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E-Learning Development Process for Operating System Course in Vocational School

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Abstract. This development research aims to produce learning media in the form of E-Learning media using Edmodo which is interesting, efficient and effective on the subjects of operating system for students of class X TKJ in SMKN 3 Manado. The development model used was developed by S. Thiagarajan et al., Often known as the Four-D model, but this research only uses (define, design, and develop). Trial of the product is done twice (limited and wide). The experimental design used was the before-after experimental design. Data collection techniques used are interview techniques, questionnaires, and tests. The analytical technique used in this development research is descriptive qualitative. These include analysis of attractiveness test, efficiency and effectiveness of E-Learning media using Edmodo. The media attractiveness test was measured using a student response questionnaire. Media efficiency test was obtained through interviews of researchers with operating system subjects teachers and students of class X TKJ 1 at SMKN 3 Manado. While the media effectiveness test obtained from student learning outcomes before and after applying E-Learning media using Edmodo. Then tested by paired sample t test formula. After the media was piloted on the subject of trials (limited and broad), and the results show that E-Learning media using Edmodo is interesting, efficient and effective. It is shown on average student response score of 88.15% with very interesting interpretation. While the average value of student learning outcomes increased from 76.33 to 82.93. The results of differential test (paired sample t-test) the value of $t = 11.217 \geq t_{table} = 2,045$ with significant value = $0.000 < \alpha = 0.050$ showing the media E-Learning using Edmodo is effective.

1. Introduction

The rapid development of information and communication technology has a direct impact/influence on education in general. Along with these developments, learning methods are also more advanced, which include personal learning methods, learning media and learning process. One form of implementation of information technology in education is the model of E-Learning.

E-Learning media that is implemented in this research is a web-based application named Edmodo. Edmodo is a private web-learning media that prioritizes the privacy of students and teachers



(separately). Edmodo can be directly accessed from the web (computer-based), also available in mobile versions for smartphone / tablet users.

There are some problems in learning in SMKN 3 Manado, among others; Lack of student interest in previous media, ie powerpoint media. Direct learning process that exceeds allotted time. And learning outcomes are less satisfactory, so that learning objectives have not been achieved optimally.

One of the constraints of conventional learning model is the necessity of direct meeting (in class) between teacher and student. E-Learning model using Edmodo can overcome these obstacles, ie learning process can be continuously done without direct face-to-face between teacher-student. this will make students more active and improve interaction among fellow students to exchange information. Students can also practice on tasks that have been prepared by the teacher. This media trains students' independence, while maintaining the interaction between teachers and students as well as between students.

According to Rusman, learning media is used by teachers to deliver lesson material not only as a means, but also to provide stimulus for students to learn, as well as develop the intellectual and emotional aspects of students. A learning medium requires good planning before being used in the learning process. The media used must be completely mastered by teachers, so that knowledge can be transferred to the students clearly and effectively.

Based on the background of the issues stated above, we are interested to conduct a study of E-learning development process for operating system subjects. Specifically, developed e-learning is tailored to the learning needs of students of class x, with reference to previous learning design. Methods.

2. Methods

2.1. Model

The development process is related to activities at each stage of development. The final product of the development result will be evaluated based on the aspect of product quality specified. The development stages of the Four-D model are: (1) Define, (2) Design, (3) Develop, and (4) Disseminate or adapted into 4-D model, ie definition, design, development, and deployment. The following stages of development using the Four-D model [1].

2.1.1. Define. The defining stage is the stage for defining and defining development requirements, consisting of; analysis of development needs, product development requirements in accordance with student characteristics, teacher needs analysis, as well as appropriate research and development models to develop the product.

2.1.2. Design. The design stage consists of 4 main activities, namely:

- Criterion-test construction, as the first action to determine the learner's initial ability and as an evaluation tool after implementation.
- Media selection, choosing a learning model that matches the material and characteristics of the students.
- Format selection, the choice of presentation model in accordance with the learning media
- Initial design, complete the prototype of the application before the trial run.

2.1.3. Develop. Development phase is done through two steps, namely expert appraisal followed by revision and developmental testing. The purpose of this development stage is to finalize learning devices after revisions based on validator evaluations and test results data.

2.1.4. Disseminate. The dissemination stage is carried out to promote the development product in order to be accepted by users, whether individuals, groups or systems. Distribution stage is divided into three activities, namely: validation testing, packaging, diffusion and adoption.

In this development study, researchers did not undertake the entire stages of development. Researchers only do 3 stages of define, design, and develop without implementing dissemination.

Reason Phase 4 (dissemination) is not implemented because the use of this learning media only in SMKN 3 Manado. There is no important value for dissemination to a wide audience or even a market [2-6].

2.2. Trial test

This research applies before-after (pretest-posttest) experimental design, comparing the values and perceptions of students before and after using Edmodo E-Learning media. The following pretest-posttest experimental design is shown in the following figure 1:

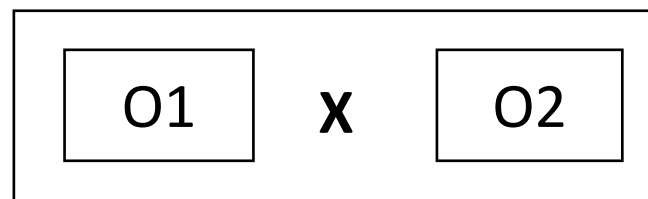


Figure 1. Experiment design using Edmodo [2].

- O1 = Pretest score
- X = Treatment (Edmodo E-Learning)
- O2 = Posttest score

Edmodo E-Learning media testing is done by involving several categories of respondents in SMKN 3 Manado, namely students of class X and teachers TKJ.

- Target Segment
 - Limited Trial : 10 randomly selected student of class TKJ at SMKN 3 Manado
 - Open Trial : All students of class TKJ 1 at SMKN 3 Manado.
- Material validator, ie teacher of operating system subjects
- Validator media display, the teacher of TKJ subjects in SMKN 3 Manado.
- Prior to conducting the experimental activities, the researchers socialized the E-Learning media using Edmodo to the test subjects. Limited Trial Test is done by using smartphone.

2.3. Data organizing

2.3.1. Attractiveness of Edmodo E-learning media. The level of attractiveness of Edmodo E-Learning media is obtained from the questionnaire results of the student responses obtained from two stages of testing (limited and open).

2.3.2. The efficiency level of Edmodo E-learning media. Testing efficiency of Edmodo E-Learning, conducted through interviews with teachers and students operating system subjects in class X TKJ 1 SMKN 1 Manado. Interviews are structured, and completed with checklists.

2.3.3. The effectivity level of Edmodo E-learning media. The level of effectiveness of Edmodo E-Learning is seen from the presence or absence of differences in student learning outcomes (operating system structure material), before and after the implementation of Edmodo E-Learning. The paired sample t test is used to assess whether there is a significance difference of the two paired samples.

3. Results and Discussion

This development research succeeded in producing Edmodo E-Learning media on the subjects of Operating System, for students of class X TKJ 1. This media can be accessed using computer and handphone through www.edmodo.com, As for Edmodo application available on PlayStore and AppStore on mobile device . The resulting product consists of some content, including:

- Instruction guide.
- Learning materials, about the structure of the operating system. This material is adopted from Abdul Munif's book.
- Video learning, which contains the lesson of the operating system structure.
- Powerpoint Presentation
- Exercises and test, as a means of training students' abilities after learning with Edmodo E-Learning.

3.1. Trial test results

The percentage of scores obtained from content validation by validator is 81.82%. The score shows the media is feasible, but there are some revised criteria according to the suggestion of the validator. while the percentage of scores obtained from design validation is 71.43%. The score shows the media is feasible, but there are some revised criteria according to the suggestion of the validator.

3.1.1. Trial test results; Attractiveness of Edmodo E-learning media. The level of attractiveness of Edmodo E-Learning media was measured based on the results of questionnaires among the ten selected students. The mean percentage of response score obtained from this stage is 91%.

3.1.2. Trial test results; The efficiency level of Edmodo E-learning media. Trial test results show nine out of ten students can quickly understand the material with Edmodo E-Learning media. Learning time used in the learning process of the operating system that is for 3 x 45 minutes, without any reduction in study time. Based on the results of the narrative of the students, it can be interpreted that the Edmodo E-Learning media is efficiently used in the learning process, because it can help students to quickly understand the material.

3.1.3. Trial test results; The effectivity level of Edmodo E-learning media. The hypothesis proposed in the effectiveness test is:

H0 : Average learning outcomes before using edmodo media \geq Average learning outcomes after using edmodo e-learning media

H1 : Average learning outcomes before using edmodo media \leq Average learning outcomes after using edmodo e-learning media

The results of paired sample test analysis showed significant differences in pretest and posttest values, so it can be said that edmodo e-learning media is effective in improving learning outcomes. This can be seen from $t_{hitung} = 6.708 \geq t_{tabel} = 2.262$ or significance value = $0,000 < \alpha = 0.05$. The mean posttest score was higher (81.5) than the pretest (74), then the hypothesis (H1) was accepted. It can be concluded that there is an increase in student learning outcomes after using edmodo e-learning media (see Figure 2).

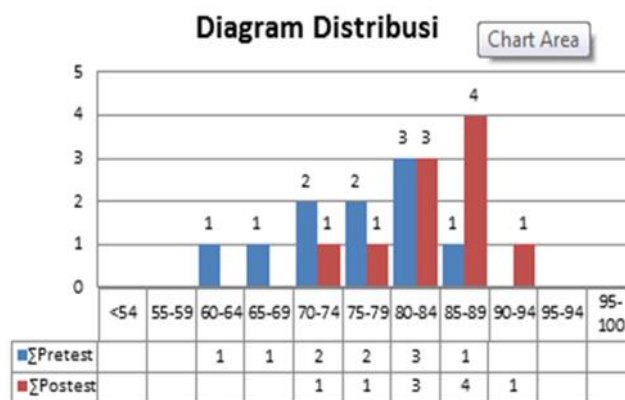


Figure 2. Distribution chart of trial pretest and posttest value.

3.2. Test results

3.2.1. Full test results; *Attractiveness of Edmodo E-learning media.* Overall classroom testing performed after revision of the trial test results. Edmodo E-Learning is further implemented in all 30 students of class X TKJ 1.

Measuring the level of attractiveness of Edmodo E-Learning media in the class test, still using closed questionnaires. The average percentage of students' scores on media responses was 88.15%. The value can be interpreted as a category: very interesting, with the terms of the acquisition value range of 80% - 100% (see Table 1).

Table 1. Scores per indicator.

No.	Indicator	Score
1	Learning content completeness	80,00%
2	Comprehensive language	80,00%
3	Media content completeness	80,00%
4	Clarity of the question	90,00%
5	Easy access	93,33%
6	Attractive media design	96,67%
7	Positive affects	93,33%
8	Encouraging to learn	90,00%
9	Interest in using media for other subjects	90,00%
Mean		88,15%

3.2.2. Full test results; *The efficiency level of Edmodo E-learning media.* The percentage of students who more quickly understand the material using Edmodo E-Learning media has increased, ie from 40% up by 80% compared to previous media. The amount of time spent in the learning process on this full test which initially 3 x 45 minutes reduced to 2 x 45 minutes, so that the remaining 45 minutes can be utilized by teachers for question and answer activities and practice questions.

3.2.3. Full test results; *The effectivity level of Edmodo E-learning media.* The average pretest value of 76.33 with standard deviation of 6.970, while the average posttest value of 82.93 with standard deviation of 6.987. It shows an increase in student learning outcomes. While standard deviations indicate the distance between the top and the bottom of the student's average score, the smaller the value may well represent the real data of the observed value. The result of paired sample test shows the significance value $p = 0,000 < \alpha = 0,050$, which means there is significant difference between before and after using Edmodo E-Learning media. Thus, the use of Edmodo E-Learning media is effective in improving student learning outcomes.

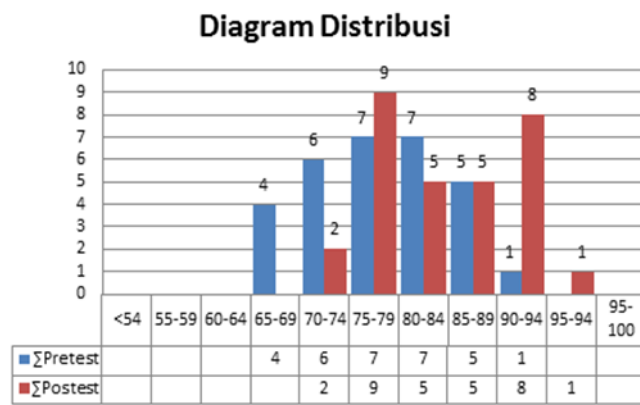


Figure 3. Distribution chart of full pretest and posttest value.

Based on Figure 3, The graph above shows an increase in the value of learning results obtained by students. the results show there are no students with a value of 65 (low) at posttest. Improvements occur in most students, such as those exposed in the graph.

3.3. Discussion

The results of Edmodo E-Learning media development on the subjects of the operating system for students of class X TKJ, successfully meet the criteria of attractiveness, efficiency, and effectiveness of the product. Judging from the attractiveness level, the average acquisition score of student response questionnaire on the limited trial is 91.11% and the full test is 88.15%, indicating that the developed media is very interesting if used and it is very helpful for the students in the learning process. The use of interesting learning media can reflect the smooth interaction between teachers and students during the learning process and help students learn optimally [7, 8].

Edmodo E-Learning Media Operations does not need to go through complicated steps, so students are not confused in using E-Learning media using Edmodo. The completeness of the content available makes it easier for students to use the media.

Considering the efficiency level, Edmodo E-Learning Media can be used efficiently in the learning process in SMK N 3 Manado, which is shown by the teacher to be faster delivering the learning content and objectives. The results of limited trials show that by using Edmodo E-Learning media the learning time used is still in accordance with the allocation of time allocation in the syllabus, with the students' responses expressing fast understanding as much as 90%. While the test of media efficiency level at full test shows that the utilization of media developed more efficient. Even the use of time in the learning process can be reduced. And the positive response of students to the utilization of Edmodo E-Learning media, because it makes students more quickly understand the learning content. The results show that students can understand the material optimally, with less time than the allocation specified in the syllabus. The use of IT-based learning media in the learning process can help teachers in saving time, and students can also understand the material more easily [9, 10].

The development of Edmodo E-Learning is effectively applied in the learning process at SMK N 3 Manado, which is shown by the increasing of learning result obtained, compared to learning result before using Edmodo E-Learning. This is supported by the results of different test calculations (paired sample t-test). The improvement of students' learning outcomes is triggered by the ease of operating the media, so that students feel happy and enthusiastic in using it, making students motivated to learn the material of the operating system. The high motivation of the students makes the students able to master every indicator to be achieved. It proves that E-Learning media use Edmodo effectively, because it is able to achieve the learning objectives shown by the improvement of student learning outcomes from before.

4. Conclusions

In general it can be stated that the use of Edmodo E-learning media successfully improve student achievement in learning, especially in the material operating system. More specifically, the results of this study can be summarized as follows;

- The development of integrated learning media in Edmodo E-learning, managed to generate interest in students to learn operating system material. Students consider Edmodo E-learning is interesting and practical.
- Media developed more efficiently, successfully helping students more quickly understand the learning materials, or in other words make students able to understand the material in a shorter time. The results of this research show that students can understand the material optimally, with less time than the specified allocation.
- The development of integrated learning media in Edmodo E-learning, succeeded in improving student learning outcomes. Compared to before using new learning media. These results were marked by a higher posttest score than the pretest ($p < 0.05$).

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