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Global Conferences Series:
Social Sciences, Education and Humanities (GCSSSEH), Volume 5, 2020
Progress in Social Science, Humanities and Education Research Symposium
DOI: https://doi.org/10.32698/GCS-PSSHERS349

The Development of Learning Modules Based on Electronic Books on the Subject of Analyzing Tablet Formulations Using 3D PageFlip Professional

Ade Hafizza[a], Edidas[a], Jalius Jama[a]
[a]*Techonological and Vocational Education,Universitas Negeri Padang, Indonesia*
E-mail: hafizza.farmasi@gmail.com

Abstract: This article discusses the development of valid, practical, and effective electronic book-based learning modules on the subject of analyzing tablet preparations. This book is designed to improve learning outcomes and student motivation. Furthermore, this study utilizes the 4D (Four-D) model. The results obtained are that the electronic book-based learning module is expressed by experts as a valid, practical media based on teacher and student responses, and effective in improving student learning outcomes and motivation. Based on the findings, it was concluded that the book could be used as an effective teaching material on the topic of analyzing tablet preparations.

Keywords: Electronic book, Learning Modules, Four D, Learning Outcomes

INTRODUCTION

The technique of making tablet preparations is a branch of science that deals with the manufacture of various types of preparations. Furthermore, this technique in pharmacy vocational schools is a group of productive subjects. These subjects are taught in class XI and Class XII for the 2013 curriculum. The material taught has similarities with Prescription Science subjects, which have been studied in the Education Unit Level Curriculum. Competence of tablet preparation techniques includes the definition of tablets, classification of tablet s, purpose of use, method of manufacture, damage and tablet requirements. These competencies require visualization to help students in understanding concepts. While learning how tablet s are prepared, students still face various obstacles, such as difficulty understanding basic concepts and a loss of interest in learning (Agelidis and Vassilios, 2005; Harb et al., 2005). In the classroom environment, teachers have a limited of time to deliver material to students (Brioschi, 2015; Paul, C. et al, 2014). Because of the time constraints, teachers have observed lower levels of student success while learning medicine-making techniques. (Han, 2012).

Learning media are part of a system of teaching that can be used in different ways to support students in class. The development of learning media should be based on the types of tools that hold students' attention and improve their interest through instruction. (Edidas and Jama 2015). With the existence of information and communication technology (ICT) based teaching programs, education is expected to expand to more remote areas, thereby motivating more community members to begin or continue their studies (Effendi, Soenarto et al. 2015). Based on the opinions above, the electronic book-based learning module for tablet preparation techniques is the solution to the problems that have been described.

The learning module is consisting of text, images, animations, and videos. This method can help students visualize difficult material, therefore they can understand it better. The use of digital modules also enhances printed material with interactive features, making learning more interactive, easy, and fun, as well as improving student competency (Imansari, 2017; Suarsana and Mahayukti, 2013; Wijaya and Sefriani, 2017) .

The modules display information in a way that is more interactive than printed material(Bauer and Fedak, 2010; Darmayanti, et al., 2007). To measure competencies beyond the interactive quizzes through 'kahoot.it', teachers can lead face-to-face discussions about material that was presented electronically.

Based on observations of students of preparatory medicine made at Imam Bonjol Bukittinggi Pharmacy Vocational School, students tend to retain less information when their interest in the material being taught is low. Therefore, we can conclude that the traditional teaching process is not effective in helping students master the concepts of their field of study. Based on the description, an electronic book-based

learning module was developed to analyze the tablet dosage. It is expected to improve understanding and motivate students to learn more effectively.

More specifically, the objectives of this development are: 1) creating a good learning module for analyzing tablet , and 2) measuring the validity, practicality, and effectiveness of the learning modules on analyzing tablet preparations. The benefit of development is to help students understand the material on the topic of analyzing drug preparations in the form of tablets.

METHOD

The type of method used is research and development. The development method is a research to produce certain products and test the effectiveness (Sugiyono, 2010).

The development model used is the 4D model, which stands for Define, Design, Develop and Disseminate. The 4D model is used because it aims to make teaching materials (Thiagarajan, 1974). The procedure for developing this electronic book-based learning module is limited to the development stage.

The first stage is a preliminary analysis, including analysis of syllabus, concept, and student characteristics. The analysis aims to establish and define the conditions for learning needed in the development of the module.

The second stage is design, consisting of Prototype 1 of the electronic book-based learning module. The module is first designed, and then is passed off for review by experts. Prototype 1 is revised according to advice from the experts, and then becomes Prototype 2. This prototype then undergoes field testing to determine the level of practicality through teacher and student responses.

The third stage is the assessment, which is initiated once the final module has been declared practical. Evaluation of the effectiveness of its modules can be determined through analyzing the results of individual completeness and differences in learning outcomes before and after the use of learning modules, as well as determining the effectiveness in terms of learning motivation.

Data regarding validity, practicality and effectiveness are obtained using questionnaires. The trial included two groups of students of the Imam Bonjol Pharmacy Vocational School, Bukittinggi, with up to 30 students in each. One group was made the experimental class, and the other the control.

RESULT AND DISCUSSION

This study is educational research and utilizes a 4D development model, which consists of four stages: Defining, Designing, Developing and Disseminating.

Preliminary Analysis Results

One of the competencies that must be achieved in the subject of tablet Preparation is analyzing the dosage. These competencies include understanding, classification, components, how to make, damage, and tablet requirements. The learning module has all of the characteristics needed to help students master these competencies. The results of the preliminary analysis indicated that the material was in accordance with the competencies that must be achieved by students.

After conducting the preliminary analysis phase, there is a learning module that presents 6 topics. Exercises on each topic will be applied through the ‘kahoot.it’ site.

Design Results

After conducting the preliminary analysis phase, a module is designed. The results of the design at the initial stage are named Prototype 1. The format of the preparation is based on the systematics of electronic modules (Ministry of National Education, 2010), consisting of: 1) front page, 2) convention, 3) subject information, 4) contents, 5) Practice. The front page describes the contents of the learning module and can be seen in Figure 1.

Content is created with the goal of making it easier for students to learn the material. Subject information sheets are designed so students know information that will be taught and achieved. The book design s can be seen in Figure 2.

Figure 1. Display of Learning Module on Front Page.

Figure 2. Content Display and Subject Information

The contents include material, conclusions and bibliography. The material is designed based on the learning outcomes contained in the syllabus. The material is filled with text, images, animations, and videos. It can be seen in Figure 3.

Figure 3. Display of Content

The conclusion contains a brief summary of the module. The bibliography lists references to outside sources. The design of these sections can be seen in Figure 4.

Figure 4. Display of Conclusions and Bibliography.

Learning exercises will be implemented through the "kahoot.it", utilizing multiple-choice quizzes that instantly display right and wrong answers to questions. Once a question has been answered, it display the student's results. The quiz results can be seen in Figure 5.

The modules have been validated by two media and two material experts, who evaluated display, programming, utilization, material, learning, and summaries. The results are validation values for the design which are summarized in Table 1.

Table 1. Results of Electronic Book-Based Learning Module Validation

No	**Validator**	**Aiken's V coefficient**	**Classification**
1	Media Expert	0.92	Valid
2	Material Experts	0.90	Valid

The results of the validity analysis by media experts obtained an average aspect of 0.92 > 0.66, and the results of the validation with material experts obtained an average of 0.90 > 0.66. Therefore, it can be concluded that the learning module is valid.

Figure 5. Display of Exercises.

Figure 7. Display Results of Answers.

Prototype 1, which has been revised ac-cording to the validator's suggestions, is then evaluated for practicality by analyzing a questionnaire.

The results of the analysis (Figure 8 and Figure 9) show that, according to the teacher, the average practical test module obtained a value of 92.67%, and student data acquisition was 85.98%. Thereforeit can be concluded that electronic book-based learning modules are very practical.

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Figure 8. Graph of Practicality Based on Teacher's Responses.

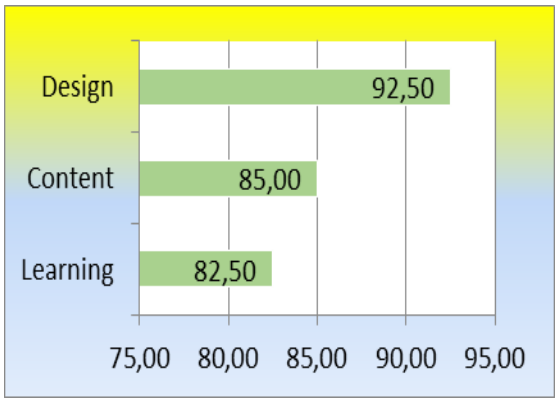
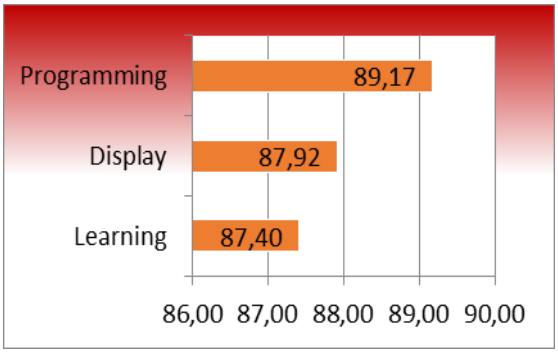


Figure 9. Graph of Practicality Based on Student Responses.



Rating Result

The module was then tested on 30 students of Class XII.A. The effectiveness is seen from the learning outcomes and questionnaire results on learning motivation.

The results of the analysis of effectiveness the module for the experimental class showed that average learning outcome was 82.53% while for the control class, it was 71.20%. The effectiveness results were also seen from differences in post-testing by using the paired data t-test. Before the t-test analysis is carried out, the test requirements, namely the analysis of normality and homogeneity, are determined.

The results of post-test data analysis, at a significance level of 0.05, obtained the value of 0.770 for the experimental class, while for the control class it was 0.352. The data is declared to be normally distributed. Based on the results of the homogeneous test analysis, the significance level of the post-test value is 0.362 > 0.05, meaning that the post-test data has the same variance. For data that has been declared normal and homogeneous, the hypothesis testing is done by using a t-test analysis with the SPSS program.

Table 2. T-Test Analysis Results.

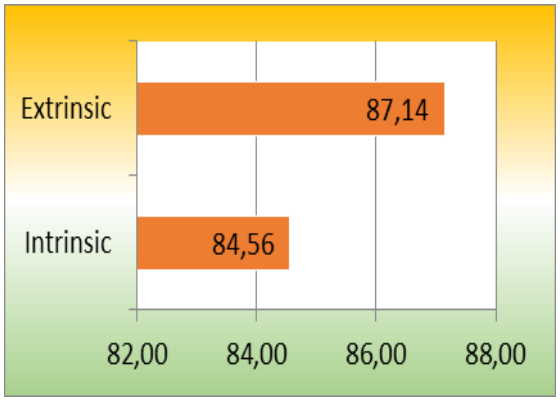
Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil_ Belajar	Equal variances assumed	.845	.362	3.823	58	.000	11.33333	2.96421	5.39983	17.26684
	Equal variances not assumed			3.823	56.983	.000	11.33333	2.96421	5.39758	17.26909

Based on the SPSS output, shown in Table 2 (T-count > t-table: 3.823 > 2,048), there are differences in the learning outcomes of the experimental and control classes. Based on the results of the t-test analysis, the electronic book was declared effective.

The effectiveness of the book is also visible when looking at student learning motivation. The results of learning motivation are obtained from a questionnaire given after using the module. The results of the assessment of effectiveness of learning motivation are summarized in Figure 10.

Figure 10. Graph of Effectiveness of Learning



Motivation.

The results is based on Figure 10 obtained an average of 85.86%. This shows that electronic learning modules are indeed effective in motivating students to learn the material. Based on the analysis of data, the results of the validation of learning modules obtained from the media and material aspects are valid. The material in the module needs to be presented well, easy to operate, and the components need to be in line with the electronic modules. In addition, the module needs to be aligned with learning outcomes, and the material should be presented clearly, with summaries displayed appropriately.

Teachers and students report that the results are practical. Therefore, it can be concluded that the electronic book can be read clearly, is easy to use, and students are interested in e-learning. The results of the effectiveness in terms of learning outcomes between the experimental and the control classes showed that after using the modules, the experimental class had higher learning outcomes than the control. Therefore, it is shown that the modules lead to better learning outcomes.

The effectiveness of the module is also seen through students' learning motivation. The effectiveness test looked at whether students were motivated intrinsically or extrinsically. Based on the results of data analysis, the electronic module was found to be effective in terms of motivation.

CONCLUSIONS

The electronic book produced is a digital module containing text, images, animations, and videos featuring material on the topic of analyzing tablet preparations. The module is applied to the Imam Bonjol Bukitinggi Pharmacy Vocational Computer Laboratory. The modules are stored offline and can be shared with students during online training.

The module is also considered by experts as a valid medium that can be used as a practical teaching method. It can be also considered practical based on teacher and student responses and the evidence obtained through research.

Based on these results, the suggestion proposed to the next researcher is to develop modules on other subjects that can be applied according to the needs of students and teachers. This module can also be tested with a larger subject, so the use of the electronic book can become much broader.

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