



Two-Dimensional Figure E-Modul with Contextual Teaching and Learning (CTL) Approach

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Abstract

The development of the technology and digital era began with the shift from printed books to electronic books. Therefore, the purpose of this study was to develop a two-dimensional figure module with Contextual Teaching and Learning (CTL) for PGSD students. This study applied the Thiagarajan 4D research and development method (Define, Design, Develop, and Disseminate). The data analysis techniques used were quantitative and qualitative descriptive data analysis. The results of this study were two-dimensional figure e-modules with the CTL approach that can be accessed by PGSD students as geometry teaching materials. The modules are two-dimensional object e-modules with CTL approach validated by experts. The results of e-module validation are 90% with highly valid and feasible categories. The implementation of e-modules shows an increase in students' understanding of two-dimensional object material.

Keywords: CTL, E-module, Two-dimensional Object

1. Introduction

Mathematics teaching materials in general still provide the concept of abstract formulas, so that students only memorize the formula [1]. In fact, mathematics is not a matter of memorization [2]. Mathematics teaches to think logically, analytically, systematically, critically, and creatively [3]. Geometry is an interesting and fun mathematic material [4] and two-dimensional object is one of the geometry teaching contents.

Along with the rapid development of communication and technology, students learning services also need to be improved by providing electronic teaching materials [5]. Teaching materials contain conceptual material [6] and problems in the form of assignments [7], [8]. The assignment aims to find out the students' learning achievement [9] relevant to their respective skills [10].

Module is one form of independent teaching material that is packaged systematically and contextually [11]. With the development of electronic books, it is necessary to develop contextual electronic modules for students. Contextual Teaching and Learning Approach (CTL) provides experience, independent learning and develops mathematical skills. [12]. Therefore, a two-dimensional object e-module with the CTL approach needs to be developed.

This two-dimensional e-module specification with the CTL approach developed is an independent module for students containing activities to improve understanding, think critically and creatively on two-dimensional and three-dimensional materials. The characteristics of e-modules contain self-instruction, self-contained and stand alone [3]. E-modules can be accessed anywhere and anytime [13], [14]. Most students are more interested in using e-modules to help complete their assignments

[5]. Therefore, the purpose of this study is to develop a two-dimensional object e-module with the CTL approach.

2. Reseach and Method

This research is a development research by adapting the 4-D model developed by Thiagarajan [15] [16] as shown in figure 1.

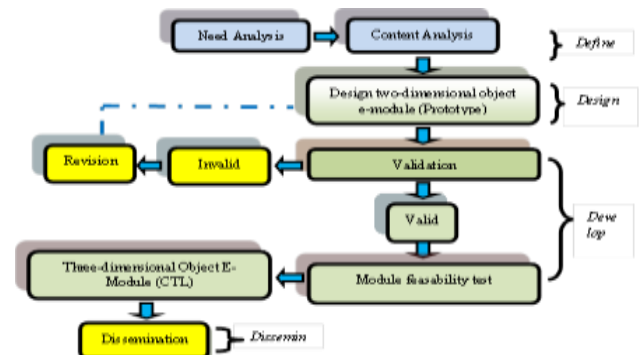


Fig 1. The procedure of Two-dimensional Object E-Module Development

Figure 1 consists of 4 stages: (1) define phase, that is, determine and define learning needs by analyzing the objectives and scope of the material, (2) the design phase (design), e-learning modules are designed to obtain prototypes (sample of a learning e-module), (3) a development phase that aims to produce a draft, revised learning tool based on expert input, and (4) a disseminate phase that aims to test the effectiveness of using e-modules in teaching and learning activities.

The subject of this study was a PGSD student at Kanjuruhan University of Malang. Data collection instruments are e-module vali-

dition sheet, observation sheet and learning outcomes test. The data analysis in this study are (a) Qualitative Data, in the form of input, criticism, responses and suggestions from validators (b) Quantitative Data, in the form of e-module validation results and learning outcomes.

3. Results and Discussions

Two-dimensional Object E- Module with CTL Approach

The E-module presents the concept of mathematics learning related to students' daily lives. The e-module material is a two-dimensional object which includes quadrangles, rectangles, triangles, trapezoidal, parallelogram, rhombus, kites and circles. The material on the e-module is packaged with a *Contextual Teaching and Learning* (CTL) consisting of making meaningful connections, self-regulated learning, Critical and creative thinking, nurturing the individual, reaching high standard and using authentic assessment [2], [17]. The following is the syntax of the development of three-dimensional e-modules with the CTL approach as seen in table 1.

Table 1.: Two-dimensional Object E- Module with CTL Approach Syntax

CTL Components	The Components in e-module
1. <i>Making meaningful connections</i>	The application of two-dimensional object in daily lives.
2. <i>Self-regulated learning</i>	Problem Posing as assigning-problem activities
3. <i>Critical and creative thinking</i>	Assigning problems in open-ended and Problem Solving form.
4. <i>Nurturing the individual</i>	Skill test and Nurturing in e-module to draw conclusion
5. <i>Reaching high standard and using authentic assessment</i>	Giving assessment column independently on learning outcomes

E-module includes content, methods, and evaluation that can be used independently according to the speed of learning of each individual effectively and efficiently. It is expected from the use of e-module that students learn through experiencing and not memorizing [18], [19]. E-modules can be accessed by students through e-learning provided by the university.

E-Module Feasibility Test

The e-module feasibility data was obtained from the validation of material, module and language experts. The data obtained was in the form of qualitative and quantitative data. The quantitative data was used to examine the e-module feasibility. The qualitative data was used as the recommendation for improving the e-module. The result of data analysis is presented in Table 2.

Table 2.: The Feasibility Test Result for the E- Module

No.	Components	Percentage	Criteria
1.	Content Feasibility	92 %	Highly Valid
2.	Presentation Feasibility	88 %	Valid
3.	Language Appropriateness	90 %	Highly Valid

Based on the analysis results in table 2, the lowest presentation feasibility is 85%, because the two-dimensional e-module still needs to be developed. The overall aspects obtained by 90% and categorized as highly valid. Thus the two-dimensional object e-module with the CTL approach is feasible to be applied in the field. Teaching materials in the form of mathematical modules have previously been developed in integer addition and subtraction material [20], pecahan [21] serta lingkaran dan bola [22].

The Experiment Result

Based on the results of the two-dimensional object e-module test with a contextual approach to PGSD students at Kanjuruhan University Malang showed a positive response by 95%. Based on the very high student response, shows that the development of

technology and information can help students in the learning process (Chena et al., 2015; Dore et al., 2018). The use of e-modules with the CTL approach has also increased students' understanding of two-dimensional object material.

4. Conclusion

The E-module with the CTL approach has the advantage of being accessible to all PGSD students anywhere and anytime. This is evidenced by the feasibility of e-modules based on the results of expert validation on aspects of content, presentation and that the average module of 90% categorized as highly valid. The use of e-modules with the CTL attract good response from students and can improve students' understanding on two-dimensional object material. Based on this, the e-module still needs to be improved in other mathematical materials as self-study references for students. Thank you to the Ministry of Research, Technology and Higher Education who have funded this research.

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