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The Development of Computer Network Learning Media to Support Online Learning

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Abstrak

Pada Era new normal, sistem pembelajaran dilakukan secara daring. Kurangnya inovasi dalam pemanfaatan media pembelajaran pada masa pandemic covid-19, mengakibatkan mahasiswa kurang termotivasi dan memiliki semangat belajar yang rendah dalam proses pembelajaran jaringan komputer. Guna mengatasi permasalahan tersebut, salah satu alternatifnya ialah mengembangkan media pembelajaran di masa pandemi. Riset ini bermaksud untuk meningkatkan media pembelajaran jaringan komputer sebagai pendukung pembelajaran daring pada era new normal. Metode yang digunakan pada peneltian pengembangan ini yaitu Reseach and Development (R&D) dengan menggunakan pendekatan model Instractional Development Institute (IDI). Model pendekatan IDI memiliki beberapa tahapan pelaksanaan diantaranya yaitu define, develop, dan evaluate. Hasil dari penelitian pengembangan media pembelajaran dinyatakan valid, praktis dan efektif untuk diterapkan sebagai media pembelajaran jaringan komputer sebagai media pendukung pembelajaran daring.

Kata Kunci: Media Pembelajaran, Research and Development, Model IDI, Jaringan Komputer.

Abstract

In the new normal era, the learning system is carried out online. The lack of innovation in the use of learning media during the covid-19 pandemic resulted in students being less motivated and having low learning enthusiasm in the computer network learning process. To overcome these problems, one alternative is to develop learning media during the pandemic. This research intends to improve computer network learning media as a support for online learning in the new normal era. The method used in this development research is Research and Development (R&D) using the Instructional Development Institute (IDI) model approach. The IDI approach model has several stages of implementation including define, develop, and evaluate. The results of the research on the development of learning media are declared valid, practical, and effective to be applied as a computer network learning media to support online learning.

Keywords: *Learning Media, Research and Development, IDI Model, Computer Network.*

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INTRODUCTION

Industrial revolution 4.0 in almost all aspects has gradually shifted to computer digitization and automation. This change requires readiness to face the future (Rifandi et al., 2020; Zainudin & Pambudi, 2019). The challenges and opportunities of the industrial revolution 4.0 also have an impact on the learning perspective, including the learning process in universities which are required to be more innovative and balanced with four 21st century skills, namely creativity skills, critical thinking, communication, and collaboration (Hamdani et al., 2019; Indarta et al., 2022; Novita & Harahap, 2020). Advances in information technology make the learning system in higher education flexible without being limited by space and time. Information is not only limited to face-to-face meetings in class, but students can get information by accessing information from home and can interact at any time (Adzan et al., 2021; Laila et al., 2016). During the industrial revolution 4.0, the Minister of Research, Technology and Higher Education urged universities (PT) to increase online learning, especially with the regulations issued by the government regarding the learning process carried out from home during the pandemic era, making universities also required to innovate in implementing and utilizing technology to support the online learning process (Novi Hendri Adi, Okta Veza, Wakhinuddin Simatupang, Dedy Irfan, Mukhlidi Muskhir, Afif Rahman Riyanda, 2021; Susanti et al., 2021; Utari et al., 2021). Therefore, universities and lecturers are required to innovate and be more creative in producing alternative learning media related to the efficient and effective use and utilization of technology in online learning. By studying at home, the biggest difficulty faced by lecturers is when implementing the home study method. Therefore, all ways must be done so that there is a significant increase even though learning is carried out online (Adi et al., 2022; Ningsih, 2021).

One of the substitutes for learning resources that can be created by lecturers is to use of learning media. However, based on the facts, the learning media has not been fully used by lecturers as an alternative source of learning, the first reason being that using the media is troublesome, the two media are sophisticated and expensive, the three lecturers are not experts in using the media, the four media are entertainment, on the contrary, learning is real, the fifth is not on campus, the sixth is the habit of enjoying lectures or talking, and the seventh is the lack of appreciation from the leadership (Rahmat et al., 2019; Zaus et al., 2018).

In the learning process carried out in the computer network course, they still use PowerPoint learning media which is simple and only in the form of slides, so that students do not master in-depth the material given by the lecturer. This causes students to be less interested in listening to or reading the presentation of material from the lecturer when learning takes place. Then lecturers and students also have obstacles when presenting material given by lecturers, including short duration, less than maximum network, and limited internet quota during conference presentations via zoom media. Therefore, for the learning process to run optimally, learning media are needed that are truly able to be understood and absorbed by students. Teaching staffs have challenges in dealing with online learning, one of which is that teachers must be able to quickly master how to use and apply learning media that can support learning goals. Not only that, but a teacher is also expected to be able to innovate and work in the learning process so that the learning objectives are maximally successful (Hamidi et al., 2011; Ningsih, 2021). Effective learning is learning that can support the achievement of instructional objectives of learning and can support the learning process by having adequate facilities and infrastructure, so that students get an attractive learning experience and increase student activity in the learning process (Islami & Indarta, 2021; Pernanda et al., 2018; Zaus et al., 2018). Practicality is the usability of products that have been developed. To identify the practicality of the products that have been developed, the researchers carried out product trials. After that, to find out the practicality of this product, it is expected that the teacher's response and the student's response after using this learning product in the learning process are expected. Practicality testing is carried out to know the usability of the product in a learning process (Firdian & Maulana, 2018; Hendri Adi et al., 2020; Muhson, 2010).

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This development research was designed using the Macromedia Flash Animate CC application as a learning support medium that was developed. This research creates a learning media product that will then be installed on each student's computer or laptop. The results of this research are expected to increase the effectiveness and accessibility of learning activities and facilitate students in completing assignments and mastering the subject matter presented (Damopolii et al., 2020; Laila et al., 2016; Simangunsong et al., 2021). With this in mind, the purpose of this research is to improve learning media that can make it easier for students to study computer networking courses.

METHOD

This research uses the Research and Development (R&D) development method. This research method R&D is a method or steps to improve a new product or improve an existing product, which can be accounted for. R&D development research is a research procedure that is planned, analytically, intended, or shown to find, formulate, justify, develop, create, and test the effectiveness of products, forms, procedures or strategies, methods, services, certain methods that are superior, current, efficient, efficient, productive and meaningful. In this study developing a learning media product using the Instructional Development Institute (IDI) approach model. The principle of this IDI model approach has 3 levels, namely determination, development, and assessment (Adi et al., 2021).

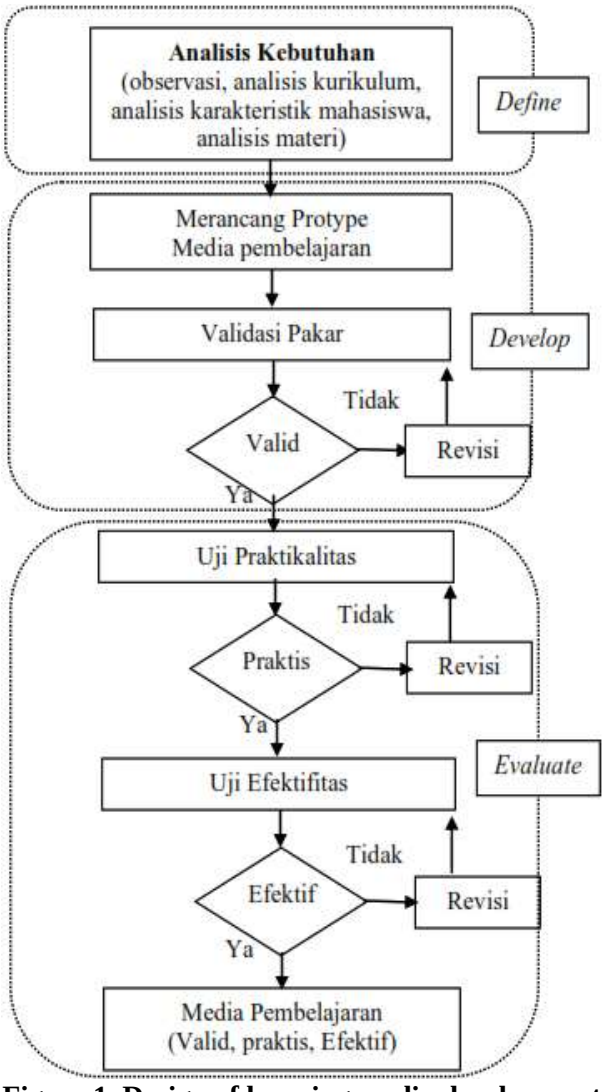

Figure 1. Design of learning media development

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Determination Stage

The application of research begins with the defining step. Based on the observations and questions and answers of researchers with teachers and students, information was obtained that for learning in the computer network course interactive learning media were needed.

Development Stage

After the determination step, the results obtained are used for the next step, which is the development step. Development steps include the preparation of prototypes and validation steps. Validation is carried out on the material and media aspects. The criteria used to assess the validity of the developed computer network learning media can be seen in the following table:

Table 1
Criteria for Achieving Validity

No	Range	Indicator
1	0-1,00	Valid
2	< 0	Invalid

Sumber: (Azwar, 2014)

Assessment stages

At the evaluation stage, researchers conducted activities focused on evaluating whether the initial design (prototype) could be used in accordance with practical and effective expectations as the media to support student online learning. the value of the results of the analysis on practicality by teachers and students are grouped in the categories presented in the following table:

Table 2
Practicality Categories

No	Range	Indicator
1	81-100	Very Practical
2	61-80	Practical
3	41-60	Practical enough
4	21-40	Less Practical
5	0-20	Not Practical

Sumber: (Riduwan, 2010)

To see the effectiveness of the developed learning media, a test of the validity of the questions, the difficulty level of the questions, the differentiating power, and the reliability of the test questions was carried out. The success of the learning media was obtained from the difference in student learning outcomes in the class that was not given treatment (control) and the class that was given treatment (experiment). Learning media can be said to be effective if the comparison between the learning outcomes of the two classes, there is an increase in student learning outcomes that are given greater treatment than the class that is not treated. Testing the effectiveness can be done by carrying out the validity test of the questions, the normality test of the questions, and the homogeneity test of the questions.

FINDING AND DISCUSSION

The process of developing computer network learning media in the Computer Network course is carried out in accordance with the Instructional Development Institute (IDI) model approach process by completing the following three stages.

In the first stage, the process of determining, researching, and gathering information is the initial stage in developing learning media. In this step, analysis activities are carried out which intend to ensure the requirements in learning, such as design analysis and student character analysis. In the design, analysis identify detail and organize in a structured manner the fundamental concepts of computer network courses by

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determining the RPS that is applied. The subject matter is arranged according to the skills or insights learned by students. These materials are in the form of text, images, animations, videos, and exercises that can increase students' motivation and interest in practicing. Analysis of student character is analyzed from the age of student experience in using media, enjoyment, hobbies of students, and motivation in interactive learning. At this stage, a needs analysis is carried out, several analyzes are carried out, then analyze the concept of the material or content that will be applied to the learning media. and student characteristics from the age of student experience in using media, enjoyment, hobbies of students, and motivation in interactive learning. Then next determine User Requirements, and Make Initial Designs and learning media. In this study, the subjects of this study were students who took computer networking courses in the regular class A.

In this second stage, researchers develop computer network learning media as a supporter of online learning. Testing for ease of use using the validity test formula. Information received through subsequent questionnaires was analyzed descriptively. The results of the analysis play a role in taking into account the quality of the learning media developed and observed from the aspect of validity. The stages in the development of this research are:

1. Gathering needs, namely by preparing teaching materials from the results of discussions with subject teachers;
2. Preparation is by making learning tools using the Macromedia Flash Animate CC application;

Figure 2. Main Menu Page

The menu display is the main access used by teaching users or students to run the pages or functions presented in the developed learning media. The menu display is used to access learning plans, materials, developer profiles, and evaluation pages.

Figure 3. material page

The display of the material page is taken from the computer network course in accordance with the semester learning plan (RPS). The material presented in this learning media consists of fifteen meetings.

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Figure 4. Evaluation Page

The Evaluation page contains learning evaluations that can be done by students to measure achievement in understanding computer network material presented in the developed learning media. In this view, questions related to computer network subjects are presented by learning media.

3. Assessment is to assess the learning tools by the validator, if there are deficiencies, then repetition or improvement is carried out according to the previous process so that the learning media developed can optimally support the learning process. At the validation stage, the learning media products that have been developed are validated by experts.

Table 3
Validators' Assessment

No	Validator	Indicator	Results	Category
1	Validator 1	content	0,89	Valid
2	Validator 2	content	0,88	Valid
3	Validator 3	design	0,85	Valid
4	Validator 4	design	0,90	Valid

In the third stage, evaluating learning media, in these steps the assessment is focused on assessing the concept of learning media so that the next day it can be used as intended as a media to support online learning in computer network courses which include product trials, practical steps, and effectiveness steps.

Practical test data for computer network learning media were taken from questionnaires that had been distributed to lecturers and students. Practical test data based on practitioner/lecturer responses. Practicality relates to the ease of use of the developed learning media. Practical data were obtained through a questionnaire filled out by two practitioners. Based on the contents of the questionnaire, it can be seen the practicality of learning media.

Table 4
Lecturer Response Results

No	Indicator	Value %			Kategori
		T1	T2	Rata2	
1	Technical	87	85	86	Very Practical
2	Design	85	87	86	Very Practical
3	Contents	85	80	81	Very Practical
Total				85 %	Very Practical

From the data above, it is known that there are 3 evaluations of the practicality of learning media based on the results of the teacher's responses through questionnaires. The results of the response of teacher 1 (T1) and teacher 2 (T2) with a value of 86% based on technical aspects, based on design aspects there were scores of 86%. and from the aspect of content by 81%. Then the total average value of the overall response of the teachers answered with a value of 85%, and it can be said that the media developed was very practical.

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The practicality of learning media also requires input in the form of responses from students. This data was obtained after learning was carried out, through a questionnaire given to students.

Table 5
Student Response Results

No.	Aspect	Results %	Category
1.	Convenience.	87 %	Very Practical.
2.	Motivation.	87 %	Very Practical.
3.	Attractiveness.	88 %	Very Practical.
4.	Usefulness.	85 %	Very Practical.
Average		86 %	Very Practical.

From the information in table 5, it can be seen that there are four practicality assessments of learning media based on student responses through questionnaires. Student rating includes, among others: (1) ease of use is obtained by 87% in the very practical category, (2) motivation is obtained by 87% in the very practical category, (3) attractiveness is obtained by 88% in the very practical category, (4) the usefulness is obtained by 85% in the very practical category and the overall average is 86% in the very practical category, these results indicate that the developed practical categories.

After testing the practicality of the media, the researchers tested the effectiveness of the developed learning media. Before the test is given to the sample class, first a trial is conducted to determine the validity of the questions, the reliability of the questions, the level of difficulty of the questions and distinguishing power, the homogeneity test, and the t-test.

Testing the Validity of Questions

Testing the validity of the test instrument was carried out by testing questions on computer network course students (outside the sample) with the assumption that they were both carried out in computer network courses. After testing the validity of the item items from the 30 questions given to the students, there were 25 valid questions and 5 invalid questions, meaning that the invalid questions were discarded.

Question Reliability Test

Test reliability is a measure of whether the test can be trusted. The results of the calculation of the reliability of the questions are known that all the questions are reliable.

Table 6
Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.887	25

The results of reliability using IBM's SPSS obtained a value of 0.887. These results are compared with the r table. The test is declared reliable if r calculation results > r table. According to the r table, for N=30 and a significant level of 5%, the value of r is 0.361. Then we get r count > r table = 0.887> 0.361. From the results of the analysis and based on the interpretation of the value of r, it can be seen that the test has a high level of test reliability, namely 0.887.

Student Learning Outcomes

Student learning outcomes (posttest) of control class students (classes do not use learning media) of 20 students of class 5f obtained results for posttest 77.15 and experimental class (using learning media) of 19 students of class 5c obtained results for posttest 84.78.

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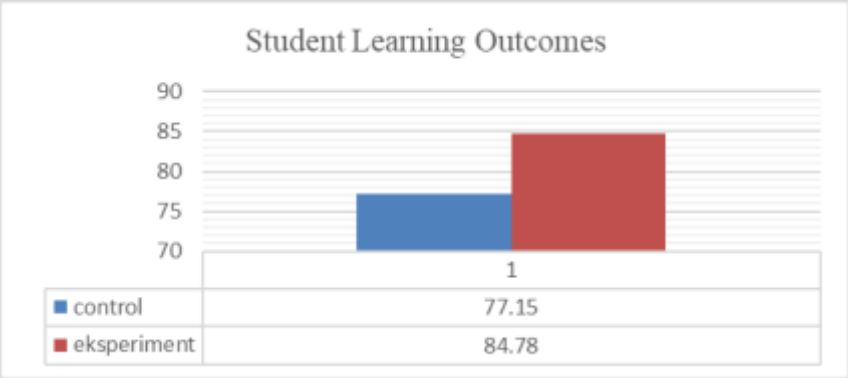

Figure 5. student learning outcomes

Normality Test

From the results of the normality test that has been carried out with SPSS, it is found that a significant value based on Kolmogorov for the control class is 0.177 and for the experimental class, it is 0.200, so it can be concluded that the data is normally distributed because > 0.05.

Table 7
Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	kelas	Statistic	df	Sig.	Statistic	df	Sig.
hasil	kontrol	.162	20	.177	.948	20	.333
	ekperimen	.159	19	.200*	.934	19	.202

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Homogeneity Test

The results of the homogeneity test of the control and experimental class learning outcomes can be seen that the significant value is 0.242 > 0.05 so that it can be interpreted between the control and experimental classes in the homogeneous category.

Table 8
Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
hasil	Based on Mean	1.416	1	37	.242
	Based on Median	1.521	1	37	.225
	Based on Median and with adjusted df	1.521	1	26.708	.228
	Based on trimmed mean	1.401	1	37	.244

T-Test

Based on the normality test and post-test homogeneity, it is said that the two categories are normally distributed in a homogeneous variant so that the comparison test of the two-class averages. from the results of the t-test carried out the significant value is 0.000 > 0.05 so it can be interpreted as having a significant comparison between the two classes.

Table 9
T-Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	hasil - kelas	79.38462	5.41254	.86670	77.63007	81.13916	91.594	38	.000

CONCLUSION

In the development of computer network learning media that has been carried out, it is concluded that in the mechanism of developing computer network learning media as a supporter of online learning through the stages of analyzing the needs needed by students and lecturers, then the development stage is carried out and the last stage is the evaluation stage. At the learning media development stage, the validity of the learning media was also tested which stated that the learning media was valid in terms of media, content, and design. Next, a Practicality test was also carried out, with the result that the learning media was stated to be very practical to use. Furthermore, the media was also tested for effectiveness, and the results of the effectiveness test of learning media were declared effective, this was evidenced by the increase in student learning outcomes with the post-test score in the class not being treated at 77.15% and the class being treated 84.78%.

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