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Development of Learning Media in The Subject of Network Insfrastructure Administration

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Abstract

This research aims to develop learning media for class The research method used is the R&D method using the four-D development model. The four-D development model consists of Define, Design, Development, and Disseminate. The results obtained from this development research are learning media based on Adobe Flash Professional CS6. Based on the research results, it can be concluded that the media developed is declared valid in the media aspect at 85.42%, the material aspect with results at 80.83%. The media developed is practical with a practical value from teacher responses with results of 90.14% and student responses of 89.60%, and the resulting learning media has been effectively used with posttest results seen from students' classical completeness of 88% and a gain score of 0 .38 in the medium category. The conclusion is that the Adobe Flash Professional CS6-based learning media developed can be used and is feasible in the learning process to improve student learning outcomes.

Keywords: Learning Media, Flash Media, Network Infrastructure Administration

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INTRODUCTION

Vocational secondary education is a form of education organized by the government to produce high-quality individuals, so that its graduates are expected to enter the workforce and develop a professional attitude in their respective fields. This aligns with the Government Regulation of the Republic of Indonesia Number 19 of 2005 Article 26 paragraph (3) which states, "The purpose of vocational secondary education is to increase intelligence, knowledge, personality, noble character, and skills to live independently and pursue further education according to their major" (Rohim & Jaya, 2019) (Azmi, 2022) (Firdaus et al., 2023).

To create vocational high school (SMK) graduates who are ready to work in their fields, efforts must be made to achieve this quality, such as providing adequate facilities and infrastructure, improving the quality of educators, and refining the curriculum that emphasizes the development of aspects leading to the enhancement and development of life skills. These efforts are realized through the achievement of students' competencies to be able to adapt and succeed in the future (Afrianto & Wirayudha, 2024) (Fadhilah & Husin, 2023).

Many factors influence the achievement of learning objectives. There are two main factors that affect learning outcomes: internal factors, which include physical factors, intelligence, motivation, attention, interest, talent, and readiness; and external factors, which include family, community, teaching methods, curriculum,

and learning media. Therefore, one of the aspects that can influence learning outcomes is learning media (Slameto, 2010) (Adnan, 2024).

Interactive learning media is one type of learning media that has several advantages, including being flexible (allowing users to choose materials according to their needs and use them whenever they want), content-rich (providing ample information relevant to the presented material), and interactive (enabling two-way communication between the media and the user). This media facilitates independent learning and allows students to choose materials according to their preferences. With interactive media, students can learn anytime and anywhere (Nopriyanti, 2015) (Winataputra, 2001) (Marta et al., 2024).

Currently, the use of interactive media in learning has significantly increased, involving almost all of the students' senses through the use of images, colors, sounds, and simulations in learning. It is not surprising that interactive media has become an innovative tool for independent learning that can improve students' learning outcomes. This is supported by Dale's cone of experience theory, which emphasizes that students' learning experiences are better when they do or experience what they learn themselves (Yustina & Yahfizham, 2023) (Isma et al., 2021).

The more concrete the students' learning experiences and practice, the more experiences they gain. Conversely, the more abstract the students' experiences, the fewer experiences they acquire, for example, by relying solely on verbal language (Rohim & Jaya, 2019) (Hikmah Fajar et al., 2023) (Fadhilah et al., 2023).

METHODS

This research uses research and development (R&D) methods. The research and development process involves creating products, refining existing products, and testing their effectiveness (Riduwan, 2010). This research uses the four-D development model, which follows a systematic process according to the identified problems. The four-D model includes four stages: Define, Design, Develop, and Disseminate, following the flow from Thiagarajan (Sugiyono, 2013) (Taali et al., 2021).

The development of Adobe Flash Professional CS6-based learning media for the subject of Network Infrastructure Administration aims to support student learning and improve learning outcomes. The research subjects are 25 students of class XI TKJ. The type of data used in this research is primary data, obtained directly from sources such as schools, teachers, experts, and students. This research data is analyzed using descriptive analysis, which includes the analysis of the validity, practicality, and effectiveness of the developed learning media.

RESULTS & DISCUSSION

The results of this study include assessing the validity, practicality, and effectiveness of Adobe Flash Professional CS6-based learning media for the Network Infrastructure Administration course for grade XI Computer and Network Engineering at SMK Negeri 1

Linggo Sari Baganti. The development utilized the Four-D model, which includes four stages: Define, Design, Develop, and Disseminate.

In the Define stage, an analysis and identification of problems were conducted to obtain various information related to the product to be developed. Observations showed several issues in the teaching and learning process, including the use of conventional media where the learning materials were limited to textbooks, resulting in a monotonous learning process. This hindered optimal interaction between teachers, students, and teaching media. Additionally, student observations indicated that the average learning outcomes in the Network Infrastructure Administration subject were below the minimum completeness criteria (KKM).

The next stage involved selecting appropriate learning media to present the material. This study chose Android-based learning media designed using Adobe Flash Professional CS6. This software was selected because it supports animation creation, button design, and integration of text, images, animation, and sound, making it a comprehensive learning tool. The media can be run on both computers and Android devices. The next step was choosing a format for developing the learning media to design the learning content and material presentation. The chosen format includes the study material presented from basic competencies to be achieved, material explanations, exercises, and evaluations.

The next step was selecting the application to be used for the learning media. Adobe Flash Professional CS6 was chosen for its support in creating animations and buttons and integrating text, images, animations, and sounds for the learning media. The developed media can be used on both computers and students' smartphones. After selecting the application, the next step was to design the content and develop the learning media to assist in presenting the learning materials. The chosen format includes material studies in the form of media, presented based on the basic skills to be acquired, material explanations, exercises, and evaluations.

The components of the Android-based learning media are as follows:

a. Intro Page

The intro page displays the initial appearance when opening the interactive learning media, equipped with a start button leading to the main menu, as shown in Figure 1.

Figure 1. Intro Page

b. Main Menu Page

After the intro, students enter the main menu page with several menu buttons to support the learning process, as shown in Figure 2.

Figure 2. Main Menu Page

c. Identification and Reference Page

This page explains the core and basic competencies of the Network Infrastructure Administration course. The reference page displays the book cover and sources, with three buttons: back, main menu, and exit, as shown in Figure 3.

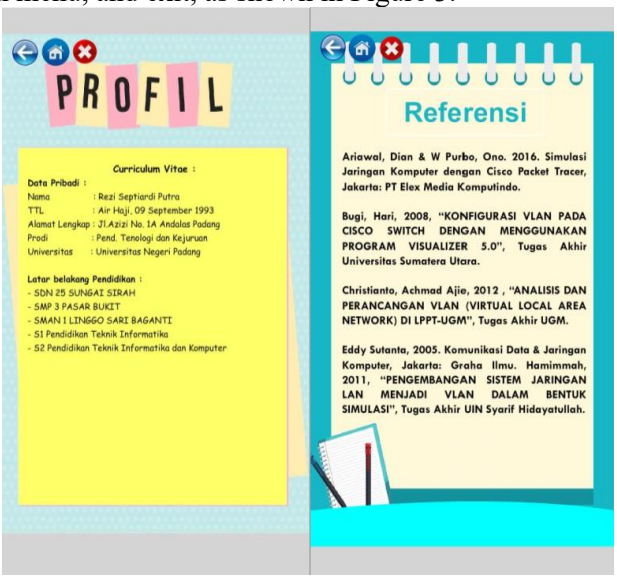

Figure 3. Identification and Reference Page

d. Material Menu Page

This page displays several buttons for the Network Infrastructure course materials, as shown in Figure 4.

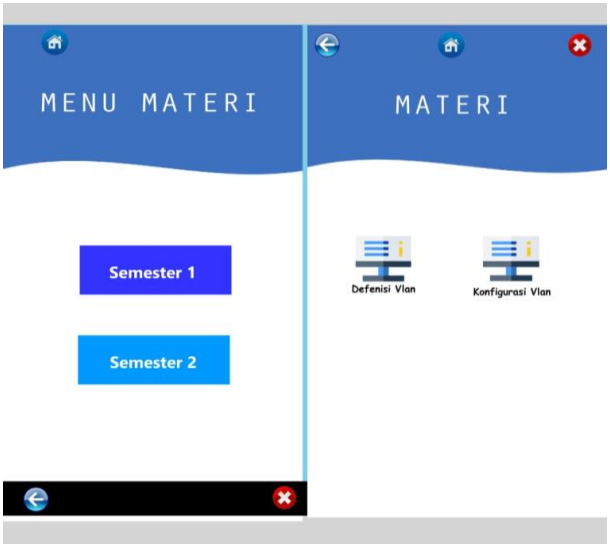

Figure 4. Material Menu Page

e. Video Menu Page

The video menu contains a button linking to YouTube for accessing learning videos, requiring an internet connection. It includes three buttons: back, main menu, and exit, as shown in Figure 5.

Figure 5. Video Menu Page

f. Evaluation Menu Page

The evaluation menu contains a button leading to the evaluation page, explaining the number of questions (20) and instructions for answering them, with three buttons: back, main menu, and exit, as shown in Figure 6.

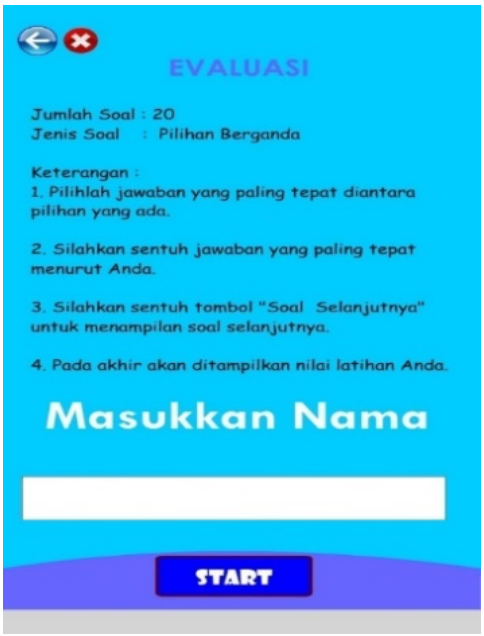

Figure 6. Evaluation Menu Page

After the design stage is completed, the next stage is development. This stage aims to produce learning media that are valid, practical, and effective. The validity stage is carried out by testing with media experts and subject matter experts. Meanwhile, the practicality stage is conducted by testing with students and teachers, and the effectiveness of the learning media is tested on student learning outcomes.

The validity stage involves providing questionnaires to validators. There were four validators for the learning media: two media experts and two subject matter experts. The validator data are presented in Table 1.

Table 1. Validator Data for Adobe Flash Professional CS6-Based Learning Media

Validator Name	Evaluation	Aspect Validated
Prof. Dr. Hasan Maksum, MT	Lecturer FT-UNP	Media Validator
Geovanne Farell, S. Pd, M.Pd. T	Lecturer FT-UNP	Media Validator
Wawan Purwanto, S. Pd, M. T, Ph. D	Lecturer FT-UNP	Subject Matter Validator
Dr. Dedi Irfan, S. Pd, M. Kom	Lecturer FT-UNP	Subject Matter Validator

The media experts evaluate the feasibility of the media in the learning media. The media experts' assessment instrument uses the Guttman scale, which consists of 15 items divided into three indicators: construction requirements, didactic requirements, and technical requirements. Additionally, there are suggestions and comments from the validators regarding the developed learning media. The overall results of the media validation are shown in Table 2.

Table 2. Media Expert Testing Results

Indicator	Average Percentage
Didactic Requirements	90 %
Construction Requirements	82,5 %
Technical Requirements	83,75 %
Overall Average Percentage	85,42 %

From Table 2, the media expert test scores can be analyzed based on each indicator. The first indicator is didactic requirements, consisting of 3 statements with an average percentage of 90%. The second indicator is construction requirements, consisting of 4 statements with an average percentage of 82.5%. The last indicator is technical requirements, consisting of 8 statements with an average percentage of 83.75%. From the analysis results shown in Table 2, the conclusion of the media testing is that it is valid with some improvements.

Next, the subject matter experts evaluate the feasibility of the flash-based learning media's presentation. The subject matter expert assessment instrument uses the Likert scale, which consists of 15 items divided into four indicators: content quality, learning quality, interaction quality, and presentation quality. Additionally, there are suggestions and comments from the validators regarding the developed learning media. The overall results of the material validation are shown in Table 3.

Table 3. Subject Matter Expert Testing Results

Indicator	Average Percentage
Content Quality	83,33 %
Learning Quality	80 %
Interaction Quality	80 %
Presentation Quality	80 %
Overall Average Percentage	80,83%

From Table 3, the subject matter expert test scores can be analyzed based on each indicator. The first indicator is content quality, consisting of 6 statements with an average percentage of 83.33%. The second indicator is learning quality, consisting of 3 statements with an average percentage of 80%. The third indicator is interaction quality, consisting of 3 statements with an average percentage of 80%. The last indicator is presentation quality, consisting of 3 statements with an average percentage of 80%.

Based on the overall average percentage from the subject matter experts, the feasibility percentage is 80.83%. The conclusion from the subject matter expert testing is that the learning media is feasible for use with some improvements.

Next, the practicality test evaluates the teachers' practical responses to the learning media. This practicality data is obtained from questionnaires filled out by two teachers from SMK Negeri 1 Linggo Sari Baganti for the Network Infrastructure Administration subject. The practicality evaluation results are summarized in Table 4.

Table 4. Teacher Response Questionnaire Results on the Practicality of Learning Media

Validation Aspect		Percentage	Category
Ease of Use	Penggunaan	90 %	Very Practical
Time Effectiveness		86,67 %	Very Practical
Media Usage		93,75%	Very Practical
Average Percentage		90.14%	Very Practical

Based on Table 4, an analysis can be conducted based on validation aspects. In the practicality testing conducted with teachers, there are three validation aspects. The first aspect is ease of use, which consists of 8 statements with a percentage of 90%. The second validation aspect is time effectiveness, which consists of 3 statements with a percentage of 86.67%. The last aspect is media usage, which consists of 8 statements with a percentage of 93.75%. Thus, the average percentage of teacher responses is 90.14%, categorized as "Very Practical."

Next is the practicality test of student responses to the learning media. This practicality data is obtained from questionnaires filled out by 25 students of class XI at

SMK Negeri 1 Linggo Sari Baganti majoring in Computer and Network Engineering. The practicality evaluation results are summarized in Table 5.

Table 5. Student Response Questionnaire Results on the Practicality of Learning Media

Validation Aspect	Percentage	Category
Ease of Use	88,93 %	Very Practical
Time Effectiveness	90,67 %	Very Practical
Media Usage	89,20 %	Very Practical
Average Percentage	89.60%	Very Practical

Based on Table 5, an analysis can be conducted based on validation aspects. In the practicality testing conducted with students, there are three validation aspects. The first aspect is ease of use, which consists of 8 statements with a percentage of 88.93%. The second validation aspect is time effectiveness, which consists of 3 statements with a percentage of 90.67%. The last aspect is media usage, which consists of 8 statements with a percentage of 89.20%. Thus, the average percentage of student responses is 89.60%, categorized as "Very Practical."

Next is the effectiveness test, which examines student learning outcomes by conducting tests. The initial test, where students had not used the learning media, is called the pretest. The second test is conducted by providing treatment to students, allowing them to learn using the learning media. The learning outcomes are obtained after conducting pretests and posttests using 20 multiple-choice questions. Pretest and posttest learning outcome data are presented in Table 6.

Table 6. Pretest and Posttest Learning Outcome Data

Learning Outcome	≥ KKM	Percentage	≤KKM	Percentage	Average
Pretest	11	44 %	14	56 %	70,4
Posttest	22	88 %	3	12 %	82

Based on Table 6, it can be seen that in the pretest condition, of the 25 students studied, 11 students did not meet the Minimum Competency Criteria (KKM) with scores below the threshold, while 14 students scored above the KKM. After the posttest, of the 25 students studied, 22 students met the KKM and 3 did not. The posttest results show that 22 out of 25 students scored above the KKM, with a percentage of 88%. Therefore, it can be concluded that the developed learning media is effective for use when viewed from classical completeness.

In addition to testing with classical completeness, the effectiveness test is also conducted using gain scores. The gain score test results can be seen in Table 7.

Table 7. Gain Score Values

N	Minimum Score	Maximum Score	Gain Score
25	0,00	1,00	0,38
	Category		Medium

Based on the classical completeness reaching 88% and a gain score of 0.38 with a medium category, it can be concluded that the learning media is declared effective.

The final stage is the dissemination stage. At this stage, the developed learning media is ready to be used or disseminated in other classes for the subject of Network Infrastructure Administration. The purpose of this dissemination is to facilitate teachers in conducting the learning process and to make the learning atmosphere more engaging, thereby increasing student interest in learning.

CONCLUSION

Based on the research results, several conclusions were obtained. First, the development process has resulted in Adobe Flash Professional-based learning media for the subject of Network Infrastructure Administration at SMK N 1 Linggo Sari Baganti, which can be used by students on computers, laptops, and smartphones anytime and anywhere. Second, the developed learning media is declared valid by experts and can be used as learning media, with an average media validity of 85.42% and material validity of 80.83%. Third, the developed learning media is declared very practical as responded by teachers and students, with a practicality score of 90.14% from teacher responses and 89.60% from student responses. Fourth, the developed learning media is effective for use, with posttest results showing classical completeness of students at 88% and an N Gain Score of 0.38 with a medium category.

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