced to increase climate literacy in Indonesia that is valid and practical (Rosmiati and Satriawan, 2022). Based on this research, it appears that a digital module has not been developed that explores physics concepts in making Jember batik crafts as an effort to support multicultural education based on local wisdom. This research aimed to examine the validity of digital physics modules that will be used to facilitate students' scientific and digital literacy skills as an effort to support multicultural education based on local wisdom.

METHOD

The research method used is research and development with the ADDIE development model (Sugiyono, 2015). The location of this research is Rezti's Mboeloe Jember batik craftsmen. Explanation of the stages of the ADDIE development model, including: 1) Analysis Stage, At this stage an analysis of the local potential of Jember is carried out in order to explore any physics concepts in the process of making Jember batik handicrafts based on the results of

observations, interviews and documentation as well as literature review; 2) Design Stage, The planning stage aims to design a module that is made based on the results of observations and documentation of the process of making Jember batik which is associated with an analysis of physics concepts; 3) Development Stage, the development stage aims to produce a digital physics module related to the exploration of physics concepts in making Jember batik crafts. At this stage, validation is carried out by three experts. The three experts has competency and capability about learning media scope. The expert was determine the validity of the digital module in terms of module readiness and existing material; 4) Implementation, the implementation phase is related to the activities of testing this digital module on prospective physics teacher students in basic physics learning. Students to use this digital module during the learning process and 5) Evaluation, The evaluation stage is the final stage of designing this digital module after it has been implemented. The stages of the research carried out are described as in Figure 1.

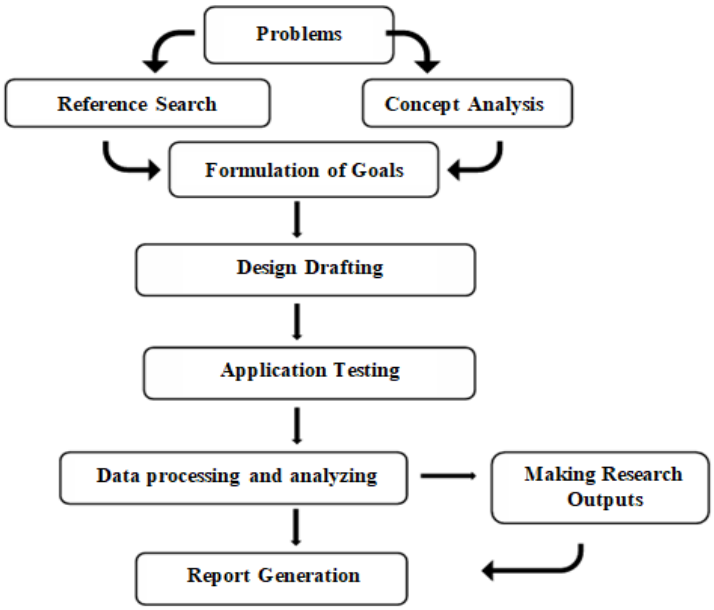

Figure 1. Research stage

Data analysis techniques for validity data were carried out by descriptive analysis. The validity criteria for the digital module exploring the physics of the process of making "Jember Batik Crafts" are shown in Table 1.

Tabel 1. Validity criteria

Presentase	Validity criteria
75% < p ≤ 100%	Very good
50% < p ≤ 75%	Enough
25% < p ≤ 50%	Not good
0% ≤ p ≤ 25%	Not very good

(Sugiyono, 2020)

RESULTS AND DISCUSSION

This research was conducted in June-July 2023. The research began by reviewing the existing curriculum in the Physics Education Study Program and the physics concepts that would be discussed. Furthermore, research observation activities were carried out at Rezti's Batik Mboeloe Jember. Based on the results of observations related to the process of making Jember batik, the physics concepts contained in it are analyzed carefully. After that, digital

media development was carried out in the form of digital modules based on the local wisdom of Jember batik crafts. This digital module consists of a front page, instructions for using the module, introduction, competencies, materials, quizzes, and profiles of the drafting team. Display of development results as shown in Figure 1.

Figure 1. Digital Module Display

Figure 1a is an initial display of the batik digital module. Figure 1b contains the main menu display. Figure 1c is an introduction to the material discussed. Figure 1d contains instructions for using the digital module. Figure 1e is a competency menu consisting of learning outcomes and objectives. Figure 1f is a discussion menu consisting of ideal fluids, types of fluid flow, continuity equations, Bernouli's law, and the process of making batik. Figure 1g is an example of one of the materials contained in the material menu. Figure 1h is a selection of materials related to the process of making Jember batik crafts. Figure 1i contains practice questions. Figure 1j contains the score of the assessment after doing the practice questions, and Figure 1k is the profile of the digital module builder.

The digital modules that have been developed are then validated by three media and material experts. The three validators are lecturers of the Physics Education Study Program. There have been several revisions of the validator's assessment. The results before and after the revision are shown in Table 2.

Table 2. The revised results of the validator's assessment

Before	After	Explanation
		Improvements to the addition of guidelines for using digital modules
		Improvements to formula writing (background section to make it clearer)
		Repair fluid flow concept image
There are no fundamental questions for students as learning companion questions		Added a screen about basic questions

Validation results by the validator showed that the construct aspect was 90.29% (very good), the content aspect was 85 (very good) and the language aspect was 92.22% (very good). The average validity for all aspects, namely 89.17%, is in the very good and valid category, so that it can be used in the physics learning process. The validation results are shown in Table 3.

Table 3. Results of digital module validation based on local wisdom of Jember Batik crafts

	Construct	Validator 1	Validator 2	Validator 3
Number	Assessment criteria	Score	Score	Score
1.	Suitability of digital module content with learning outcomes and learning objectives	4	5	5
2.	The suitability of the content of the material in the digital module with the learning objectives	5	5	5
3.	The suitability of the content of the material contained in the digital module with the level of student development	4	4	4
4.	Clarity of instructions and directions for activities presented in a coherent and clear manner so as not to cause errors in carrying out activities	3	5	5

Construct		Validator 1	Validator 2	Validator 3
Number	Assessment criteria	Score	Score	Score
5.	Presentation of material is interactive and participatory (in learning to invite students to be active)	5	4	4
6.	Appropriateness of the difficulty level of the material with student development	4	5	4
7.	Conformity of sentences with the level of development of students	5	5	5
8.	Material truth from the aspect of science	5	5	5
9.	Learning media is equipped with basic questions (problems) that direct students to determine basic concepts	3	5	5
10.	The suitability of the contents of the practice questions with the material	5	4	4
11.	Type and size of letters according to the level of student development	4	5	4
	Total Score	47	52	50
	Maximum Score	55	55	55
	Percentage	85,45%	94,54%	90,90%
	Average Percentage		90,29%	
	Content	**1**	**2**	**3**
12.	The development of a digital module exploring the concept of physics in the manufacture of "Jember Batik Crafts" as an effort to support multicultural education based on local wisdom is something new	4	5	4
13.	Development of a digital module exploring the concept of physics in making "Jember Batik Crafts" as an effort to support multicultural education based on local wisdom can facilitate students' scientific literacy skills	4	5	4
14.	Development of a digital module exploring the concept of physics in making "Jember Batik Crafts" as an effort to support multicultural education based on local wisdom can facilitate digital literacy skills in students	3	4	5
15.	Development of a digital module exploring the concept of physics in making "Jember Batik Crafts" as an effort to familiarize students with the potential of the surrounding environment, character and competitiveness.	5	5	3
	Percentage	80%	95%	80%
	Average Percentage		85%	
	Language	**1**	**2**	**3**
16.	The language used fulfills the readability aspect	5	5	5
17.	Conformity with the rules of the Indonesian language	4	5	4
18.	The sentences used are simple and easy to understand	4	5	5
19.	Clarity of instructions and directions on the digital physics module	3	5	5

Construct		Validator 1	Validator 2	Validator 3
Number	Assessment criteria	Score	Score	Score
20.	The language used is communicative	5	5	5
21.	The level of language used is in accordance with the cognitive development of students	4	5	4
	Percentage	83,33%	100%	93,33%
	Average Percentage		92,22%	

Table 4 Recapitulation of Expert Validation Results

No.	Aspect	Validator	Percentage Analysis		Criteria
			$\sum p$	$\underline{p}$	
1.	Construct	1	85,45%	90,29%	Very good
		2	94,54%		
		3	90,90%		
2.	Content	1	80%	85%	Very good
		2	95%		
		3	80%		
3.	Language	1	83,33%	92,22%	Very good
		2	100%		
		3	93,33%		

The results showed that the digital module exploring the physics concept of making "Jember Batik Crafts" as an effort to support multicultural education based on local wisdom is in the very valid/good category. Based on the research conducted by Ammy (2021) regarding the development of interactive digital modules, it was found that digital modules were used very effectively in learning as evidenced by the average student score being more than 75. In line with Amanullah's research (2019), students can be more motivated in digital literacy when the learning process is carried out through the use of attractive digital media, presenting text, images, video and sound. In addition, the development of digital modules based on local wisdom is in line with research conducted by Elisa et al (2022), the results of the research show that the modules are in the valid category and are suitable for use in the local wisdom-based physics learning process.

This module is used to teach digital literacy and scientific literacy to students. In addition, the use of this digital module is expected to increase students' understanding of the use of information and communication technology, students can understand physics concepts in the surrounding environment, especially in Jember Batik crafts. This research is in line with research conducted by Harianto (2023), which is related to the importance of showing concept videos so that students can understand concepts and be able to explain phenomena around them scientifically in accordance with the competence indicators of scientific literacy. With the digital module, students can access information not only from the instructor, so that students are no longer dependent on the instructor as the only source of knowledge. This allows for more interactive and student-centered learning. Learners can be actively involved in the learning process (Ismet et al., 2022). Then Salsabila et al. (2023) explained that installing and using digital modules based on local wisdom is very easy, students also find it easier to use digital modules because they are equipped with explanations regarding the steps involved in making them. The digital module containing the local wisdom of the Jember Batik craft is also equipped with instructions for use and practice questions so that students can study

independently anytime and anywhere. This is in line with the opinion of Haryaningrum et al. (2023) which states that the use of picture book media can make it easier for teachers and students to use it.

CONCLUSION

The validation results for each aspect, namely construct validation of 90.29%, content validation of 85%, and language validation of 92.22%. These three aspects are in the very good category. The results of the overall validation show that the digital module based on the wisdom of Jember Batik crafts achieves a validity score of 89.17% which is in the very good category and is suitable for use. Thus, it can be concluded that digital modules based on local wisdom in Jember Batik crafts can then be used in the physics learning process as an innovative solution to learning resources based on local wisdom.

RECOMMENDATION

Suggestions from this study are: 1) for educators, they can use this digital module that has been developed in physics learning, and 2) for other researchers, it can be developed in the analysis of physics concepts that have not been discussed in digital modules based on local wisdom in Jember Batik crafts and other forms of local wisdom.

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