



Validity of E-Module on Cell Material for Class XI IPA SMA/MA

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Abstract

The purpose of this study is to produce a valid and practical e-module for cell material in class XI IPA SMAN 1 Pasaman. This research is development research that uses a 4D development model consisting of a definition stage, a design stage, a development stage, and a dissemination stage. This stage is limited to the development stage because it is limited by time and cost. The e-module validity test on cell material for class XI IPA SMA/MA was carried out by 3 validators, namely 2 lecturers at the PGRI University of West Sumatra and 1 biology teacher at SMA Negeri 1 Pasaman using a validity questionnaire. The results of the e-module validity test questionnaire analysis on cell material for class XI IPA SMA/MA obtained a value of 93.1% with very valid criteria. The conclusion from the research of e-module on cell material for class XI IPA SMA/MA obtained very valid results with an average rating of 93.10%.

Keywords: validity test, e-module, cell material

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Introduction

Teaching materials are all forms of materials that are arranged sequentially and systematically and display the needs of the competencies that will be mastered by students in the learning process (Ng et al., 2021). Teaching materials can be said to be good if they meet the specified conditions. These provisions are then used as characteristics of a teaching material or subject matter. The characteristics of good teaching materials according to the Ministry of National Education (Inayati et al., 2018), are the substance of the material accumulated from the competency

standards or basic competencies contained in the curriculum, ease of understanding, attractiveness, and ease of reading.

In today's era, a teacher can develop teaching materials that will be used in the learning process by utilizing today's technology. Various efforts to improve the quality of learning continue to be carried out, including through the development of teaching materials and learning media as well as the use of Information and Communication Technology (ICT) in learning biology. Teaching materials are all forms of materials used to assist teachers/instructors in carrying out teaching and learning activities in the classroom (Amoah et al., 2023). The development of teaching materials aims to make it easier for teachers to interact with students through the teaching materials provided by the teacher.

Under certain conditions, teachers cannot deliver learning materials thoroughly so learning materials that are not conveyed must be studied independently by students. The function of the module according to (Montenegro-Rueda et al., 2023); (Darling-Hammond et al., 2024), is as an independent teaching material, replacing the function of the teacher in explaining the material repeatedly, as an evaluation tool and learning reference for students.

Modules are printed and written teaching materials used by students to study independently. Apart from being in print, Modules can be presented in the electronic form known as e-modules. E-modules have better advantages than print modules. (Alvia Quthrotun Nada et al., 2022), asserts that e-modules are better than print modules because they have characteristics consisting of text, animation, audio, and video so e-modules are good teaching materials for students to learn independently.

Based on the results of the author's interview with the biology teacher of class XI at SMAN 1 Pasaman in March 2022 at SMAN 1 Pasaman, it is known that the learning process at SMAN 1 Pasaman is carried out offline and online. Biology lessons are conducted 4 JP per week. Teachers must take advantage of the time allocation available in schools so that learning objectives can be achieved. Other teaching materials are provided by the teacher in the form of worksheets as tasks to be done by students at home.

Based on the results of the questionnaire that was filled out by 35 students in March, it was found that students understood the cell material by listening to the teacher's explanation. This is because students find it difficult to distinguish organelles of animal cells and plant cells from images such as lysosomes, glyoxysomes, peroxisomes, and others. The criteria for teaching materials desired by students are the material delivered is complete, concise, solid, and clear. In the learning process of cell material, students are assisted with learning resources including LKPD or LKS, modules, and textbooks. According to students, the module used needs to be developed so that students can understand the cell learning material. The color criteria made in the e-module will be dominated by blue according to the choice of the students.

The results of the analysis of teaching materials used in schools such as textbooks, modules, and worksheets found several weaknesses, except for textbooks. The textbook already has the appropriateness of the material by the curriculum, but the availability number of textbooks is not sufficient for the number of students in SMAN 1 Pasaman. While the worksheets used have not implemented the use of learning models. In addition, the LKS used still does not meet the minimum standards of the LKS components. According to the Ministry of National Education (2008 in Shobirin et al., 2013), the LKS component consists of titles, learning instructions, competency achievement, subject matter, supporting information, tasks, and work steps and assessments, but the LKS used by schools do not have components such as study instructions, supporting information, tasks and work steps.

Methodology

This research is development research oriented to product development. The development

of the model used by S. Thiagarajan, Dorothy S. Sammel, and Melvyn I. Semmel (1974) is 4-D which includes defining, planning, developing, and disseminating (Trianto, 2010). The development of e-modules is limited to the development stage because it is limited by time and cost. This study consists of a validity test that will be filled out by lecturers and teachers through a questionnaire to produce a revised e-module based on expert input and test data.

The steps to test the validity are as follows: the author asks the lecturers and teachers to see the appropriateness of the linguistic content, presentation, and graphics of the developed e-module media, and the author asks lecturers and teachers to give an assessment of the e-module media that has been made based on the items on the validation sheet and provide suggestions for the shortcomings that exist in the e-module media. After the assessment was carried out, the researcher revised the e-module.

Results and Discussion

The researcher uses a Likert scale which is modified with five answers as follows:

SS = Strongly Agree with a weight of 5

S = Agree with a weight of 4

KS = Disagree with a weight of 3

TS = Disagree with a weight of 2

STS = Strongly Disagree with a weight of 1

The data analysis technique used is qualitative data in descriptive form with the formula:

$$\text{Validity Value} = \frac{\text{The total score obtained}}{\text{Maximum total score}} \times 100\%$$

After the results of the percentage of validity are obtained, grouping is carried out according to the criteria modified can be seen in Table 1.

Table 1. The average value of the e-module validity test on cell material for class XI IPA SMA/MA

Validity Average	Criteria
85-100%	Very valid
69-84%	Valid
53-68%	Very valid
37-52%	Not valid
0-36%	Very not valid

The validity of the e-module on cell material for class XI IPA SMA/MA was carried out by 3 validators, namely 2 lecturers at PGRI University, West Sumatra, and 1 biology teacher at SMA Negeri 1 Pasaman. The data from the validity test results can be seen in Table 2.

Table 2. The results of the e-module validity test on cell material for class XI IPA SMA/MA

Aspect	Amount	Maximum Score	Average value (%)	Criteria
Content eligibility components	173	180	96.11	Very valid
Linguistic component	82	90	91.11	Valid

Components of Serving	124	135	91.85	Very valid
Graphics Component	98	105	93.33	Very valid
Average			93.10	Very valid

Discussion

The validity of the e-module on the developed cell material obtained an average value of 93.10% with very valid criteria (Table 2). The validity assessment that has been carried out includes aspects of the feasibility of content, language, presentation, and graphics (Elo et al., 2014); (Weiner et al., 2017). The results of the assessment are obtained because the e-module has appropriate content in terms of material, good and correct use of language, attractive and interactive presentation, and graphics. The assessment was obtained because the e-module had appropriate content in terms of material referring to school and college books which were compiled by adjusting the indicators of achievement in schools. Sentences in the e-module are arranged using the Indonesian Language Rules with a simple number of sentences. The presentation of the e-module material is equipped with images that have clear descriptions and videos related to cell material such as bioprocesses and practicum about cells and are equipped with practice questions and evaluations that can reflect on students. In addition, to the graphics, the e-module has a display that is adapted to students by considering the use of soft and contrasting colors, the use of harmonious music, images, and videos with the best resolution, and the use of type and letters that are clear to read. This is by (Van Diggele et al., 2020), who states that good teaching materials have material coverage that meets the achievement of competence in schools and is guided by good and correct language writing, presentation, and graphics that are arranged systematically and clearly.

The evaluation of the validity of the e-module from the feasibility aspect obtained an average value of 96.11% (very valid). The validation results show that the content of the e-module already includes core competencies, basic competencies, and indicators of competency achievement with the existing curriculum. In addition, the content of the developed e-module has followed the development and needs of SMA/MA students. This is because the material in the e-module is based on literature from books published by the Ministry of Education and Higher Education. Then the material from the book is arranged based on the achievement of competencies in the school. The preparation of the material is also carried out by taking into account the current aspect so that it is relevant to the needs of students. (Tong et al., 2022), states that the module material must be appropriate based on the achievement of competencies that apply in schools. In addition, asserts that the module is made with a student-oriented orientation so that students can understand and master the learning material being taught.

The validity of the e-module from the linguistic aspect is stated to be very valid with an average value of 91.11%. This shows that the e-module developed uses good and correct language. The writing of the e-module uses the Indonesian language rules to produce good and correct e-module sentences (Pawestri et al., 2023); . E-modules are also made with sentences that are not too long so as not to confuse the contents of the e-module. This is by (Sipayung & Benarita, 2023), who states that module sentences must use communicative sentences with correct language writing and not cause double-meaning sentences. Writing and language e-modules must use good and correct language writing references including vocabulary, sentence clarity, relationships between sentences, and sentences that are not too long so that information on learning material in e-modules is easily understood by the student reader. Module writing should use simple and not long sentences so that the learning information conveyed is clear and directed to the reader.

From the aspect of the presentation, the validity of the e-module on cell material is declared very valid with a value of 91.85%. The e-module material developed is equipped with enlarged image illustrations so that users can see the part of the image they want to see. In addition, the image is also equipped with information and literature sources. As for some of the material, some videos

are relevant to the material in the e-module that was developed such as practicum activities so that students can understand how the cell practicum process is carried out. The e-module is equipped with practice and evaluation questions that are equipped with keys and discussions and will appear when pressed with the button on the e-module. This is by (Wijngaards-de Meij & Merx, 2018), who state that the presentation of material on the module must be made with good and attractive visualization by adjusting the achievement of the learning objectives.

The validity of the e-module from the graphical component has obtained a value of 93.33% with very valid criteria (Rahmatika et al., 2022). This shows that the overall e-module design is very good and attractive including the cover display, button animation, music, font type and size, images, and videos used (Daryanes et al., 2023). The cover display uses soft and contrasting colors so that it can be seen comfortably by the eye. Button animations are made in various forms to let users know that these buttons can be used to carry out the functions of the buttons on the e-module. In addition, there is background music and sound effects that are used in a harmonious voice with a slow tempo so that students do not feel bored or sleepy. Images and videos in the e-module material use a high graphic resolution so they don't look blurry. The type and size of the font used in the contents of the e-module are Times New Roman with a size of 14-18 pt. The purpose of selecting the type and size of the selected font is so that the writing looks clear and neat in the e-module. Times New Roman is one of the types of letters used in the manufacture of teaching materials because it has a graceful and clear form to read. (Dwivedi et al., 2022), also emphasized that the graphics of the module must have good physical modules such as using clear and easy-to-read font types and sizes, a neat and orderly layout of the module contents, as well as clear and appropriate images and videos by the module.

Conclusion

Teaching materials are all forms of materials that are arranged sequentially and systematically and display the needs of the competencies that will be mastered by students in the learning process. The e-module validity test on cell material for class XI IPA SMA/MA was carried out by 3 validators, namely 2 lecturers at the PGRI University of West Sumatra and 1 biology teacher at SMA Negeri 1 Pasaman using a validity questionnaire. The results of the e-module validity test questionnaire analysis on cell material for class XI IPA SMA/MA obtained a value of 93.1% with very valid criteria. The conclusion from the research of e-module on cell material for class XI IPA SMA/MA obtained very valid results with an average rating of 93.10%.

Conflicts of Interest

The authors declare no conflict of interest

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