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Development of Interactive Learning Media in Computer Subjects and Basic Networks in Vocational High Schools

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Abstrak

Pemanfaatan teknologi dalam proses pendidikan merupakan salah satu aspek yang mempengaruhi atau membantu terpenuhinya proses pembelajaran yang berkualitas dalam upaya pencapaian tujuan pendidikan. Jika pemanfaatan teknologi ini tidak dilakukan akan ada banyak hal kesulitan ditemui dalam proses pembelajaran yang diberikan langsung oleh guru. Hal ini akan mempengaruhi banyak aspek, seperti penjelasan guru yang sulit diterima dan dipahami serta kurangnya konsentrasi siswa sata proses pembelajaran karena media yang diberikan monoton. Penelitian ini bertujuan untuk mengembangkan media pembelajaran dan menghasilkan media yang valid, praktis, dan efektif pada mata pelajaran Komputer dan Jaringan Dasar untuk kelas X Teknik Komputer dan Jaringan Dasar di SMK YAPIM. Metode yang digunakan dalam penelitian ini adalah metode Research and Development (R&D), dengan model pengembangan four-D. Hasil yang diperoleh dari penelitian ini adalah media pembelajaran interaktif berbasis web. Berdasarkan hasil penelitian disimpulkan bahwa media yang dikembangkan dinyatakan valid pada aspek media 86%, aspek materi dengan hasil sebesar 96%. Media yang dikembangkan praktis dengan nilai kepraktisan dari respon guru dengan hasil sebesar 97,92% dan respon siswa 88,29%, serta media pembelajaran interaktif berbasis web yang dihasilkan efektif digunakan dengan hasil posttest dilihat dari ketuntasan klasikal siswa sebesar 100% dan nilai gain score sebesar 0,50 dengan kategori sedang.
Kata Kunci: Web, Media Pembelajaran Interaktif, Komputer dan Jaringan Dasar

Abstract

The use of technology in the educational process is one of the aspects that influence or help fulfill a quality learning process in an effort to achieve educational goals. If the use of this technology is not carried out, there will be many difficulties encountered in the learning process which are given directly by the teacher. This will affect many aspects, such as the teacher's explanation which is difficult to accept and understand and the lack of concentration of students during the learning process because the media provided is monotonous. This study aims to develop learning media and produce valid, practical, and effective media in the subject of Basic Computers and Networks for class X Computer Engineering and Basic Networks at YAPIM Vocational School. The method used in this study is the Research and Development (R&D) method, with a four-D development model. The results obtained from this study are web-based interactive learning media. Based on the results of the study it was concluded that the developed media was declared valid on the media aspect of 86%, the material aspect with a yield of 96%. The developed media is practical with the practicality value of the teacher's response with a result of 97.92% and the student's response is 88.29%, and the resulting web-based interactive learning media is effectively used with the posttest results seen from the students' classical completeness of 100% and the gain score of 0.50 in the moderate category.
Keywords: Web, Interactive Learning Media, Basic Computers and Networks

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I.   INTRODUCTION

Learning technology is in line with the progress and development of the times (Coccia & Watts, 2020), where the transition to a new century known as the 21st century is so fast and accelerating changes that impact human existence, including the education system (Li, 2020). Students in the 21st century must master science (Afandi et al., 2019), skills, metacognitive (Karnain et al., 2019), be able to think critically and creatively, and be able to communicate or collaborate effectively, this situation illustrates a gap between expectations and reality (Inganah et al., 2023). Likewise with the use of technology in the world of education (Ali, 2020). The use of technology in learning is one of the many aspects that influence or help fulfill a quality learning process in an effort to achieve educational goals (Madani, 2019).

Learning media is an important element in learning that can improve the learning process (Puspitarini & Hanif, 2019). Achieving good learning outcomes depends on the teacher's ability to direct learning activities according to the learning that has been designed (Prasetyo et al., 2021). The use of media in the teaching and learning process in general is to clarify the real presentation of messages (Andriyani & Suniasih, 2021), not only in oral and written form (Winarto et al., 2020). Then overcome the limitations of space, reading materials and also create more direct interaction and increase stimulation for students in learning.

A study by (Novita & Harahap, 2020) has been carried out to develop computer system learning media with Adobe Director 11 software. This research managed to get a fairly good accuracy value with a relatively short steady state time. However, the software used only uses Adobe Director and must also continue to update the display when it is used. Another research conducted by (Pratomo & Irawan, 2015) to develop web-based interactive learning media using the Hannafin and Peck models in web programming courses. But this research only focuses on one material. Another study conducted by (Khaidir, 2020) which aims to improve cognitive learning outcomes of students through the use of web-based interactive learning media exe. However, in carrying out research, students must install the system onto their respective devices so that the time needed is not effective. Meanwhile, the research conducted by (Sultonik et al., 2020) aims for interactive learning media based on the appsgeysers website. The difficulty that arose during the research was that students were not allowed to bring cellphones to school, because parents were afraid that their cellphones would be damaged or unwanted things such as being lost and so on. Another research conducted by (Suandi, 2022) which aims to produce a product in the form of web-based learning media that uses the ADDIE model. A similar study was also carried out by (Tambunan & Siagian, 2022) using the ADDIE model with a very good level of validity. However, this research only reached the design stage. Therefore, the renewal of the research that will be carried out is to create an interactive learning media using the Google site so that when making and using it is not difficult.

The initial process carried out to develop a media in learning is by monitoring the extent to which the media has been used and applied during teaching and learning activities, especially in Computer and Basic Network subjects at the Vocational High School (SMK) level. Based on the reality on the ground, it is necessary to find shortcuts to develop media in learning so that educational progress can go hand in hand with technological advances. Therefore, it is necessary to develop an interactive learning media in the subject of Computers and Basic Networks with the subject of 16 students from class X TKJ 1 and 18 students from class X TKJ 2 at YAPIM Vocational School. Learning media can be seen at the following link: https://youtu.be/ng8v2d97iTU.

II.   LITERATURE RIVIEW

A.   Interactive Learning Media

The media as an intermediary, especially the source of the message and the recipient of the message which functions as a bridge between the source of the message and the recipient of the message (Abidin & Murtadlo, 2020). Media is also defined as a messenger technology that can be used for learning (Montag et al., 2019). Meanwhile, interactive learning media are learning media that are able to provide stimulation to the audience (students) to carry out active learning activities (Trees & Jackson, 2007). With the availability of interactive media students can explore, discover, conduct investigations and build learning frameworks according to their own wishes, because interactive media can display feedback to students. From all the notions of interactive learning media above, it can be taken the essence that this interactive learning media is a learning media that can explain the content of learning material, both abstract and pseudo material that can influence and provide action and reaction in learning activities.

B.   *Media Use in Learning*

The use of media in the implementation of teaching and learning activities is to convey messages in the form of sound, images or text which are part of the material content of a subject where the message can be absorbed easily by students (Sumanti et al., 2021). Many uses of learning media in learning have been put forward by experts including (Herrington & Kervin, 2007):

1) Become more standard in conveying the material.

2) Increase the attractiveness of learning.

3) Making the learning process more interactive.

4) Study time limits can be determined based on the type of material presented.

5) Learning is not only at school but can also be done at home.

Media is something that conveys a message and can stimulate students' thoughts, feelings and desires so that a learning situation is created (Globokar, 2018). Media can be interpreted as an intermediary tool or means of communicating between one party and another.

C.   *Basic Computers and Networks*

In general, the learning system in vocational schools is divided into productive, normative and adaptive lessons. Computers and Basic Networks in vocational schools are classified as productive subjects where apart from learning in the classroom the learning process is also carried out in the laboratory because this subject has practical material as regulated in the vocational school curriculum whose derivatives are based on the syllabus and KI KD (Jaya et al., 2020).

Generally, the subject matter solely from the teacher is conveyed through presentation slides or from the blackboard, therefore students feel bored, lazy, and not interested when the teacher explains the subject matter. Because interactive learning media can describe abstract material with animation, it takes less time and can describe directly, the learning process is repeated, interactive learning media is the best solution to use. However, in this study, interactive learning media was made specifically for KD assembling computers and testing the results of the assembly.

III.   RESEARCH METHODS

The R&D (Research and Development) method was used in this study. The R&D method is a method that aims to develop and produce valid research products through processes or steps that are cyclic and iterative in nature such as field testing, product revisions to finally produce products that are in accordance with the stated goals (Sabrina, Irfan, et al., 2022). This research procedure uses a 4D development model, namely Define, Design, Develop, and Disseminate (Sabrina, Novaliendry, et al., 2022).

Based on Figure 1, the 4D model was chosen in this study because the development model has a systematic procedure, in accordance with the problems underlying this research. Researchers hope that with this model learning modules can be developed that are valid, practical, and effective in increasing motivation, activity and student learning outcomes.
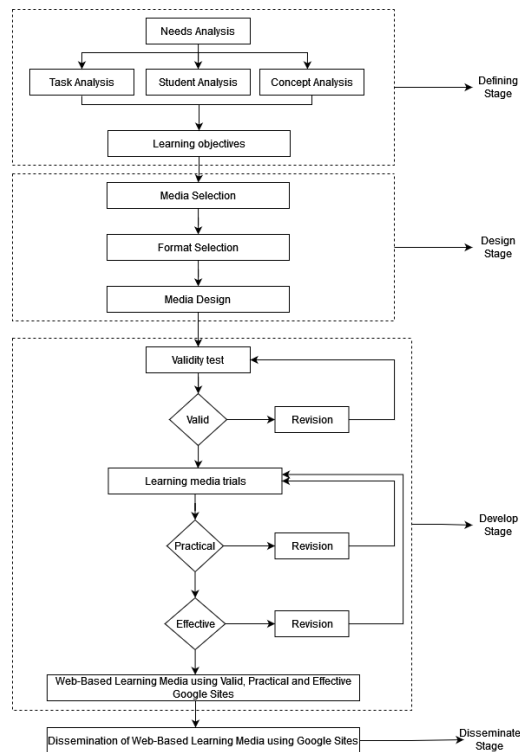
Figure 1. Stages of the development procedure

IV. RESULTS AND DISCUSSION

The results of this study are used to determine the validity, practicality and effectiveness of web-based interactive learning media for the Komjardas subject at YAPIM Vocational School.

A. Definition stage

This defining stage was carried out in order to find out the conditions in the field (Anwar & Sabrina, 2020) with the KJD learning process for class X TKJ. At this stage the steps carried out by analyzing the product development carried out consist of analysis of needs, curriculum, students, assignments, and concepts (Sabrina, Irfan, et al., 2022). From this analysis, it resulted in the formulation of learning objectives that required media assistance as a teacher's tool in conveying material and students for independent study selected Komjardas material, because the learning method applied was still monotonous, so students were less active and creative in the learning process. The teaching material used in the Computer and Basic Networks subject is in the form of presentation slides, the delivery of material is still one-way, namely the teacher provides material and students send assignments given by the teacher, so that learning is less effective, interactive and monotonous. By using interactive learning media, teachers can provide even more interesting explanations.

B. Design Stage

At the design stage, among others: 1) designing learning media; 2) Materials, pictures and videos that are appropriate and appropriate to the pressure material); 3) Media expert and material expert validation sheets; 4) practicality sheets by teachers and students; and 5) student effectiveness sheets.

C. Development stage

The results of the development stage are: 1) web-based interactive learning media consisting of student competencies, teaching materials, images, videos, and interactive evaluation questions; 2) media validation score; 3) user practicality scores; and 4) student effectiveness scores.

D. *Deployment stage*

This stage is a web-based interactive learning tool for KJD subjects that has been developed and can be used by teachers and students. At this stage, the distribution is carried out to see how learning media is used by teachers and students, so that it can be used as a tool to support the learning process in improving student learning outcomes.

Based on the development stages that have been carried out, the results of data analysis are obtained as follows:

Validation data analysis

The validity of the instrument is used to determine whether or not the web-based interactive learning media is valid (Andriyani & Suniasih, 2021), where validity refers to the benefits and whether or not the test is appropriate so that the resulting media can be used. In this study, the validator will validate 3 aspects of the assessment namely, didactic aspects, construction aspects and technical aspects using instruments using a Likert scale for analysis, can be seen in table 1.

Table 1. Media Expert Validity Result Data

No	Validator	Evaluation (%)	Category
1.	Validator 1	94	Valid
2.	Validator 2	86	Valid
3.	Validator 3	79	Valid
Total		86	Valid

Based on table 1, the results of evaluating the validity of web-based interactive learning media are 86%, so this learning media can be said to be valid and can be used as KJD learning media. Meanwhile, the results of the material validation assessment can be seen in table 2.

Table 2. Material Expert Validity Result Data

No	Validator	Evaluation (%)	Category
1.	Validator 1	93	Valid
2.	Validator 2	99	Valid
Average		96	Valid

Based on table 2, the overall validity value is 96% for web-based interactive learning media, so it can be said to be valid and suitable for use as KJD learning media.

Practicality data analysis

Data collection through input from validators uses a questionnaire to assess the validity of this web-based interactive learning media (Fatahillah et al., 2020). Researchers gave questionnaires to teachers and students to ensure the accuracy of the media made, can be seen in table 3.

Table 3. Data on Teacher Response Practicality Results

No	Aspect	Evaluation (%)	Category
1.	State of Use	96,25	Very Practical
2.	Time	100	Very Practical
3.	Media Use	97,50	Very Practical
Average		97,92	Very Practical

Based on table 3, the results of the practicality assessment of web-based interactive learning media by teachers amounted to 97.92%, indicating that this learning media can be used as KJD learning media. As for student responses, it can be seen in table 4.

Table 4. Data on Student Response Practicality Results

No	Aspect	Evaluation (%)	Category
1.	State of Use	88,23	Very Practical
2.	Time	88,16	Very Practical
3.	Media Use	88,47	Very Practical
Average		88,29	Very Practical

Based on table 4, the results of the practicality assessment of web-based interactive learning media by students were 88.29%, indicating that this learning media can be used as a KJD learning media.

Effectiveness data analysis

The effectiveness of web-based interactive learning media is carried out to determine the level of effectiveness of web-based interactive learning media that is applied in learning (Muhardi et al., 2020). The following is an analysis of the acquisition of student learning outcomes.

Table 5. Student's Classical Mastery Result Data

No	Minimum Completeness Criteria	The number of students	Percentage
1.	≤76	0	0%
2.	≥76	28	100%
	Amount	28	100%

Based on table 5 it is known that 28 students completed the subject or 100%, which means the completeness standard has been met. Meanwhile, to test student learning outcomes and give tests to students who are research respondents, the effectiveness of learning outcomes is tested. This test is performed twice. The first time students who have not used learning media take a test called a pretest based on results. The second test, referred to as the posttest, is given to students who have used learning media.

Table 6. Pretest and Posttest Student Learning Outcomes Data

Learning outcomes	≥ Minimum Completeness Criteria	Percentage	≤ Minimum Completeness Criteria	Percentage	Average
Pretest	4 Students	14%	24 Students	86%	68,78
Posttest	28 Students	100%	0 Student	0%	85,30

From table 6 it is concluded that the results of the pretest were 28 students, namely 4 students passed and 24 students did not pass. While the results of the posttest, namely 28 students, all passed. Research on the development of web-based interactive learning media is supported by the results of research that has been done, that the web can help the teaching and learning process.

The development of web-based interactive learning media is able to improve student learning outcomes and increase student responses. This interactive learning media also makes it easier for teachers to train students' skills and activeness, motivates students, is fun, can assist students in learning, provides a variety of learning resources. So that interactive learning media can be categorized as valid, practical and effectively used in the process. While the limitations of the research found are that this web-based interactive learning media is only used by teachers and students in the implementation and delivery of basic computer and network subject matter.

This web-based multimedia development is very helpful for students in online and offline learning, because this product development can be accessed anywhere, and at any time so students can access it under any circumstances as long as a smartphone or laptop is connected to the internet. If students want to access it offline, students can download the module or material that has been prepared on the download page so that students can read or study the material without a network or offline. And also when students feel bored reading the material being studied, students can study the material using the videos that have been provided on the web.

V. CONCLUSION

The development of web-based interactive learning media has gone through several stages. Each stage has been completed in the development of web-based interactive learning media for KJD subjects at YAPIM Vocational Schools, which can be used by teachers and students whenever they want, wherever they are, and without time or place restrictions. This learning media was declared valid by the media expert validator with an average validity value of 86%, and the material expert validator with an average validity value of 96%. For the practicality of teacher learning media a score of 97.92%, and students 88.29%. Whereas the effectiveness of learning media is categorized as very effective, seen from the normality test results of the pretest and posttest data of 0.05, the pretest data significance value is 0.055>

0.05, so it can be said to be normally distributed, while the posttest obtained a value of 0.205> 0.05 then it can be said to be normally distributed.

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