DEVELOPMENT OF "INTRODUCTION TO NETWORKING" LEARNING MATERIALS FOR CLASS XI TKJ IN SMKN 1 KAMAL USING UNITY 3D

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Abstract

This research is based on the condition in which printed books and modules were not enabling enough for the students to study the Introduction to Networking materials. The results were the students' lack of learning motivation and low learning outcomes. One alternative to improve the motivation and interest in learning is using Unity 3D for learning resources. For this research, ADDIE (Analysis, Design, Development, Implementation, and Evaluation) was used as the development model. The new materials were tested to XI grade TKJ students of SMKN 1 Kamal. Results obtained from survey on small group trials were 93% and for large group trials were 90%. After they were converted to the table of achievement level and qualification, the results acquired very high qualification of 90% -100% with highly feasible description.
Key Words: Learning Materials, Unity 3D, ADDIE, Introduction to Networking

1. Introduction

TKJ (Teknik Komputer dan Jaringan – Computing and Networking Engineering) is a one of the majors in Indonesian's SMK (Sekolah Menengah Kejuruan – Vocational Secondary School). One of the lessons in the majors is Introduction to Networking. On one side, the teachers are expected to deliver the lessons effectively; on the other side, the students are required to master the lessons after the class.
Based on observation in the field experience practices (Praktik Pengalaman Lapangan - PPL) activity, the researcher found a problem in Introduction to Networking lessons: the printed books and modules were not captivating, thus making the students experienced learning difficulties and felt bored during the class. This lack of motivation and interest clearly had

bad influence on their learning outcomes. Motivation can be interpreted as an existing impulse on a person so that person would do activities or learning activities to get information and experience(de Freitas & Griffiths, 2008); while interests according to Slameto(Slameto, 2013), is a liking feeling someone has for a thing or activity without anybody telling him/her to like it.

Based on previous research conducted by Novandi and Buditjahjanto(Ahmad Novandi & Asto Buditjahjanto, 2016) titled Development of Presentation Learning Media using Courselab 2.4 on Basic Digital Electronics in SMKN 3 Surabaya, stated that "students tend to feel bored and sometimes students were not able to understand the lesson materials because the words used are too vague and the explanation of the images used as lesson material visualization is not clear". Therefore, in a nut shell, some factors that are affecting students' learning interest and motivation are not-stimulating-enough books, class conditions that are not supportive for learning, andmonotonous learning methods. The availability of learning media that can make it easier for students to learn would obviously helpful in this context.

Along with the rapid development of technology, teachers who are responsive to the condition by adapting innovative approach/technologies in their classes will assuredly make learning remains fun, active, creative, and innovative. These recent technologies can also be used as independent learning resources by the students. If they are fascinating and inspiring enough, they can also increase students' motivation and interest to achieve the learning objectives. One alternative is developing learning materials using Unity 3D.

The word *media* comes from the Latin language and is the plural form of *medium* which literally means intermediator. Thus, media is the intermediator or agent who delivers the message fromthe sender to the recipient(Azhar Arsyad, 2014).

Unity 3D is a technology that can be used by game developers to help in making game. It is a game engine with low learning curve (Ryan Henson Creighton, 2010).Unity 3D is developed by Unity Technologies and first launched in 2005. Since it has an integrated rendering capability, it not only can create 2 dimensions programs, but also 3 dimensions games (Baskara Arya Pranata, Andre Kurniawan Pamoedji, & Ridwan Sanjaya, 2015).

This research' aims was to develop Introduction to Networking learning media for class XI TKJ SMKN 1 Kamal using Unity 3D.

2. **Research Method**

The development model used in this media development is ADDIE(Robert Maribe Branch, 2009). ADDIE is an abbreviation of Analysis, Design, Development or Production, Implementation, and Evaluation. Figure 1 shows the implementation of ADDIE approach in the development of the learning materials.

In the first stage (Analysis), we identified the initial condition of the school, such as: student characteristics, learning process, current curriculum, and factors that could cause problems. The second stage (Design) was all activities related to the development of the lessons' objective, assessment, exercises, and content. It also incorporated analysis associated with learning materials, lesson plans, and media selection. This stage was done systematically and specifically. The third stage (Development) combined the content assets created from the previous stage in a structured form. The form had to be able to meet students' obligation. It also defined the appropriate interaction, which had to be creative, innovative, and encouraging students to learn more. Then, the fourth stage (Implementation) was the testing of the third stage's product. It was done iteratively, making revisions for each iteration. The fifth stage (Evaluation) was done in concurrence with fourth stage during the iteration

process. After all materials had been validated by experts,the process stopped as it meant that the material had been ready to be used by the students.

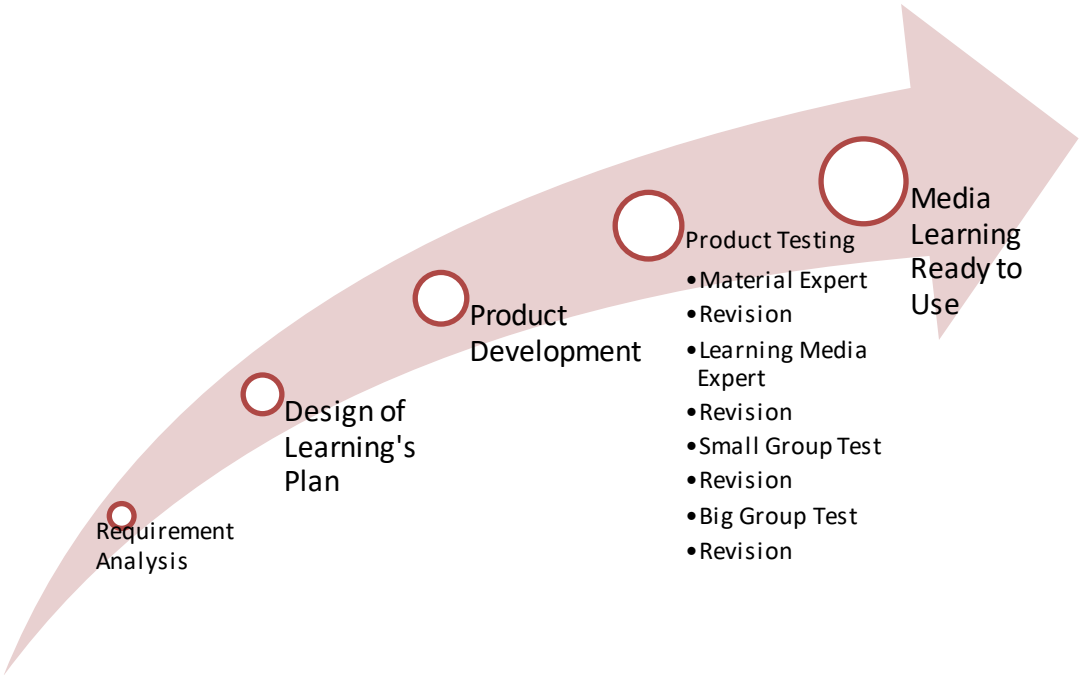

Figure 1. Process Diagram

Technical analysis of data was done in the form of qualitative descriptive analysis and statistical descriptive analysis. Qualitative descriptive analysis clustered qualitative data in the form of responses, critics, or suggestions for improvement found in the questionnaire. This analysis was used as a reference to improve or revise the learning media being developed. Next, statistical descriptive analysis was used to analyze the data collected from the questionnaire to obtain an overview or highlights of the learning media. From the questionnaire, we calculated the percentage of each question using the Komang I. Sudarman formula (Wanda Ramansyah, 2016) as in equation 1.

$$Answerpercentage = \frac{\Sigma(answer \times eachchoiceweight)}{n \times largestweight} \times 100\% \quad \text{…. Equation (1)}$$

Description:
n = Total number of questionnaire items

The labeling of the quality of learning media based on Unity 3D used scale level conversion as shown in table 1. This table shows the level of achievement of learning media in accordance with the percentage of achievement obtained from survey results. From the table it appears that the level of qualification of the teaching media is divided into five levels, namely very good, Good, satisfactory, less than satisfactory, and Bad.
Table shows that if the percentage of achievement is less than 74%, it is necessary to make improvements to the teaching media. If the results above 74%, then do not need improvement on

the media teaching. Stages of evaluation and improvement are done continuously to get the appropriate percentage of achievement.
The results of comparing the data with the table were used to revise and review the product being developed, and to get utilization suggestion.

Table 1. Conversion of Achievement levels and Qualifications (Wanda Ramansyah, 2016)

Achievement Level	Qualification	Description
90% - 100%	Very good	Highly feasible, learning media does not need to be revised
75% - 89%	Good	Feasible, learning media does not need to be revised
65% - 74%	Satisfactory	Bellow feasible, learning media need to be revised
55% - 64%	Less than satisfactory	Not feasible, learning media need to be revised
0% - 54%	Bad	Awfully not feasible, learning media need to be revised

3. Result and Discussion

Results of this research was a usable learning media about Introduction to Networking for students of class XI TKJ SMKN 1 Kamal using Unity 3D. The pictures of the learning material are shown in figure 2.

Figure 2. (from left) Main Menu, Lessons, Inside the lesson, Quizzes, Guess the Picture Quiz, Hints

The products developed had been tested on students of class XI TKJ SMKN 1 Kamal. The small group experiment result is shown in table 2, where as the large group experiments is shown in table 3.

The data generated during the small group experiment shows that the average percentage for all marked components is 93%. This shows that the learning media is in the qualification level of "Very good" and does not require any revision.

The data generated during the large group trial displays that the average percentage for all marked questions is 90%. This shows that the product developed is in the qualification level of "Very good" and does not need any revision.

The results is good can be achieved because previously been done studies related to the material and display of teaching media in accordance with the students.

Table 2: Small group test results

No	Components Assessed	Score from Respondent	Sum of (∑) Score	Score Average (∑ Score / sum of Respondents)	Percentage (%)
1	Did the media Unity3D basedlearning present "Introduction tonetworking" materials well?	5 5 5 4 5	24	4,8	96%
2	How much was the material presented easy to understand?	4 5 5 5 3	22	4,4	88%
3	Were the guessing pictures exercises easy to understand?	5 4 4 5 5	23	4,6	92%
4	Did the guessing pictures exercises increase your understanding of the materials?	5 4 4 5 5	23	4,6	92%
5	Did the media help you in learning Introduction to Networking?	5 5 5 5 5	25	5	100%
6	How easy was it to use the media?	5 5 5 4 4	23	4,6	92%
7	How stimulating was the visual display (animation)?	5 4 4 4 5	22	4,4	88%
8	Did the audio (music) help you to understand the materials more?	4 5 5 4 5	23	4,6	92%
9	Was the texts and font in the media clear enough?	5 5 5 5 4	24	4,8	96%
10	Did the color combination, order, and selection in the media help you to discern different components on the display?	5 4 4 5 5	23	4,6	92%
	Average percentage				93%

Table 3: Large group test results

No	Components Assessed	Score from Respondent	Sum of (∑) Score	Score Average (∑ Score / sum of Respondents)	Percentage (%)
1	Did the media Unity3D basedlearning present "Introduction to networking" materials well?	4 5 5 4 5 5 4 4 5 4 5 4 5 5 4 5 4 4 5 4 5	95	4,5	90%
2	How much was the material presented easy to understand?	5 5 5 4 5 5 4 3 5 4 5 5 3 5 5 5 3 3 4 5 5	93	4,4	88%
3	Were the guessing pictures exercises easy to understand?	5 5 5 4 5 5 4 4 4 4 5 5 5 5 5 5 5 5 5 3 4 5	97	4,6	92%
4	Did the guessing pictures exercises increase your understanding of the materials?	5 5 5 3 5 5 3 5 5 3 5 4 5 4 4 5 5 5 3 5 5	94	4,4	89%
5	Did the media help you in learning Introduction to Networking?	5 5 5 5 5 5 5 4 4 5 5 4 3 5 4 5	98	4,6	93%

		5 4 5 5 5			
6	How easy was it to use the media?	5 5 5 4 5 5 4 4 5 4 5 5 4 4 5 5 4 5 3 4 5	95	4,5	90%
7	How stimulating was the visual display (animation)?	5 5 5 3 5 4 4 4 5 3 5 5 4 5 5 5 3 4 4 5 5	93	4,4	88%
8	Did the audio (music) help you to understand the materials more?	5 5 5 4 5 5 3 4 4 4 5 4 3 5 4 5 4 5 4 4 5	92	4,3	88%
9	Was the texts and font in the media clear enough?	4 5 5 3 5 5 4 5 5 3 5 5 4 5 5 5 5 5 5 3 5	96	4,5	91%
10	Did the color combination, order, and selection in the media help you to discern different components on the display?	5 5 5 5 5 5 4 4 5 5 5 4 5 5 4 5 4 3 3 4 5	95	4,5	90%
		Average percentage			90%

4. Conclusions and Recommendations

The questionnaire results established that the developed Introduction to Networking learning media is measured Very good. It means that the learning materials can help students' learning.

Suggestions to fully optimize the using of the Introduction to Networking learning media are as follows:Teachers should present the materials creatively and clearly and Students should be more active in using the media so that the purpose and learning outcomes can be achieved.

5. Reference

Ahmad Novandi, & Asto Buditjahjanto. (2016). Pengembangan media pembelajaran presentasi menggunakan courselab 2.4 pada kompetensi dasar-dasar elektronika digital di smk 3 negeri surabaya. *Jurnal Pendidikan Teknik Elektro, 5*(1).

Azhar Arsyad. (2014). *Media Pembelajaran*. PT RajaGrafindo Persada.

Baskara Arya Pranata, Andre Kurniawan Pamoedji, & Ridwan Sanjaya. (2015). *Mudah Membuat GAME dan Potensi Finansialnya dengan unity 3D*. Jakarta: PT Elex Media Komputindo.

de Freitas, S., & Griffiths, M. (2008). The convergence of gaming practices with other media forms: what potential for learning? A review of the literature. *Learning, Media and Technology, 33*(1), 11–20. https://doi.org/10.1080/17439880701868796

Robert Maribe Branch. (2009). *Instructional Design : the ADDIE Approach*. Springer.

Ryan Henson Creighton. (2010). *Unity 3D Game Development by Example*. Packt Publishing.

Slameto. (2013). *Belajar dan Faktor-Faktor Yang Mempengaruhi*. Jakarta: Rineka Cipta.

Wanda Ramansyah. (2016). Pengembangan Multimedia Pembelajaran Interaktif dengan Tema Pengenalan Huruf Hijaiyah untuk Peserta Didik Sekolah Dasar. *Jurnal Ilmiah Edutic, 3*(1).