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Validity of a Coastal Environments-Based Physics Learning Module on the Theme of Temperature and Heat

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Abstract: Researchers have developed the coastal environments-based physics learning module. One of the quality modules developed can be seen from its validity. This research aims to describe the validity of the coastal environments-based physics learning module on the theme temperature and heat. The technique of collecting data is used a validation sheet by four validators, namely two as expert validators and two as validator practitioners. The validity aspects of the experts assessed are construct, content, and language. Aspects of validity seen from practitioners are relevance, accuracy, readability, and language. The criteria for stating the quality of the physics module developed in each component consist of four evaluations, 1) invalid, 2) less valid, 3) valid, 4) very valid. The results of this research indicated that the expert validity was 3.38 with a very valid category; also that practitioner validity is 3.64 with a very valid category. Thus, a physics learning module insight the coastal environment could be used in learning to observe aspects of quality from other aspects such as practicality and effectiveness.

Keywords: module validity, teacher's responses, temperature and heat, physics learning module, coastline

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INTRODUCTION

Education will be more meaningful if students learn directly about real life in the learning process. One of them is the environment. The environment provides stimulation to individuals as well as individuals responding to the environment. The process of interaction affects individual changes in the form of behavior change (Badawi & Qaddafi, 2015). Therefore, learning that integrates the environment makes learning more interesting and enjoyable. It also allows students and teachers to actively participate based on the environment that surrounds students, and obtain optimal learning outcomes. (Winarni, 2016). The use of teaching materials integrated with local potential can improve college students' literacy skills because they can understand the ability of science learning (Nuraini, 2017).

The environment around students enables more interesting and enjoyable learning, one of which is the coastal environment (Badawi & Qaddafi, 2015; Brahim, 2007; Preliana, 2015). Coastal area is a meeting area between land and sea, with the boundary towards the land which includes some land, both dry and submerged in water that still has the

influence of marine characteristics such as sea breeze, while towards the sea covers coastal waters to the outermost. Coastal areas are still affected by natural processes that occur on land such as sedimentation and fresh water flow, as well as processes caused by human activities on land and at sea (Arief, 2010). One of physics learning material that is easily found in coastal environments is temperature and heat. Many phenomena of the concept of temperature and heat are found in coastal areas as an example of the occurrence of sea winds and land winds which is the application of convection heat transfer.

Learning needs that are based on the environment, are not in line with reality at school. The results of interviews conducted at physics teachers at the School of Fisheries and Vocational in Puger were informed about teachers who use book packages and none who use teaching materials that can be used with fisheries resources as learning resources. In fact, the Fisheries and Vocational Schools are close to the Coastal Environment. Thus, the daily life students learn is the Marine Environment. This, allows students to learn phenomena that are directly related to the subject matter.

The importance of carrying out learning based on the environment, then we need a media that can transfer what is in the environment into the classroom (Nugraha & Binadja, 2013). Students more easily understand the concept with the presence of learning media (Wicaksono, Wasis, & Madladzim, 2017). One of the learning media is learning module.

Modules are learning media that are developed in accordance with what is needed in learning. In this case, it takes an environment-based physics learning module on the topic of temperature and temperature. At the very least, the module contains the purpose and process of learning, description of material, tests, summaries and answer keys. Modules designed by themselves according to the needs and contents of the minimum module standards are expected to improve understanding, problem solving, learning outcomes and student activity (Sipayung & Simanjuntak, 2017).

Some previous research results show that the effectiveness in using modules related to the coastal environment towards learning outcomes has increased (Badawi & Qaddafi, 2015; Enersy, Karyadi, & Winarni, 2017; Gafrani & Mulyanratna, 2013; Zukmadini, Karyadi, & Trisnawati, 2018). Students can find out things in subjects related to the coastal environment that are close to where students live (Annur, Sari, Wati, Misbah, & Dewantara, 2020; Oktaviana, Hartini, & Misbah, 2017).

Researchers develop the coastal environments-based physics learning module on the Theme of Temperature and Heat. Learning Module development research is carried out a quality test, one of which is the validity of the Learning Module developed (Nieveen, 2013). Validity is a measure that shows the levels of validity or validity of a product (Arikunto, 2013). Thus, this study aims to describe the validity of the coastal environments-based physics learning module on temperature and heat in Fisheries and Marine Vocational Schools.

METHOD

The product developed by researchers is a coastal environment-based physics module on the theme temperature and heat in Vocational School. This product is used at the Fisheries and Marine Vocational School in Puger. The quality of coastal environments-based physics modules are developed, one of which can be seen from its validity (Nieveen, 2013).

The module validation begins with the prototyping stage (design stage) resulting in a draft 1 coastal environments-based physics learning module for two learning activities. The draft 1 module produced from the product design stage is then assessed as feasibility by expert validators. After draft 1 was obtained, an evaluation and revision was held. Evaluation aims to test the validity of the module based on expert judgment and revisions if there are improvements from the results of validation by experts. Products that have been evaluated and revised are referred to as draft II. Product validation will be carried out by validators.

Validation by Experts

The coastal environments-based physiscs learning module validated by two expert lecturers in the Physics Education Study Program, Faculty of Teacher Training and Education, University of Jember. Aspek validitas yang dinilai adalah construct, contens, dan language. The validation instrument used to collect data is the physics module validation sheet. This validation sheet is used to provide input in the form of criticism and suggestions to the quality of the developed physics modules. The criteria for stating the quality of the physics module developed in each component consist of four evaluations, 1) invalid, 2) less valid, 3) valid, 4) very valid and suggestions or input on improvements to the physics module can be filled in by the validator in the suggestions section.

Data analysis techniques based on the data analyzed at this stage are quantitative data obtained from the validator and analyzed descriptively by examining the results of the assessment of the developed physics module. Based on the average indicator value is determined the average value for each aspect of the assessment. The results of the calculated formula are converted into qualitative data with the criteria as shown in Table 1(Hobri, 2010).

Table 1 Criteria for Evaluating Validity

V_a Value	Criteria
$3,25 < V_a \leq 4,00$	Very Valid
$2,50 < V_a \leq 3,25$	Valid
$1,75 < V_a \leq 2,50$	Less Valid
$1,00 \leq V_a \leq 1,75$	Invalid

Validation by Practitioner

This validation was carried out by two validator practitioners, namely two teachers who used this module in learning. The validity aspects assessed are relevance, accuracy, readability, and language. The validation instrument used to collect data is the physics module validation sheet. This validation sheet is also used to provide input in the form of criticism and suggestions for the quality of the developed physics modules in terms of module users. The criteria for stating the quality of the physics module developed in each component consist of four evaluations, 1) invalid, 2) less valid, 3) valid, 4) very valid and suggestions or input on improvements to the physics module can be filled in by the validator in the suggestions section.

Data analysis techniques based on the data analyzed at this stage are quantitative data obtained from the validator and analyzed descriptively by examining the results of the assessment of the developed physics module. Based on the average indicator value is determined the average value for each aspect of the assessment. The results of the calculated formula are converted into qualitative data with the criteria as shown in Table 1(Hobri, 2010).

RESULT AND DISCUSSION

The coastal environment based physics learning module consists of: page title, page identity, preface, table of contents, list of images, instructions for using the module, chapter title, chapter

objectives or competencies, description of material or subject matter, discussion material, sample questions, maps concepts, summaries, formative tests, exercises, glossaries, answer keys, and bibliography and external back cover pages. Part of the physiscs learning module based on the coastal environment can be seen in Figure 1.

The physics learning module based on the coastal environment in question is a module in the form of physics teaching materials in which the concepts, principles and laws of physics that are loaded are related to events that often occur around the coast in accordance with material content in temperature and heat materials. The developed module contains various things that exist in the environment around the students of the Fisheries and Vocational Schools so that they can improve their mastery of student concepts and student learning outcomes.

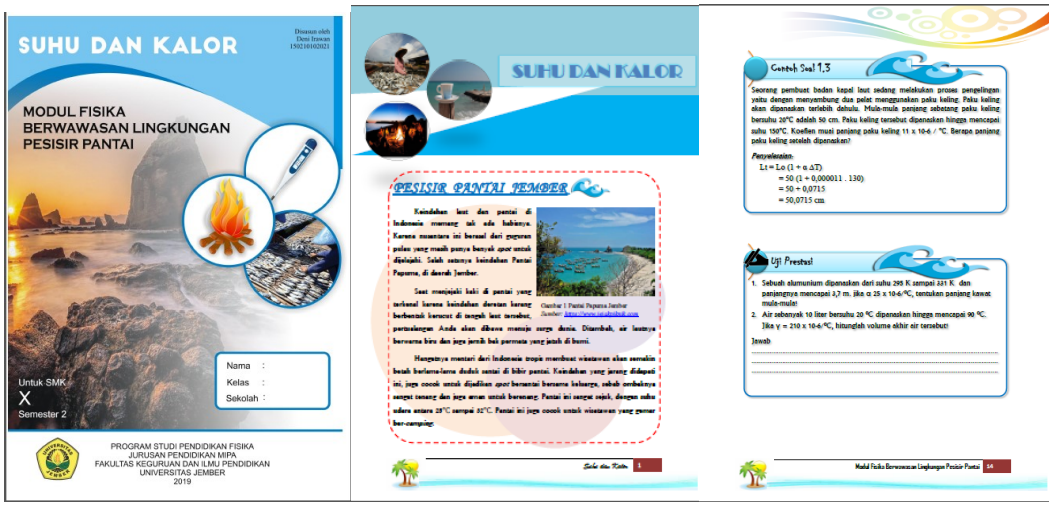

Figure 1 Part of the Coastal Environment-Based Physics Learning Module

Validation by Expert

The purpose of expert validation is to correct deficiencies and weaknesses in the product so that the product can be corrected according to the advice of experts in their fields (Baharuddin & Daulay, 2017; Dewantara, Febrianti, Wati, & Mastuang, 2019; Misbah, Dewantara, Hasan, & Annur, 2018). Values obtained from two expert validators are averaged to determine the final expert validation value. Details of the overall score of the module validation aspects by experts can be seen in Table 2.

Table 2 Results of Expert Validity

Aspects	A_i Value	Criteria
Construct	3.58	Very Valid
Contens	3.5	Very Valid
Language	3.07	Valid
Average (V_a)	3.38	Very Valid

The results of the validation obtained were then analyzed to perfect The coastal environments-based physiscs learning module before the trial. The validity score of the module from the calculation of the two validators shows a score of 3.38 and is included in the very valid criteria. This shows that the coastal environments-based physiscs learning module is feasible to be used by teachers and students in the learning process and the desired aspects in this study. These aspects include constructive aspects, content and language feasibility. Thus it can be said that the coastal environments-based physiscs learning module can be used in learning.

Based on the validation analysis from draft 1 by the two expert validators, it was found that the construct aspects

obtained very valid criteria. This shows that the modules developed are in accordance with Core Competencies, Basic Competencies, indicators and learning objectives to be achieved. The steps in the preparation of modules, namely the formulation of the Basic Curriculum taken from the applicable curriculum (Prastowo, 2015).

The aspect of content eligibility obtains validity with very valid criteria. This shows that the coastal environments-based physiscs learning module is a new matter that contains the phenomenon and events of coastal events in temperature and heat material for example temperature differences around the coast, utilization of heat transfer in fishermen's life such as the use of land winds and sea breeze, fish drying and making of the ship body and preservation of fish in ice boxes.

In language aspects obtain validity with valid criteria. This shows that the language used in the coastal environment-oriented physics learning module is in accordance with the correct Indonesian language rules, both in terms of readability, clarity of instructions and direction of the module, and the sentence used is easily understood by students.

The coastal environment-based physics learning modules are improved according to suggestions and comments from expert validators. Suggestions and comments given by the validator on the product are used as material for revising the material components and product presentation developed so that it can proceed to the next step, namely small group testing (limited) . There are a number of suggestions from expert validators to improve this module, namely changing the background color and adding phenomena or examples of applying temperature and heat to everyday life in the module. Color can increase attractiveness, color create interest, and increase students' motivation to read text descriptions (Sitepu, 2012). So that in this module there are improvements in accordance with the validator suggestions shown in Table 3.

Table 3. Results of module revisions according to expert validator suggestions

Revised Components	Revised Results
Add information on temperature and heat phenomena in everyday applications, especially in coastal areas	Add information on temperature and heat phenomena, namely heat utilization for drying salted fish
The background color on the formula needs to be replaced to make it clearer	The formula's background color is replaced with a clearer color
$Lt = Lo(1 + \alpha \Delta T)$	$Lt = Lo(1 + \alpha \Delta T)$

Validation by practitioners

Validation was continued by two practitioners. Practitioner is two teachers in physics studies. Study subject teachers have contributed to student book assessments that include presentation and language feasibility aspect (BNSP, 2013). The criteria that need to be considered by teachers in choosing learning media are: (1) the provision of media with the purpose of teaching; (2) support for the content of study material; (3) ease of obtaining media; (4) teacher skills in using it; (5) there is time to use it; and (6) according to the level of thinking of students (Sudjana & Rivai, 2010). The component of user response in the development of this module includes 4 aspects, namely relevance, accuracy, readability and language. The value obtained from this user response is then

referred to the validity criteria to determine the validity level. Details of the score of the entire module validation items by users can be seen in Table 4.

Table 4 Results of User Response

Aspects	A_i Value	Criteria
Relevance	3.70	Very Valid
Accuracy	3.83	Very Valid
Readability	3.40	Very Valid
Language	3.64	Very Valid
Average (R_a)	3.64	Very Valid

In Table 4, it can be seen that the user response category obtains relevance with very good categories, this indicates that the subject and learning objectives in the physics learning module are oriented to the coastal environment relevant to the competencies that must be mastered by students. Judging from the aspect of accuracy, the module obtains validity with very good criteria. This shows that the material presented is in accordance with the truth and the scientific context describes the beach events with material temperature and heat.

Viewed from the aspect of legibility, obtaining responses with good criteria. This shows that the module can motivate students and increase students' interest in reading and can facilitate students in learning temperature and hot materials. Language aspects get responses with very good categories. This is because the module uses language that is easily understood by students and is able to motivate students. So, user response in this module gets a score of 3.64 with very good criteria. So that from the user response data it is known that this module is in line with expectations and there is no revision and can be used in learning. The results of validity indicate that the physics module developed is feasible and can be used at the trial stage at school (Imami, Prihandono, & Supriadi, 2017; Oktaviana et al., 2017).

Based on the validity oleh praktisi analysis, it can be seen that the coastal environments-based physics learning module on the theme temperature and heat obtained by validity with very valid categories. The science learning module of Physics of temperature and heat material based lingkungan dapat diterapkan karena valid (Bahri, Kusumawati, & Nuraini, 2017; Yuliacahyani, Prihandono, & Lesmono, 2017). Thus, a coastal environment-based physics module can be used in learning to improve student learning outcomes and environmental awareness.

CONCLUSION

Based on the analysis hasil validasi oleh ahli dan oleh praktisi, it can be seen that the coastal environments-based physics learning module on the theme temperature and heat is very valid. Thus, the module can be used in learning to improve student learning outcomes and environmental awareness. Further research is needed to observe aspects of quality from other aspects such as practicality and effectiveness.

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