

Development of Interactive E-Modules (e-MI) through The Canva App in Biology Learning

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Abstract. This study aims to produce an interactive e-module (e-MI) on carbohydrate material biochemistry course with good validity, practicality, and effectiveness. The research method used in this research is Research and Development (R&D) with ADDIE approach design (Analyze, Design, Development, Implementation, Evaluation). The results of this study are e-MI products based on the validation results of content experts by 84.25% and media experts by 77.98%, showing valid criteria in the aspects of content feasibility and practicality. While the results of user trials of 81.34% indicate practical criteria in the practical aspect of using interactive e-modules (e-MI), and a percentage of 82.65% shows very effective criteria in terms of the effectiveness of using e-MI. So the results of this study recommend using this interactive e-module (e-MI) for learning activities, especially in the Biochemistry course of carbohydrate material.

Keywords: Biology Education; Interactive E-Modules; ADDIE Model

1 Introduction

Modules are learning resources commonly used by lecturers. The module is a planned learning device used to help students learn independently [1]. Modules widely used by lecturers are printed and can be used directly by students alone to understand the material. The printed form module is certainly not practical if applied to online learning today. Independent learning is needed in the current online learning process where lecturers cannot fully monitor the student learning process. Digital learning is a form of learning that supports students to learn independently and helps students during online learning [2]. Modules that are part of digital learning and developed using computer technology are called Electronic Modules (E-Modules) [3]. E-Module is an alternative learning resource that can be used during online learning. Innovation in the development of electronic modules is needed to support 21st-century learning [4] and the existence of Z-generation. This technology generation is intelligent and desires to direct themselves [5]. E-Modules support students to learn independently and can be done by developing digital learning materials that utilize technology [6]. E-Modul is a set of non-printed learning media arranged systematically and can be used to learn independently according to their learning style to solve problems in their way [7].

E-Modules can solve problems related to the quality of learning because it facilitates communication between students and lecturers, lecture materials, and fellow students in unlimited situations, conditions, places, and times [8]. This is why e-Modules can be used

during face-to-face learning and online learning because they can be used not only during lecture hours but also outside lecture hours [9].

Biochemistry courses are subjects considered difficult by most students [10]. The majority of students are not yet capable of integrating concepts [11], so to understand complex biochemical materials, learning resources such as e-Modules are needed that are easy for students to use during online learning because they can be accessed using laptops or cell phones. This e-module contains teaching materials consisting of interactive animation, audio, navigation, links, and videos. Interactive E-Module (e-MI) helps students engage the senses of hearing and sight, making it easier for them to remember the information and understand it and will affect long-term memory [12]. This e-MI development uses the Canva application, which students can use via laptops and smartphones. In addition, the E-Module, which is equipped with pictures, videos, animations, questions, and initial guidelines for practicum activities, is expected to help students learn independently to achieve concepts [3].

2 Methodology

The research method used in this research is Research and Development (R&D) with ADDIE approach design (Analyze, Design, Development, Implementation, Evaluation) [13]. According to Lodico, the design of this development approach consists of five stages, namely: a) analysis; b) design; c) development; d) implementation; and e) evaluation [14]. Visually, this ADDIE stage can be seen in Figure 1.

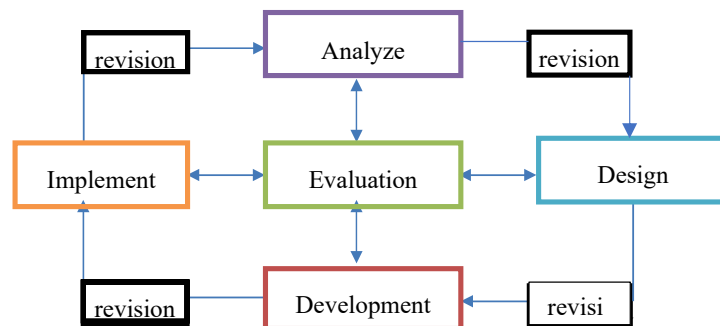


Figure 1. ADDIE Development Approach Design

The stages carried out in research with the design of the ADDIE development approach are as follows:

a. Analyze

At this stage, the main activity is to analyze the need to develop new learning tools, namely the Interactive e-Module (e-MI), and analyze the feasibility and requirements for developing new learning tools.

b. Design

In designing new teaching resources/materials (e-MI), the design stage is similar to creating e-MI products. This activity is a systematic process containing the content and construction of the Interactive e-Module (e-MI), starting from setting learning objectives, designing scenarios or teaching and learning activities, and designing learning materials and

evaluation tools for learning outcomes that exist e-MI along with the e-mail design. MI, applications used and features in e-MI also layout on flash video products, etc. This e-MI product design is still conceptual and will underlie the following development process.

c. Development

The development in the ADDIE design contains activities for realizing the e-MI product design. A conceptual framework and construction of e-MI implementation have been prepared in the design stage. The conceptual framework is recognized as a product ready to be implemented at the development stage.

d. Implementation

At this stage, the e-MI product design and methods developed are implemented. During implementation, the e-MI design developed is applied to actual conditions. At this stage, the results of the development are involved, namely assessed by experts (Judgement experts) and users (students) to determine their effect on the quality of learning which includes components of content feasibility and design feasibility, including aspects of validation and aspects of practicality and effectiveness of e-MI products. The application is carried out in small groups to get input from users and experts/ judges to improve product drafts.

e. Evaluation

After implementation, the design of the interactive e-module (e-MI) product developed is applied to actual conditions, namely large-scale trials on users, namely students. The evaluation was conducted to provide feedback on implementing the Interactive e-Module product.

3 Result and Discussion

3.1. Analysis and Design Stage

Based on the needs analysis in the Biochemistry course, especially on Carbohydrates, students still have difficulty understanding the abstract structure of carbohydrates. Online learning reinforces this difficulty, so videos and simulations are needed to help students understand and reach concepts.

3.2. Development Stage

The results at the analysis and design stages obtained material developed in the carbohydrate chapter. Next is the preparation of points that will be elaborated, such as materials, questions, videos, hyperlinks, simulations, and references, all of which will be outlined through the Canva application.

3.3. Implementation Stage

The results of the development then enter the implementation stage by content experts and media experts by getting some input from content experts, including a) the characteristics of the e-module are raised; b) using image comparisons between contextual and chemical structures; c) addition of examples of questions; d) in the introduction, a brief description and purpose of the e-module should be added. Meanwhile, inputs from media experts include: a) Images that are too small and text that exceeds the background object; 2) The table of contents should be directly directed to the page with one click; 3) quiz sheets should use google form; 4) the video displayed should contain a homemade video; 5) Designs and images should be free of license.

The validation of content/teaching materials experts on the Development of Interactive E-Modules in Biology Learning was carried out by two experts in biology learning. The

assessment was carried out to analyze the quality of the Interactive e-Module in every aspect assessed and justify the feasibility of the Interactive e-Module product. The results of validating each aspect of the quality of the Interactive e-Module are presented in Figure 2.

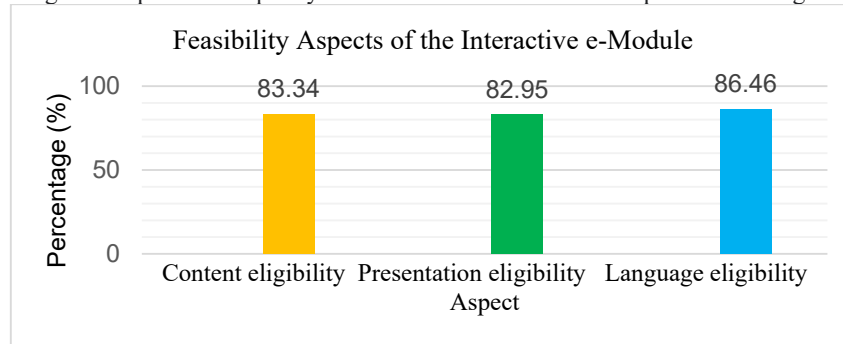


Figure 2. Average Value of Teaching Material Expert Validation Results

Based on the data from the expert validation of teaching materials above, it can be seen that the feasibility of content and presentation in the Development of Interactive E-Modules in Biology Learning, in general, is in the valid category with a percentage of 83.34% and 82.95%. In comparison, the language feasibility aspect is very valid in the category with 86.46%.

Validation of media experts on the Development of Interactive E-Modules in Biology Learning was carried out by an IT/Media expert. The assessment was carried out to analyze the quality of the Interactive e-Module in each assessed aspect and justify the feasibility of the Interactive e-Module product. The results of validating each aspect of the quality of the Interactive e-Module media are presented in Figure 3.

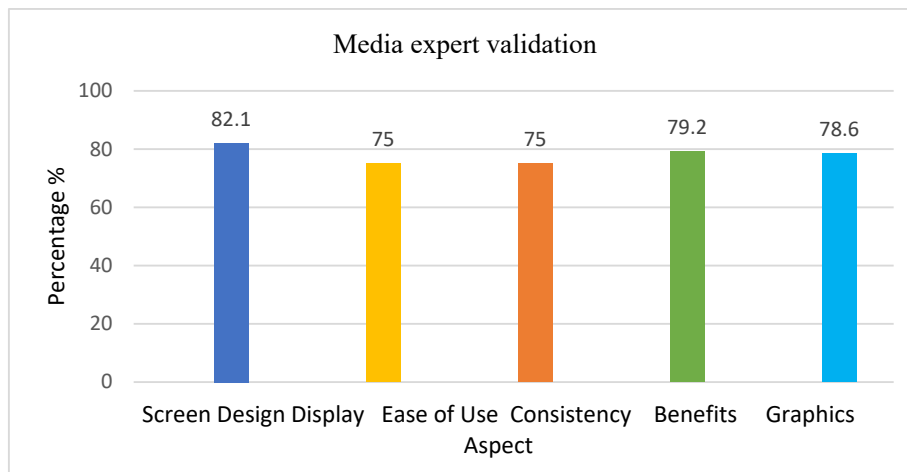


Figure 3. Average Value of Media Expert Validation Results

Based on the data from the validation results of media experts above, it can be seen that the screen design display, ease of use, consistency, usefulness, and graphics in the Development of Interactive E-Modules in Biology Learning are generally in the valid category.

Figures 2 and 3 show that the e-module (e-MI) developed is valid. This indicates that the e-MI produced follows the theory and focuses on content, display design, language use, and product components related to each other [15]. In line with the opinion, which states that if the data produced by a product is valid, it can be said that the product provides an overview of the development objectives appropriately and the following reality and is used [16]. Content validity is an essential part of module development. This is because the content in the module becomes a reference in the learning process where invalid content can lead to a wrong understanding of the material [8]. The language aspect has very valid criteria, this aspect is the most crucial aspect in the preparation of e-MI where the thing that needs to be considered in the practice of e-MI is accuracy in sentence arrangement so that the module is communicatively structured and easy to use as a study guide [17]. The conclusion of the validator states that e-MI is feasible to use.

After being validated by experts and revised according to the suggestions from the validator, the researcher then conducted a small-scale trial to see the practicality and effectiveness based on student responses to the use of e-MI. The test results obtained 81.34% for the practicality aspect in the practical use category. E-Modules are suitable for being used as alternative (functional) learning materials that can help learn. This is very time efficient because students can read e-modules (e-MI) anywhere and anytime [18]. The effectiveness aspect of using e-MI is based on student independence in learning. The percentage of 82.65% for the effectiveness aspect is in the very effective category used by students. Based on the results, it can be stated that e-MI is very effectively used to support student independence in learning. The development of e-MI as an alternative learning media can support independent learning where interactive e-modules can make students learn independently [19]. The results of the implementation phase show that e-MI is ready to be used and feasible to be tested on a large scale which is part of the evaluation phase.

4 Conclusion

The results of this study are an interactive e-module (e-MI) product which is based on the validation results of content experts covering aspects of the feasibility of content, presentation, and language in the Development of Interactive E-Modules in Biology Learning reaching 84.25% and based on media expert validation which includes screen design display, ease of use, consistency, usability, and graphics in the Development of Interactive E-Modules in Biology Learning reached 77.98%, both validation results indicate valid and practical criteria in terms of content feasibility and practicality. While the results of user trials of 81.34% indicate practical criteria in the practical aspect of using interactive e-modules (e-MI), and a percentage of 82.65% shows very effective criteria in terms of the effectiveness of using e-MI. So the results of this study recommend using this interactive e-module (e-MI) for learning activities, especially in the Biochemistry course of carbohydrate material.

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