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The Development of 3D Flipbook E-Learning Module of English Mathematics Profession

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Abstract. This development research aimed to design a 3D Flipbook e-learning module and determine students' perceptions of the developed 3D Flipbook e-learning module. The research method used was development research with the ADDIE development model which consisted of Analyse, Design, Develop, Implement, and Evaluate stages. The instruments used in this study were validation sheets of material experts and media experts, pre-test and post-test quizzes, and questionnaire sheets. This feasibility of the developed 3D Flipbook e-learning module was verified by the content experts, media experts, and trials to the preservice teacher at Sultan Ageng Tirtayasa University. The validation by material experts obtained a percentage of 86.97%, the validation by media experts obtained a percentage of 89.65%, and trials to students obtained a percentage of 78.7%. Overall, it can be concluded that this teaching material is good and appropriate to be used to facilitate students in learning English in the mathematics profession. For data processing using normalized gain techniques, the results were obtained in the medium category $0.3 \le g < 0.7$ equal to 0.669048. It can be concluded that the 3D Flipbook e-learning module is quite effective and suitable to be used in classroom learning.

1. Introduction

The teaching and learning process can bring information and knowledge in interactions between teachers and students to achieve a goal [1]. Various problems in the learning process need to be harmonized and stabilized so that learning conditions are created by the objectives to be achieved and can be obtained optimally [2]. Learning resources are one of the factors in achieving learning objectives that need to be utilized. Teaching material is one of the learning resources used in higher education [3].

One of the teaching materials used by teachers to teach is modules [4]. Learning modules are instructional materials arranged systematically and interestingly that include the content of the material, methods, and evaluations that can be used independently to achieve the expected competencies [5]. With this module, students will have learning resources that can be implemented separately and active in their learning. Modules currently used for the teaching and learning process usually still use paper [6]. Each student has a different attitude; of course, some are happy with reading the paper modules, and some are not happy [7].

The development of information and communication technology will continue to develop along with the increasing human needs, such as in the field of education [8]. The teacher's role in applying the functions of information and communication technology more appropriately is very much needed to better illustrate or expose young people about the use of technology more precisely and more useful

[9]. For teachers, in this case, it is a challenge in itself to improve competence and experience as a teacher [10]. To improve the competence and professionalism of a teacher, many ways can be taken [11]. One of them is developing instructional materials that can motivate students to be more active, with specific software that can produce instructional media that can be studied independently, such as e-modules [12].

The benefits of using e-module media as a learning resource in the learning process include increasing existing knowledge in the classroom, can awaken students' ways of thinking, attitudes, or behaviors, and can develop further [13]. The material produced in the module is only enrichment. Students can broaden their insights by studying additional materials provided in modules and pearls of science knowledge to increase students; besides, there is also a re-discussion of some of the material provided in the classroom [14]. Thus it can motivate students' learning independence and encourage their creativity [15].

To balance student learning styles that are varied and can be done even by teachers interested in learning, it is necessary to develop teaching materials that can overcome problems in the learning process [16]. One of them is with the module and the use of information technology today. Electronic book technology has led to a combination of print technology and smartphone technology in teaching and learning activities. Paper modules can be transformed into electronic form so that the emergence of e-modules [17]. Thus, the electronic module can be interpreted as a form of independent learning material that is structured into learning units to achieve learning objectives, which are displayed in electronic format, where every teaching and learning activity in it is linked with links as navigation that makes students more active with the program, equipped with a video tutorial display. Audio to enrich the learning experience [18].

The definition of e-module is a form of presentation of independent learning materials that are systematically arranged into a particular learning unit, which is presented in an electronic format, where each learning activity in it is linked with a link as navigation that makes students more interactive with the program, complemented by the presentation video tutorials, animations and audio to enrich learning experiences and achieve expected competencies according to their level of complexity electronically [19]. E-modules are created using software that every page becomes like a printed module [20]. E-modules are more practical because they are a combination of print and computer media [21].

Meanwhile, the impact of technological developments and the increasing use of computers can be felt in education, especially on the use of instructional media [22]. Engineering learning media also provides opportunities for teachers to develop learning methods and techniques[23]. Software that is increasingly diverse and readily available causes making learning media easier [24]. With this convenience, it is hoped that teaching media can provide positive values in the learning process [25].

The objectives in this research development were to produce learning media in the form of3D Flipbook e-learning module for English mathematics profession for preservice students of Sultan Ageng Tirtayasa University and to determine students' perceptions of English e-modules of the mathematics profession by using the 3D Flipbook e-learning module for preservice students of Sultan Ageng Tirtayasa University.

2. Research Method
This research was research and development using the ADDIE model which consisted of Analyse, Design, Develop, Implement, Evaluate stages. The ADDIE development model was developed to design a learning system with five stages of research and development as presented in Figure 1 [26].

Figure 1. ADDIE Model [27]
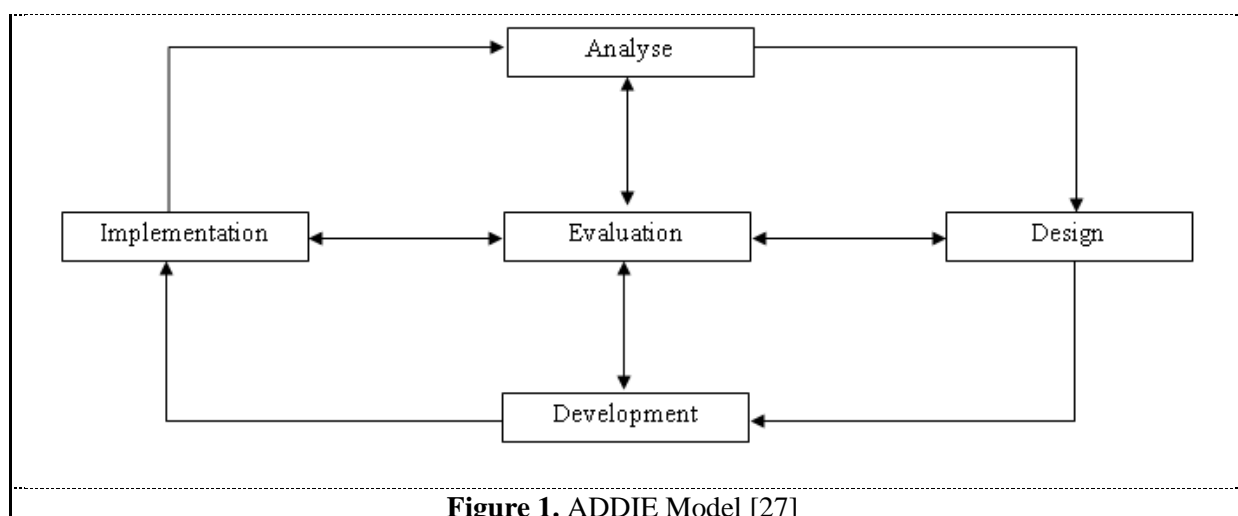
The subjects in this study were 15 preservice teachers of the University of Sultan Ageng Tirtayasa. The product produced in this development was a 3D Flipbook e-learning module containing English material for the mathematical profession, examples of questions, quizzes to evaluate the ability of students, as well as learning video links to make it easier for students to understand the material.

The data of this research consisted of quantitative and qualitative data. Furthermore, the quantitative data were obtained from student learning outcomes based on student worksheets and individual quizzes. The qualitative data was obtained from suggestions and comments from experts, namely material experts, media experts, students, and student response questionnaires.

The instruments used to determine the feasibility and effectiveness of the developed products were validation sheets of material experts and media experts, pre-test and post-test quizzes, and student response questionnaire sheets. The validity was determined by the results of questionnaires filled by media experts, material experts, and students. The following are the criteria for the interpretation of scores on the Likert scale [28].

Table 1. The Score Interpretation of the Rating Scale

Percentage	Interpretation
0% - 25%	Poor
26% - 51%	Low
51% - 75%	Moderate
76% - 100%	High

Furthermore, the interpretation of scores was calculated based on each item's score by using the formula shown in Figure 2.

$$Score\ Interpretation = \frac{Total\ Score\ Achieved}{Maximum\ Score\ Total} \times 100\%$$

Figure 2. The Score Interpretation of the Likert Scale

The trial data had been calculated using normalized gain techniques to see the magnitude of the increase after learning by using the e-learning module. The calculation steps using the normalized gain technique can be seen in Figure 3 [29].

$$\textbf{Gain Standard} = \frac{\textbf{Posttest score} - \textbf{Pretest score}}{\textbf{Maximum score} - \textbf{Pretest score}}$$

Figure 3. Gain Standard

The next step was adding the normalized gain of each student and determine the average results. The effectiveness criteria can be seen in Table 2.

Table 2. Classification of N-Gain

N-Gain	Improvement Classification
g > 0,70	High
0,30 < g ≤ 0,70	Medium
g ≤ 0,30	Low

3. Result and Discussion

3.1 3D Flipbook E-learning Module

Based on the research and development results using the ADDIE model, the first data results from the validation of media experts can be seen in Table 3.

Table 3. Media Expert Validation Results

Rating Aspects	Score
Flipbook Cover Design	32
Flipbook Contents Design	72
Average	**52**

The obtained average value was 52 which means that the developed 3D Flipbook e-learning module was appropriate. Furthermore, the results of the material expert validation can be seen in Table 4.

Table 4. Material Expert Validation Results

Content Aspect	Score
Conformity of material	12
Material Accuracy	28
Supporting Learning Materials	20
Material Update	13
Presentation Aspect	
Presentation Techniques	7
Supporting Presentation	25
Learning Presentation	4
Completeness of Presentation	10
Language Assessment	
Straightforward	12
Communicative	7
Dialogical and interactive	8
Conformity with the level of development of students	6
Congestion and Cohesiveness	8
Use of Terms, Symbols, or Icons	7

Total Score	167

Based on Table 4, the score obtained was 167 which means that the developed 3D Flipbook e-learning module was appropriate. The responses of questionnaires filled by students in the small-scale trial are shown in Table 5.

Table 5. The Results of Small-Scale Trial

Student	Assessment Aspects		
	Display	**Presentation of Material**	**Benefits**
1	20	32	17
2	21	33	19
3	18	35	20
4	23	34	18
5	21	31	21
Total of each Aspect	103	165	95
Overall		363	

Table 5 shows that the developed 3D Flipbook e-learning module was feasible to be used. Furthermore, the large-scale trial results using a questionnaire to determine students' responses to the developed 3D Flipbook e-learning module can be seen in Table 6.

Table 6. The Results of Large-Scale Trial

Student	Assessment Aspects		
	Display	**Presentation of Material**	**Benefits**
1	22	36	21
2	18	28	14
3	24	36	18
4	23	34	18
5	23	34	18
6	18	35	20
7	21	35	17
8	24	35	17
9	24	33	17
10	23	34	18
11	18	35	20
12	18	35	19
13	22	32	15
14	20	33	14
15	18	31	18
Total of each Aspect	316	506	264
Overall		1086	

Based on Table 6, the students' responses after using the 3D Flipbook e-learning module was in the excellent category according to the Likert scale's criteria of interpretation. Furthermore, the pre-test and post-test were processed using normalized gain techniques to see the improvement after learning using the developed 3D Flipbook e-learning module. The normalized gain technique has several steps

as already explained in the research method. The standard gain obtained from each student is shown in Table 7.

Table 7. Gain Standard Data of Each Student

Students	Pre-Test	Post-Test	Gain Standard
1	15	40	0.714286
2	10	35	0.625
3	10	35	0.625
4	15	50	1
5	15	50	1
6	10	30	0.5
7	10	35	0.625
8	10	40	0.75
9	10	30	0.5
10	15	45	0.857143
11	10	35	0.625
12	10	30	0.5
13	10	30	0.5
14	10	30	0.5
15	15	40	0.714286

Based on table 7, the average score obtained was 0.669048. It can be concluded that the use of the 3D flipbook e-learning module was in the moderate category which is quite useful to be used.

In this study, the similarity between this research and the previous ones is that the researchers developed electronic modules as learning media. Meanwhile, this research developed a 3D Flipbook e-learning module that can be used offline or online. Online use has its advantages. If the user feels unclear about the available information details, the provided internet links can direct the users to web pages containing more information. Meanwhile, when accessed offline, the information displayed is limited to only what has been loaded by the developer.

4. Conclusion
Based on the research results on the development of the 3D flipbook e-learning module, the following conclusions are obtained: (1) the results of the validity test by the material experts were 86.97%, the validity test results from the media experts were 89.65%. The results indicated that the developed 3D Flipbook e-learning module was feasible. (2) The results of the normalized gain were 0.669048 in the medium category ($0.3 <g <0.7$). Then, the 3D Flipbook e-learning module is effective and suitable to be used in classroom learning.

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