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Validity of QR Code e-Module as A Media for Ecosystem Learning

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Abstract

With the rapid technological growth, education must participate in using technology as an innovation in learning. The purpose of this study is to know the validity of QR code e-Module as a media for ecosystem learning This research is development research using Addie models. The model consists of the five stages of analysis, design, development, implementation, and evaluation. But in this research only to the stage of development. The study was carried out in the month of March-May 2024. The data used in this study is data on the validity of the QR code e-Module test. The instruments used are questionnaires, the data used in the study at analysis using descriptive statistics in the form of presentation. The validity of the materials by 89.17%, the validity of the median expert by 83.33%, and the validity of the linguist by 88.71% valid criteria. Thus concludes that the e-Module based on the QR code developed is declared valid with an average of 87.07%.

Keywords: Learning, e-Module, QR Code, Innovation, Validity

INTRODUCTION

With advances in Information and Communication Technology (ICT) in the era of the Industrial Revolution 5.0, which have affected all aspects of life including education, there is a good chance that the educational demands of reform will arise (Siregar & Marpaung, 2020; Yudhistian & Cintamulya, 2024). Because technology and science would allow effective and efficient education (Muhson, 2010). Especially in today's education that must rely on technological science in its teaching. The problem with learning is the limitations of the learning media (Nadira *et al*., 2022). Therefore, the selection of the learning media used needs to be tailored to students' conditions and learning strategies. One of the burgeoning media innovations is the use of an e-Module as a learning aid. e-Module or electronic module is digital teachings that can be accessed through electronic devices such as computers, tablets, or smartphones. The use of e-Module offers a variety of advantages, such as access access, interactivity, and the ability to update content periodically (Prastowo, 2019).

With these interactive electronic module, the learning process will involve audio, sound, movie and other views and programs that are easily understood and thus make good learning media (Sugianto et al., 2013; T. S. H. Wulandari, 2024). To increase the interactivity and attractiveness of the e-Module, this research develops a QR code-based e-Module. QR code or quick response code is a two-dimensional matrix code that can be scanned using a mobile device. By leveraging the QR code, students can easily access the supplementary information,

the learning videos, and the interactive quizzes associated with the topics studied. It is hoped to increase students' involvement in the learning process (Huang & Huang, 2015).

Based on early observations at the MTS Muhammadiyah 25 Brondong regarding the students' need for learning media: e-Module, obtained a result that 75% of students have never used e-Module and 83% claim that students need alternative learning resources. Alternative and interactive learning media development of e-Module is thus needed. However, to ensure the effectiveness of the e-Module in boosting students' study results, strict validation tests are required These validation tests include assessments of various aspects, including material clarity, agreements with the curriculum, and module conformity as ecosystem materials for students.

Several validity studies have been conducted in developing teaching materials, learning media, and learning resources (Awwalina & Indana, 2022; Budiarso et al., 2022; Fatimah & Isnawati, 2024; Fauziah & Asrizal, 2023; Gitnita et al., 2018; Lestari & Cintamulya, 2022; Ma et al., 2024; Najwa & Irianti, 2023; Nawawi & Wardhani, 2023; B. C. Wulandari et al., 2021). In the study, this topic of ecosystems is selected as e-Module content because of its relevance to the education curriculum and the importance of understanding ecosystems in daily life. An ecosystem is the relationship between one and another with its ward (Rabb, 2017). Ecosystems are part of a functional unit of the basis of ecology, as they encompass many organisms and other abiotic components equally. The harmonious interaction of ecosystem elements is essential for the sequel (Wibowo & Sari, 2021).

This research aims to test the validation of the development of QR code based e-Module as a medium for ecosystem learning. It is thus hoped that the results of this study will contribute to improved quality of learning in schools and provide an alternative media for innovative learning.

METHOD

The product developed in this study is a QR code-based e-Module for ecosystem learning. Researchers plan research from March 2024 to May 2024, the research and development that was used. Research and development methods are research methods used to produce a particular product and test its effectiveness (Sugiyono, 2018). This research model uses Addie's model. It has five steps, such as analysis, design, development, implementation, and evaluation (Sugiyono, 2017).

The research is only up to the stage of development. However, the principle of development research has been included in the development of teaching materials. Data retrieval is done using a questionnaire or tray instrument to check the vilification and product being made. At this stage of development, the validity of the product is tested by expert

validation (Wulandari, 2024) The validation instrument is intended to ensure that the instruments already made worthy of use and use as a measuring instrument to be measured (Ernawati & Sukardiyono, 2017).

The results of the developed e-Module validation analysis are measured using the Likert scale. That aims to generate quantitative Numbers from qualitative data. The Likert scale used in this validation sheet contains five intervals that is; a) score 5 means very good, b) score 4 means good, c) score 3 means pretty good, d) score 2 is bad and e) score 1 is bad. The validity assessment of the product produced using the following equations:

$$P\ (\text{Presentation Each Criteria}) = \frac{\textit{Score per criteria}}{\textit{Maximum Score}} \times 100\ \%$$

Source: Arikunto (2014)

Data analysis could be matched to the valiant criteria and refer to Arikunto (2014) shown by the following Table 1:

Table 1. Likert Scale Assessment Criteria

Validity Criteria	Level of Validity
90%-100%	Very Valid
75%-89%	Valid
65-74%	Valid Enough
40%-64%	Bad Valid
0%-39%	Invalid

Based on Table 1. Above then a level of kevaliies and of QR code e-Module as a media for ecosystem learning, is summarized. The standard used by researchers for the validity of the QR code e-Module as an ecosystem learning media is theoretically valid if the assessment is ≥ 75%.

RESULTS AND DISCUSSION

The research conducted is the Development of an e-Module using the ADDIE development model, which includes Analysis, Design, Development, Implementation, and Evaluation. In the implementation and evaluation stages, they were not conducted due to time constraints. Based on the ADDIE development stage, the first step in the development of the e-Module is analysis, where in this stage the researcher conducts a needs analysis by identifying student needs and also identifying the material as the goal for product development.

The research that has been developed has produced a product that functions as an ecosystem learning media, namely an interactive module based on QR code. This module consists of a front cover, preface, table of contents, introduction, usage instructions, concept map, content, glossary, and bibliography. The layout of the interactive e-Module is presented

simply with a consistent proportion for each main topic, making it easy for students to understand the material concepts. The layout and design of the developed e-Module QR code can be seen in Figure 1 and Figure 2.

Figure 1. Front Cover of the e-Module

Figure 2. e-Module Layout Display

The components of the QR code e-Module content include concept maps, material summaries, and observation activities. and several features that are packaged and presented in the form of barcodes, such as problem analysis activities, learning activities, instructional videos, and assignment submissions. The features are shown in Table 2.

Table 2. Look and Features e-Module

e-Module Feature	Description
KEGIATAN ANALISIS PERMASALAHAN	Contains assignments in the form of problem analysis that must be solved to assess students' understanding of each subject
KEGIATAN BELAJAR I	Contains questions in the form of a game to measure students' understanding of the material
VIDEO PEMBELAJARAN	Contains videos to provide a deeper understanding of the material being studied
PENGUMPULAN TUGAS	Student assignment submission area

Electronic module are learning tools presented independently and structured into learning units. Its presentation is in electronic form, and each learning activity is connected through links, allowing students to interact more closely with the program. In addition, there are sounds, animations, and videos to enhance the learning experience (Kemendikbud, 2017). This is also in line with the opinion Alivia *et al.* (2023), which states that interactive electronic module in the learning process will involve teaching materials presented in digital

format, equipped with various interactive features that will help students understand the material better.

All features presented in the interactive e-Module are packaged in the form of QR codes and can only be accessed via the internet (Awwalina & Indana, 2022). In the QR code section, there is a core part which includes the evaluation of each material, consisting of quizzes, problem analysis activities that raise issues in each material, learning videos, and a submission place for assignments in the form of Google Drive.

Next stage of development, at this stage, the e-Module is validated. The process of validation of e-Module is done to repair e-Module based on validator assessments of the validator and Suggestions or comments to produce appropriate e-Module used as teaching material. The module's assessment consists of three components material worthiness, language worthiness and media worthiness (Latifah *et al*., 2020). The assessment results are presented in Table 3, while a valiant-to-module diagram is presented in Figure 3.

Table 3. Validation Reconstruct

No	Assessment Aspect	Validator Score				
		Validator I	Validator II	Validator III	Average	Criteria
1	Content	90%	97,5%	80%	89,17%	Valid
2	Language	77,5%	92,5%	80%	83,33%	Valid
3	Media	86,15%	96,92%	83,07%	88,71%	Valid
The Total Average Value Score Criteria		84,55%	95,64%	81,23%	**87,07%**	**Valid**

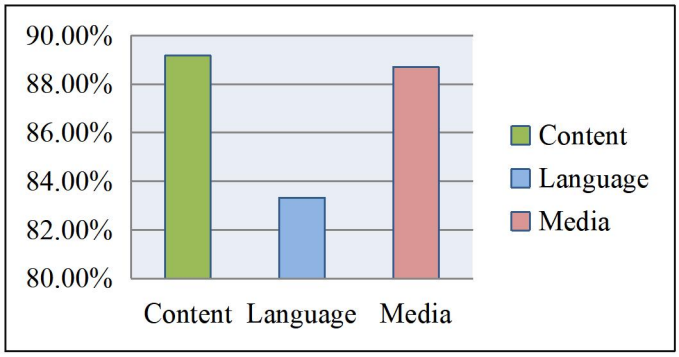

Figure 3. Validation Results by Expert Validator

Next stage of development, at this stage, the e-Module is validated. The process of validation of e-Module is done to repair the recapitulation results in Table 3. QR code e-Module as a media for ecosystem learning get the average of the eligibility of material by 89.17%, the average of the share feasibility by 83.33% and the average of the feasibility of the media by 88.71%. The total average percentage of 87.07% so the QR code based e-Module is stated by the validity of the (Arikunto, 2014). The state declared that the assessment of the

expert validator to the material aspect, the aspect of the media, and the language aspect is stated and worthy of being used in learning activities but there is a need to be repaired.

In addition to providing an assessment of products, the validator also shows excellence and lacks in developed products, as well as suggestions for improvement. The three validators state that the advantage of this developed product contains easy-to-understand material. Product shortage is displayed in Table 4. As follows:

Table 4. Revisions from the Validator

A Revised Section	Before Revision	After Revision
Addition of material	The section studying activity discussion I added ecosystem change materials.	Adding ecosystem change materials to the I learning activity discussion section. 
Design consistency	Noting the design's consistency in the conclusion section. 	Change the design on the part to be consistent. 

Based on the validation results obtained from 3 expert validators, it can be concluded that the developed e-Module has been feasible to be tested.

CONCLUSION

The study media is published using links made by researchers. These QR code based e-Module include competence, concept maps, materials descriptions of ecosystems, learning videos, evaluation of interactive quizzes, problem analysis activities used to sharpen students' critical thinking skills, and also a place for the job collection. The media that has been developed is later validated by three expert validators. After doing research and development (R&D), which corresponds with the addie model development stage, noted that validity of QR code e-Module as a media for ecosystem learning ls are valid. This is demonstrated by the value of validation of 89.17% for content according to basic competence, the value for language worthiness in these e-Module is 83.33%, and the value for graphic worthiness of a media expert of 88.71%. Thus, a total salvation average of 87.07% in a valid category, suggests that the product developed can be used. To get more accurate results, research must be carried out to the evaluation stage, and developed learning products must be corrected and further tested.

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