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DEVELOPING GUIDED INQUIRY-BASED ECOSYSTEM MODULES BASED ON FISH POND LEARNING

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ABSTRACT

Abstract: The aim of this research was to produce ecosystem module-based inquiry with fishpond as a learning resources that met valid and practical criteria. This method of research development used ADDIE from Branch. The result showed that validation of module is 98.78% it meant that comply criteria was very valid and from subject expert was 100%, the result of practicality was 98% it meant that comply criteria was very practical and the mean result of the student's response was 91.65%. It meant that student gave a positive response to module. Based on this result, it could be concluded that the ecosystem module-based inquiry with fish pond resources that met valid, practical criteria and can be further implemented to grade X.

INTRODUCTION

Learning is an educational process that helps students grow their attitudes, knowledge, and abilities and supports them in learning actively and achieving anticipated competences (Majid & Rochman, 2014; Amri, 2015). Janawi (2013) says the learning process should place pupils based on their talent, interests, and abilities. According to the 2013 Curriculum, learning must allow for initiative, creativity, freedom, and physical and psychological development (Permendikbud No. 22, 2016).

The 2013 curriculum uses a learning-oriented, competency-based paradigm to generate productive, creative, inventive, and effective students through strengthening attitudes, skills, and knowledge (Majid & Rochman, 2014; Ministry of Education and Culture, 2012). Implementing curriculum improvements depends on teachers', students' knowledge, abilities, and commitment (Loubser et al, 2001). Teachers and students should strengthen the learning process through a scientific, thematic approach both between sessions and inside a lesson structure, therefore inquiry-based learning is needed (Majid & Rochman, 2014; Permendikbud Number 22, 2016).

Inquiry learning is ideal for today's science learning since it teaches students to investigate, integrate logic and imagination, and explain predictions (Wenning, 2011; Wenning, 2006). Teacher organization is key to a successful planned learning process (Rossum & Hamer, 2010). Effective learning prepares students with knowledge, skills, and values and creates a helpful learning environment (Burns, 2011).

Contextual learning emphasizes information provided and real-world circumstances that help students to discover connections between their knowledge and everyday life by using constructivism, questioning, inquiry, and reflection (Sagala, 2009; Majid & Rochman, 2014). Schools can implement contextual learning by using local resources. Local potential can give a local context in the formation of knowledge that connects scientific theory with local situations, making student learning more accessible and relevant. Ponds are a local source of potential-based learning in Lamongan Regency.

Lamongan Regency's inland fisheries produced 46,604,901 kg in 2015, while swamps, reservoirs, and rivers produced 2,964,533 kg (Husain et al. 2017). Lamongan is East Java's greatest fish producer, according to the 2015 Accountability Report of the Regional Head of Lamongan Regency. According to a needs analysis for teachers and students, ponds should be used as a learning resource at SMA N 1 Karangbinangun, Lamongan Regency. Using ponds as a learning resource will develop the notion of ecosystems and clarify the subject studied. According to Kunandar (2013), quality and relevant teaching and learning must be preceded by robust teaching preparation, hence the module was chosen as teaching material that was constructed utilizing inquiry learning syntax. k learning resources.

METHOD

This study uses research & development *Analyze, Design, Develop, Implement, Evaluate* (ADDIE) by Branch (2009). The *analyze stage* was carried out through interviews and providing needs analysis questionnaires to teachers and students of SMA N 1 Karangbinangun. The *design stage* is done by making a module design. The *develop stage* is carried out by developing the module according to the design

and validating and repairing the module. The *implement stage* is carried out by applying the module to students and the *evaluate stage* by evaluating the results obtained at each stage.

The validators in this study were lecturers of the Department of Biology, State University of Malang as material experts and teaching materials experts and biology teachers at SMA N 1 Karangbinangun Lamongan as field practitioners. The subjects of this research were 28 students of class X SMA N 1 Karangbinangun Lamongan. The research instruments used included a needs analysis questionnaire, a module validation sheet and a student response questionnaire to a nodule. The types of data in this study include quantitative data and qualitative data. Quantitative data in the form of scores of validation results and scores of student response questionnaires, while qualitative data in the form of comments and suggestions given by validators, field practitioners and students. The data analysis technique uses the average score analysis with the following rules and criteria.

This study employed ADDIE suggested by Branch (2009). The analyze stage involved interviews and needs analysis from teachers and students of SMAN 1 Karangbinangun. The first step was designing the initial modul design. In the develop stage, the module was developed, validated, and revised. The implement step applied the module to students, while the evaluate stage evaluated the results of module application.

The validators in this study were biology teachers at SMAN 1 Karangbinangun Lamongan as field practitioners. A number of 28 students from Grade 10 of SMAN 1 Karangbinangun Lamongan students participated as the subjects. Needs analysis questionnaire, module validation sheet, and module student response questionnaire were utilized as data collectionm instruments. This study comprised of both quantitative and qualitative data. Quantitative data was obtained from validation findings and student questionnaires, and qualitative data was obtained from validators, field practitioners, and students. The data analysis technique employed an average score analysis as stated below.

$$P = \frac{\sum x}{\sum xi} x100\% \quad (1)$$

The criteria for the validity, practicality and readability of the module can be seen in Table 1 below.

Table 1. Criteria for Validity, Practicality, and Readability of Modules

Percentage (%)	Level of Validity, Practicality and Readability	Information
85.01 – 100	Very valid/ practical/ good	Minor revision
70;01 - 85.00	Quite valid/ practical/ good	Minor revision
50.01 – 7;00	Not valid/ practical/ good	Major revision
01.00 – 50.00	Invalid/ practical/ good	Major Revision

Source: adapted from Akbar (2016)

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RESULTS

The product produced in this research and development is an inquiry-based ecosystem module based on fish pond learning. The module was validated by teaching materials experts, materials experts, field practitioners and tested on 28 students to obtain student responses. The developed module consists of three learning activities that use the inquiry syntax.

Validation by Teaching Material Expert

The results of module validation by material experts show that the module meets the very valid criteria with a percentage of 98.78%. The module was validated based on aspects of module characteristics and aspects of module components, indicators of module characteristics include self-instruction, self-contained, stand-alone, adaptive and user-friendly, while indicators of module component characteristics include module size, page header section of the node, module graphics , initial section, module core and cover. The results of the validation test of teaching materials experts are shown in Table 2.

Table 2. Validation Results of Teaching Material Experts

No	Rated aspect	Percentage (%)
A.	Module Characteristics	
1.	*Self Instruction*	100
2.	*Self Contaned*	100
3.	*Stand Alone*	100
4.	*Adaptive*	100
5.	*User Fiendly*	100
B.	Module Component Assessment	

1.	Nodule size	100
2.	Module cover page section	93.75
3.	rnodule	100
4.	The beginning of the rnodul	100
5.	The core of the rnodule	92.85
6.	Cover part	100
	Average Validity	98.78

Suggestions and comments from teaching materials experts include (1) changing the image of the fish on the front cover thus it does not look like an ornamental fish, (2) inserting the campus identity on the cover, (3) correcting typos in the module, (4) the stage of communicating the scientific approach needs to be clarified in module (explicit).

Material Expert Validation

The results of the module validation by material experts show that the module material meets the very valid criteria with a percentage of 100%. The aspects assessed include the relevance of the material, the accuracy of the material, the completeness of the material, the systematic and presentation of the material, the suitability of the presentation with the demands of *student centered learning,* language, readability and communication. The results of the validation test by material experts are shown in Table 3

Table 3. Material Expert Validation Results

No	Rated aspect	Percentage (%)
1.	Material relevance	100
2.	Material accuracy	100
3.	Material equipment	100
4.	Systematic and material only	100
5.	The suitability of the presentation with the demands of *student-centered learning*	100
6.	Language	100
7.	Readability and communication	100
	Average Validity	100

Suggestions and comments from material experts include (1) the image size is not proportional, (2) the module title needs to be clarified and completed, (3) the space within the module is too wide and (4) it should provides sufficient space for students to answer/fill in the module.

Field Practitioner Validation

The results of module validation by field practitioners were obtained by 98% with very valid criteria. Aspects assessed include the size of the module, the page of the nodule cover, the specificity of the nodule, the beginning, the core and the conclusion of the nodule. The results of the validation test by field practitioners are shown in Table 4 below.

Table 4. Results of Validation by Field Practitioners

No	Indicator	Percentage (%)
1.	Module size	100
2.	Module cover page section	94
3.	Module Graphics	100
4.	Module start	100
5.	Module core parts	94
6.	Cover part	100
	Average Validity	98

Student Response to Module

The average student response to nodules was 91.65% with very good criteria. The results of student responses to the module can be seen in Table 5 below.

Table 5. Results of Student Responses to Modules

No	Rated aspect	Percentage (%)
1.	Module view	91.45
2.	Module presentation	93.52
3.	Language	90.62
4.	Benefit	91.07
	Average Score	91.65

DISCUSSION

This study generated an inquiry-based, pond-learning ecology module for grade X SMA students. The module was developed using the ADDIE development model by Branch (2009). According to the Ministry of National Education (2008), a module is a book students can learn independently with or without teacher direction. Widodo & Jasmadi (2008) describe the module as self-instructional, self-contained, stand-alone, adaptive, and user-friendly. The teacher facilitates learning utilizing modules (Wulandari et al, 2016) and conditions students (Padmapriya, 2015). Using modules in the learning process allows students to create concepts through resources and activities (Alias et al, 2018; Martiningsih et al, 2018). (Martiningsih et al, 2018).

The module's 98.78% gain is quite valid. The module's qualities and presentation are assessed. Self-instructional, self-contained, stand-alone, adaptable, and user-friendly are module characteristics. Material experts use the module's size, cover page, graphic, beginning, core, and closing to validate the presentation. Self-instruction module features help pupils learn autonomously. This module has objectives, descriptions, activities, feedback, summaries, and references. All module material is arranged in competency units, making it self-contained (Riyadhi, et al , 2009). This module shows one major resource divided into three student learning activities. All student learning uses inquiry model syntax.

Stand-alone indicates the module can be used without other media/teaching resources. This module's completeness ensures that students acquire adequate information. Adaptive features if the module is flexible and adapts to science and technology (Depdiknas, 2008). This lesson demonstrates adaptable qualities by scanning the QR Code to give students more information. Clear instructions and easy-to-understand language demonstrate user-friendliness. Instructions mention this module. Module presentation shows validity.

The material expert validation indications include (1) relevance, (2) correctness, (3) completeness, (4) systematics and presentation of the information, (5) compatibility of the presentation with student-centered learning, (6) language, (7) readability and communication module (Depdiknas, 2008). Material expert validation averages 100% remarkably valid. These results show that the module is reliable and can be utilized for learning.

Relevance is shown by the existence of curriculum-aligned material, learning activities, explanatory examples, questions, and depth. The material's accuracy encompasses scientific truth, relevance to the times, and scientific approach. Completeness includes conformance with competence, benefits and necessity of mastering competence for students, table of contents, and bibliography.

Systematics and presentations include simple-to-complex material descriptions and local-to-global thinking lines. 1–3 learning activities that build simple to complicated student knowledge. The presentation fits student-centered learning by encouraging students' curiosity, interactions with learning materials, and reading practice. Spelling, terminology, and sentence structure are accurate. The module's readability and communication include sentence length, organization, and paragraphing.

The module practicality test is used to determine the ease of use of the module in learning activities so that it can support the competencies needed by users (Alfiriani & Hutabri, 2017; Agustyaningrum & Gusmania, 2017). The competencies taught in this module are students' cognitive abilities, problem solving and environmental awareness. The practicality test was carried out by asking respondents for responses regarding the teaching materials developed (Emzir, 2012). The practicality indicators in the module practicality sheet consist of the appearance, presentation, language and benefits of using the module. The average result of practicality by students is 91.65% with a very practical category and can be used in learning.

The practicality test demonstrates the ease with which students can utilize the created instructional materials (Putra, et al., 2017). This module's appearance, presentation, language, and benefits all demonstrate its user-friendliness. The appearance of the module is made as appealing as possible with colorful designs for each page and photos to avoid monotony, the presentation of the module is organized, the module employs correct Indonesian, and the substance of the module can be applied to daily life. The usage of modules can promote students' freedom in the classroom, so module design must be intuitive for students (Budiono & Susanto, 2006).

CONCLUSION

The module product on inquiry-based ecosystem materials with pond learning resources satisfies valid and useful criteria. Validation test by teaching materials expert yielded a percentage of 98.78 percent; validation test by material expert yielded a percentage of 100 percent meeting the very valid criteria; practicality test results by field practitioners yielded a percentage of 98 percent with very practical criteria; and the average student response to the module was 91.65 percent, indicating that students respond positively to the module. On the basis of these findings, it can be concluded that the inquiry-based eco-system module based on pond learning satisfies the legitimate and practical criteria necessary for continued implementation with students in grade ten.

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