THE IMPACT OF E-MODULES ON STUDENTS' CRITICAL THINKING SKILLS

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ABSTRACT: E-modules is one of electronic learning materials more useful and efficient in 21st learning. The objectives of this study are to develop an e-module, measure its feasibility and analyze its impact on students' critical thinking in the Learning Media Course. ADDIE model (Analysis, Design, Development, Implementation and Evaluation) was used in this study. A quasi-experimental research design was carried out to analyze the impact of using e-modules on critical thinking. A total of 40 students in the fourth semester of the Geography Education Department, Social Sciences Faculty, Universitas Negeri Medan were participated in this research. Data collection was used questionnaires and an essay test. Descriptive statistics and inferential statistics were performed for data analysis. The statistical test carried out was a t-test. The research findings showed that the e-module was feasible to apply in lectures and significantly improved students' critical thinking.

Keywords: E-modules; Feasibility; Critical Thinking

1. INTRODUCTION

The rapid of ICT development in the 21st century has impacts on various fundamental human life in the world especially on education. ICT encourages educators and learners to utilize it in the teaching and learning process. All levels of education are required to apply appropriate technology for the learning process. Recently, educators needed ICT skills to improve quality of learning process, especially in 21st century as digital learning era. Both face to face learning and e-learning supported by appropriate learning technology [1].

Furthermore, various kinds of learning resources can be formed as electronic learning resources such as e-books and e-modules [2]. E-modules are electronic learning resources to support self-learning and its' flexibility. Leaning materials in e-modules can be presented by combining audio, visual or video, multimedia, animation and others [2] [3]. E-modules are developed in accordance with the curriculum. Its' characteristics include self-instructional, self-contained, stand alone, adaptive, and user friendly [4]. E-modules as learning materials that contain learning objectives or competencies in each part of learning activities, materials description and explanation, summaries, and learning assessment or evaluation. This e-module can help students to learn more flexibly, independently and support their learning achievement [5] [6].

The e-module is designed systematically and explains the learning material coherently, making it easier for learners to study and understand the material. E-modules provide learning instructions, and it can help students to achieve the learning objective effectively, efficiently and independently [7] [8]. Previous research revealed that the benefit of e-modules on self-efficacy, self-regulating, learning independence, motivation, critical thinking, learning performance and learning outcomes [9] [10] and we need to develop the learning materials based on student's characteristic [11].

Learning competencies in 21st century focuses on life skills such as critical thinking skills, problem-solving, decision-making, creative thinking, collaboration and mastery 4 new literacy including digital literacy, human literacy, language literacy and data literacy. Critical thinking skills as one of the demands on 21st century learning competencies need to be improved. Critical thinking skills are a systematic process to make decisions [12]. Critical thinking is thinking that uses depth reasoning to select information and responsibility [13]. It is an ability that cannot be developed automatically. According to previous study, critical thinking is a cognitive skill that includes self-management in problem solving as well as interpretation, analysis, evaluation,

inference, and explanation [14].

Critical thinking skills can be identified with active, reactive, and reasoning processes to solve and make decisions [15]. Learners with high critical thinking skills tend to have a high cognitive level [16]. In fact, critical thinking skills of learners in various levels of education are relatively low. Critical thinking skills can be elicited by a lack of less active learning that maximizes critical thinking skills [17].

The same problem was found in the Geography Learning Media course in Department of Geography, Social Sciences Faculty, Universitas Negeri Medan. Students have difficulty thinking critically. This can be seen in the difficulty of students in giving reasons for a problem and making the right decision. One way to improve student's critical thinking skills is to develop and use e-modules in learning activities [18]. Teaching materials must be designed and developed based on the learning needs and characteristics of students. E-modules in this study developed based on needs of learning resources on Learning Media Course. So, the existence of the e-module in this study is aimed to improve students' critical thinking.

2. METHODS

E-module development uses R&D (research and development) with the ADDIE (Analysis, Design, Development, Implementation and Evaluation) model. In this development, the feasibility of the e-module was assessed by a team of media experts and a team of material experts. After the e-module is declared feasible, the e-module is used in lectures. Then the effect of implementing e-modules on students' critical thinking uses a quasi-experimental method with two pretest posttest groups. The research was conducted in the form of 6 meetings (2 x 50 minutes). The control group does not use e-modules while the experimental group uses e-modules.

The students involved in this research consisted of class A (control class, 20 students) and class C (experimental class, 20 students) who are taking the Geography Learning Media course. Data collection was carried out using questionnaires and tests. Validation of the instrument was carried out qualitatively in the construct aspect by a team of experts consisting of 3 lecturers. After the instrument has been improved based on suggested revisions, the instrument is used in data collection. The reliability of the instrument was empirically measured using Cronbach's alpha with a value of 0.88. Based on the results of the analysis, all instruments were declared valid and reliable. The feasibility of the e-module was validated by material experts and media experts and then analyzed using descriptive statistics. Analysis of this data produces averages and percentages which are then presented in the table. Data on critical thinking was analyzed using SPSS version 26 software. Data normality and homogeneity tests were carried out using the Shapiro-Wilk and Levene tests.

3. RESULT AND DISCUSSION
3.1 E-Modules Feasibility

E-module was analyzed through validation by two groups of experts, consisting of media experts and material experts. The validation of e-module was carried out in 2 stages. The results of e-module validation from 2 teams of learning material experts for each indicator can be seen in Table 1.

Table 1. Validation Result of Media Expert

Aspect	Validation	
	V1	V2
Organizing	4	4.5
Attractiveness	4	4.3
Letters, images and video	4.5	4
User Friendly	4	4.25
Adaptive	4.25	4
Average		4.18
Category		Feasible

feasibility by material experts Validation of e-module by 2 material experts is shown in Table 2.

Based on Table 1, the result of e-module validation by media expert declared feasible for use in the course. Validation of e-module

Table 2. Validation Result of Material Expert

Aspect	Stage II	
	V1	V2
Self-Instruction	4,14	4,28
Self-Contained	4	4
Adaptive	4	4
User Friendly	4	4,5
Average		4,12
Category		Feasible

Validation of e-modules feasibility is required before the module applied to learning process. Validation stage carried out by involving learning materials or media experts and material experts. Based on result of expert validation, the e-module on Learning Media Course was feasible to use in the course. A module is declared valid and appropriate if it meets the standards assessed by a team of experts [12] [13] . This finding is in line with research [19] which also developed and analyzed the feasibility of e-modules. Furthermore, similar research was also carried out [20] to measure the feasibility of the e-module, it is necessary to carry out expert tests and trials with students. All aspects and indicators of validation by material experts are in accordance with e-module development theory [14]. According to the characteristics of e-modules, includes self-instructional, self-contained, stand alone, adaptive, user friendly, consistent font and layout, and uses electronic media and is structured based on learning principles [5].

3.2 Impact of E-Module on Critical Thinking

In the first session, the lecturer explained the Semester Learning Plan (RPS) document which contained learning outcomes of course, material, learning activities, assignments, and evaluation. The pretest implementation in the second week was carried out simultaneously between the experimental class and the control class. The results of this pretest can be observed in Table 3 below:

Table 3. Summary of independent t-test on difference of pretest

Group	N	Mean	SD	t	p-value
Experimental	20	12.89	3.1		
Control	20	11.58	1.61	1.65	.108

Based on table 3, the mean value in the experimental class (12.89) was higher than the mean value in the control class (11.58). The difference between the mean values was 1.31. The mean difference between the experimental class and the control class was not statistically significant because the value of t = 1.65, p-value = 0.108> 0.05. It indicates that the initial abilities of the two groups are almost the same (there is no significant difference). The posttest to measure the enhancement of critical thinking was held at the end of the 6th meeting. The results of the posttest in the experimental group and control group are shown in Table 4.

Table 4. Summary of independent t-test on difference of posttest

Group	N	Mean	SD	t	p-value
Experimental	20	16.04	2.33		
Control	20	13.16	1.40	4.73	.000

As shown in Table 4, the results of the independent t-test analysis on the posttest indicated that the mean value in the control group was 13.16, while the mean in the experimental

group was 16.48. The mean difference between experimental and control group was 2.98. Based on the t value (4.73) with p = .000 <.001, there is a significant difference in critical thinking between both of group. Critical thinking skills in this research include formulating problems, giving arguments, deduction, induction, deciding, and implementing and in line with [21] [22]. The appearance and the material packages in e-modules enhance students' motivation and improve their critical thinking skills [23].

4. CONCLUSION

The developed e-modules in Learning Media Course using ADDIE model were appropriate for presenting the course materials based on electronic learning resource. The e-module was validated by the experts (media expert and materials expert). The results of validation declared that e-module was feasible for applying in the learning process. Statistical analysis using t-tests indicates that e-modul was significantly improved students' critical thinking.

5. ACKNOWLEDGEMENTS

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