DEVELOPMENT OF INTERACTIVE MULTIMEDIA LEARNING USING ARTICULATE STORYLINE ON LAN CABLE CRIMPING MATERIAL AT NU TULUNGAGUNG VOCATIONAL SCHOOL

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ABSTRACT

In class and passive. In this case, it is necessary to develop interesting learning media to increase students' interest in learning. The aim of this research is to develop interactive learning multimedia using Articulate Storyline on appropriate LAN cable crimping material at SMK NU Tulungagung. This interactive learning media was created through a research and development (R&D) approach using Articulate Storyline. The development research model used is the ADDIE model (Analysis, Design, Development, Implement and Evaluation). This development research uses qualitative and quantitative descriptive analysis. The research subjects included media experts, namely lecturers at Bhinneka PGRI University, material experts, namely teachers of Basic Computer Network Engineering and Telecommunications subjects and class X TKJ students at SMK NU Tulungagung as respondents. The instruments used to assess product suitability include media expert validation, material expert validation and user assessment. The results of the media expert trial produced a feasibility percentage of 91.6%, which indicates a very feasible feasibility level. Likewise, the material expert trial resulted in a feasibility percentage of 95%, which indicates a very feasible feasibility level. In a small group experiment, it resulted in a feasibility percentage of 94.16% which indicated a very feasible feasibility level. In a large group experiment, it resulted in a feasibility percentage of 91.52% which indicated a very feasible feasibility level. Therefore, the interactive learning multimedia developed by researchers, using Articulate Storyline on LAN cable crimping material, is very suitable to support the teaching and learning activities of class X TKJ students at SMK NU Tulungagung.

I. INTRODUCTION

THE emergence of the Fourth Industrial Revolution has had a profound influence, with information technology now functioning as the basis of daily existence [1]. This transformation has significantly influenced the field of education, because it has triggered a shift towards the use of information technology-based learning media. Teachers can improve student learning outcomes by using interactive learning media, because it can stimulate students' aspirations, interests and instincts in the learning process. [2] defines Articulate Storyline as a multimedia writing tool designed to create interactive learning media in which there is text, photos, graphics, sound, video, animation and other elements combined into one. In addition, it is very user-friendly, making it accessible even for beginners [3]. According to [4], the use of Articulate Storyline facilitates students in understanding learning material, increases class effectiveness and efficiency, and encourages student motivation during the learning process.

Based on the results of observations and interviews conducted by researchers in class the process of learning activities where most students become bored and passive. In this case, it is necessary to develop interesting learning media to increase students' interest in learning. Researchers will raise the problem above with the research title: Development of Interactive Learning Multimedia Using Articulate Storyline on LAN Cable Crimping Material at Vocational School NU Tulungagung.

II. LITERATURE REVIEW

A. Interactive Learning Multimedia

[5] defines interactive learning multimedia as a computer-based learning program that combines many elements such as text, photos, videos and animation. The program aims to facilitate user engagement with the program actively and achieve specific learning goals.

B. Articulate Storyline

Articulate Storyline is a media authoring tool used to produce interactive learning media. This tool allows users to combine various elements such as text, photos, sound, graphics, animation, and video to enhance the learning experience [6]. Additionally, Articulate Storyline supports several output formats for publishing content.

C. LAN Cable Crimping Material

In the computer network engineering skills (TKJ) program at vocational high schools, LAN cable crimping material is one of the materials in the basic subjects of computer network engineering and telecommunications.

III. RESEARCH METHODS

A. Research Model

Interactive learning media with Articulate Storyline 3 was created through a research and development (R&D) approach. The ADDIE (Analysis, Design, Development, Implementation, Evaluation) model developed by Dick and Carry in 1996, was used because of its specificity in developing learning products that can be implemented effectively and each stage is systematic [7]. Figure 1 provides a more detailed explanation of the ADDIE model development flow.
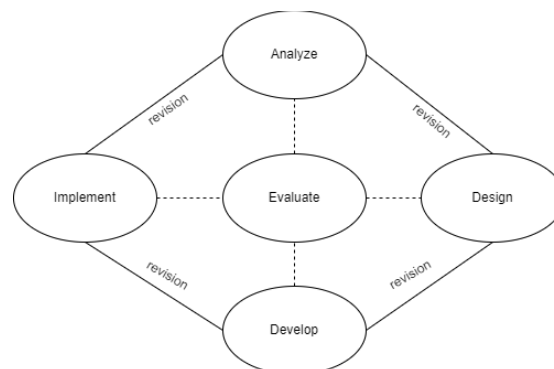

Fig. 1. ADDIE Model Development Flow

B. Test Subjects

Judging from the development flow of the ADDIE model in the picture above (Figure 1), the implementation of learning media development using the ADDIE model has steps in its implementation. The participants in this trial consisted of 12 X TKJ students at SMK NU Tulungagung. The media expert involved is Mr. Fahrur Rozi, M.Kom., a lecturer at Bhinneka PGRI University. The material expert is Mrs. Aisyah Agustina, S.Pd.Gr., a teacher who teaches Basic Computer Network and Telecommunications Engineering at Vocational School NU Tulungagung.

C. Data Analysis Techniques

This development research uses qualitative and quantitative descriptive analysis. Qualitative descriptive analysis is used to explain the results of product design implementation and evaluate the level of product feasibility. Data collected from questionnaires using a Likert scale, which consists of four answers (because it eliminates the possibility for respondents to choose a neutral alternative), is converted into numerical values using scale values. explained in Table I [8].

TABLE I
LIKERT SCALE

Score	Information
4	Very good
3	Good
2	Pretty good
1	Not good

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The formula used to obtain a percentage score for product suitability is as follows:

$$\text{Eligibility percentage\%} = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$

Once the feasibility percentage data has been obtained, the final stage involves converting the percent data into feasibility predicates. This predicate shows the quality of the product produced, either based on rating scale measurements or the criteria stated in table II [8].

TABLE II
ELIGIBILITY CRITERIA

Percentage	Kriteria
<25%	Not feasible
25%-50%	Not Worth It
50%-75%	Worthy
75%-100%	Very Worth It

IV. RESEARCH AND DEVELOPMENT RESULT

A. Analysis

Analysis stage activities include important elements such as observing the learning process, competency analysis, student characteristics, and teaching materials. The following are the results obtained during observation:
1) LAN cable crimping material is the material being taught.
2) Teachers only use textbooks that are delivered with lectures.
3) Students are given the practical task of making Straight and Cross cables.
4) Students have difficulty understanding what the teacher says.
5) Students show passivity by only looking at what the teacher presents, thus hindering their ability to effectively apply the material presented.

After analyzing by means of observations and interviews, it was clear that there were various specific product details required. The following information describes the details of the products to be produced:
1) Products in the form of learning media that help students' understanding of learning topics and produce products that can be accessed wherever and whenever they want.
2) The product under development is an application used on Android smartphones, because most students at Vocational School NU Tulungagung use Android smartphones.
3) The product developed must contain material that is in accordance with the ATP at Vocational School NU Tulungagung.

B. Design

The design stage is the stage where the product is created. This stage involves creating a storyboard, compiling learning materials, and compiling research instruments.

C. Development

This development stage carried out product validation with experts to receive criticism and input before the product was tested on class X TKJ students at SMK NU Tulungagung. The following is a display of the products that will be developed:

Fig. 2. Cover Page

On the product cover page there is a material title and there are two buttons, namely the element button which leads to the element page, and the menu button which leads to the main menu page.

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Fig. 3. Elements Page

Contains elements and learning objectives taken from ATP. There is a ← button that leads to the previous page, namely the initial display page.

Fig. 4. Menu Page

On the menu page there are four menus (materials, tutorials, quizzes, and information) and four buttons on each menu.
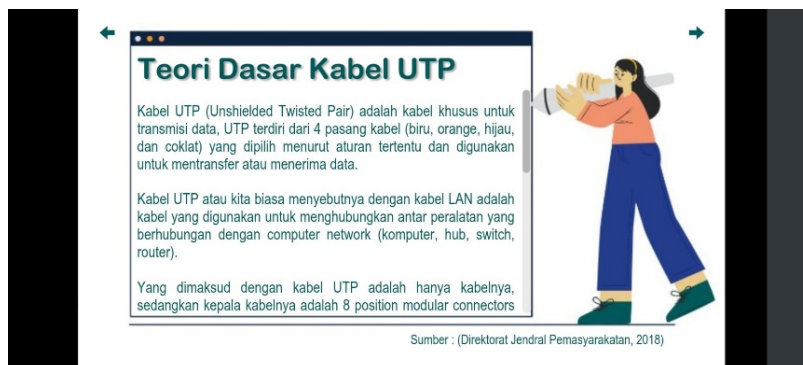

Fig. 5. Material Menu

This material menu displays basic theoretical material for UTP cables and Types of UTP Cables. Material can be scrolled up or down. There is a ← button which will go to the previous page and a → button which will go to the next page.

Fig. 6. Tutorial Menu

The tutorial menu displays two practical videos of crimping LAN cables, namely crimping straight cables and crimping cross cables. Videos can be played and paused as desired.
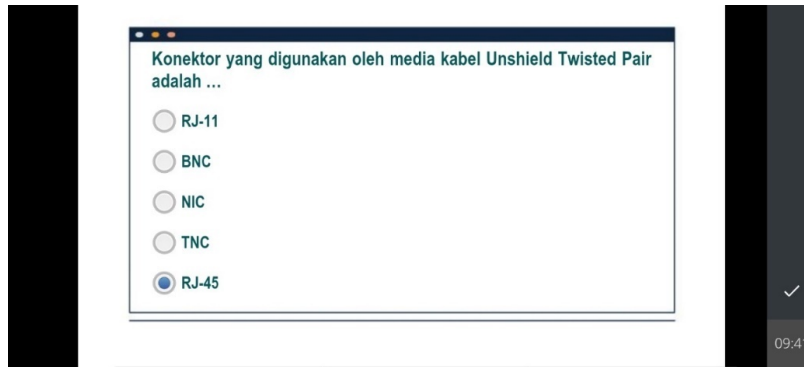
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Fig. 7. Quiz Menu

The quiz consists of 10 multiple choice questions with a time of 10 minutes. Every time you answer a question you must press the √ button to save the answer. Questions cannot be skipped or returned.

Fig. 8. Information Menu

1) Test media experts

Mr. Fahrur Rozi, M.Kom., a media expert and lecturer in the PTI (Information Technology Education) Study Program at Bhinneka PGRI University, conducted media trials. Media expert validation consists of three components: ease of navigation, appearance, and functionality. The results of media expert validation are presented in Table III.

TABLE III
MEDIA EXPERT VALIDATION RESULTS

No.	Aspect	Indicator	Score	Information
1.	Ease of navigation	Ease of use navigation	3	Good
		Suitability of navigation menus on media	4	Very Good
		Consistency of navigation menus on media	4	Very Good
		Ease of media operation	3	Good
		Smooth media operation	4	Very Good
		Clarity of operating instructions	3	Good
2.	Appearance	The media display is appropriate to the material presented	4	Very Good
		Color composition in media	4	Very Good
		Placement of content in media	3	Good
		Text quality in media	4	Very Good
		Image quality in media	4	Very Good
		Video quality in media	4	Very Good
3.	Overall function	Suitability of media to user capabilities	4	Very Good
		Comfort of learning when using media	3	Good
		Achievement of minimum specifications in media development	4	Very Good
		Total score	55	

The calculation of the eligibility percentage from media experts is as follows:

$$\text{Eligibility percentage\%} = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$

$$= \frac{55}{60} \times 100\%$$

$$= 91{,}6\%$$

From the calculation of the feasibility percentage (media expert test), the result was 91.6%. The media developed is included in the "very suitable" category for use in learning.

2) Testing material expert

Mrs. Aisyah Agustina, S.Pd.Gr., a teacher at Vocational School NU Tulungagung who teaches Basic Computer Network Engineering and Telecommunications subjects, is responsible for assessing learning materials. Table IV shows the results of material expert validation which includes cognitive aspects and information presentation.

TABLE IV
MATERIAL EXPERT VALIDATION RESULTS

No.	Aspect	Indicator	Score	Information
1.	Kognition	Learning in media can motivate students	2	Not good
		Ease of understanding the material presented in the media	3	Good
		Suitability of material to learning objectives	4	Very good
		The correctness of the material presented	4	Very good
		The consistency of the material presented	4	Very good
		Suitability of presenting videos as supporting material	4	Very good
		The relationship between evaluation and material	4	Very good
		Accuracy of evaluation in the media	4	Very good
		Clarity of evaluation in the media	4	Very good
2.	Presentation of information	Accuracy of language use	4	Very good
		Availability of instructions for using the media	4	Very good
		Availability of basic materials	4	Very good
		Availability of learning objectives	4	Very good
		Availability of grades on evaluation	4	Very good
		The material presented makes it easier for teachers to deliver the material	4	Very good
		Total score	55	

The calculation of the feasibility percentage from material experts is as follows:

$$\text{Eligibility percentage\%} = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$
$$= \frac{57}{60} \times 100\%$$
$$= 95\%$$

From the calculation of the feasibility percentage (material expert test), the result is 95%. The media developed is included in the "very suitable" category for use in learning.

D. Implementation

Implementation is intended to evaluate the level of product suitability based on user responses to it. Product feasibility testing is carried out through an assessment questionnaire for the product used. Class X TKJ SMK NU Tulungagung students were test subjects.

1) Test small groups

In this small group testing stage, it was carried out by taking a sample of 3 students as respondents. The large group test data table is shown in Table V.

TABLE V
SMALL GROUP TEST RESULTS

No.	Aspect	Indicator	Score	Percentage	Information
1.	Ease of navigation	Navigation buttons are easy to use	11	91,6%	Very worthy
		Media is easy to operate	12	100%	Very worthy
		The media runs smoothly when operated	12	100%	Very worthy
		Media operating instructions are clear	11	91,6%	Very worthy
2.	Cognition	The use of media increases my motivation in studying	10	83,3%	Very worthy
		Makes it easier for me to understand the material presented	11	91,6%	Very worthy
		Learning videos are in accordance with the learning material	12	100%	Very worthy
3.	Presentation of information	The use of language in the media is easy to understand	12	100%	Very worthy
		There are instructions for using the media	10	83,3%	Very worthy
4.	Appearance	The media display is appropriate to the material presented	12	100%	Very worthy
		Color composition in media	10	83,3%	Very worthy
		Placement of content in media	12	100%	Very worthy
		Text quality in media	11	91,6%	Very worthy
		Image quality in media	12	100%	Very worthy
		Video quality in media	11	91,6%	Very worthy
5.	Overall function	Media can be run easily according to my abilities	11	91,6%	Very worthy
		I feel comfortable using this media	11	91,6%	Very worthy
		This media includes all the functions and materials I need	11	91,6%	Very worthy
		Using media makes it easier for me to learn	12	100%	Very worthy
		I feel satisfied with this media	12	100%	Very worthy
		Total Score	226		

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The calculation of the feasibility percentage of the small group test for the media being developed is as follows:

$$\text{Eligibility percentage\%} = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$
$$= \frac{226}{240} \times 100\%$$
$$= 94{,}16\%$$

Based on analysis and calculation of the feasibility percentage from the small group test, the result was 94.16%. The media developed is included in the "very suitable" category for use in learning.

2) Test large groups

In this large group testing stage, a sample of 9 students (respondents) was used. The 9 respondents were class X TKJ students at SMK NU Tulungagung. The large group testing data table is shown in Table VI.

TABLE VI
LARGE GROUP TEST RESULTS

No.	Aspect	Indicator	Score	Percentage	Information
1.	Ease of navigation	Navigation buttons are easy to use	32	88,8%	Very worthy
		Media is easy to operate	34	94,4%	Very worthy
		The media runs smoothly when operated	32	88,8%	Very worthy
		Media operating instructions are clear	34	94,4%	Very worthy
2.	Cognition	The use of media increases my motivation in studying	32	88,8%	Very worthy
		Makes it easier for me to understand the material presented	32	88,8%	Very worthy
		Learning videos are in accordance with the learning material	34	94,4%	Very worthy
3.	Presentation of information	The use of language in the media is easy to understand	34	94,4%	Very worthy
		There are instructions for using the media	33	91,6%	Very worthy
4.	Appearance	The media display is appropriate to the material presented	33	91,6%	Very worthy
		Color composition in media	33	91,6%	Very worthy
		Placement of content in media	31	86,1%	Very worthy
		Text quality in media	35	97,2%	Very worthy
		Image quality in media	32	88,8%	Very worthy
		Video quality in media	33	91,6%	Very worthy
5.	Overall function	Media can be run easily according to my abilities	33	91,6%	Very worthy
		I feel comfortable using this media	33	91,6%	Very worthy
		This media includes all the functions and materials I need	33	91,6%	Very worthy
		Using media makes it easier for me to learn	33	91,6%	Very worthy
		I feel satisfied with this media	33	91,6%	Very worthy
		Total Score	659		

The calculation of the feasibility percentage of the large group test for the media being developed is as follows:

$$\text{Eligibility percentage\%} = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$
$$= \frac{650}{720} \times 100\%$$
$$= 91{,}52\%$$

Based on analysis and calculation of the feasibility percentage from the large group test, the result was 91.52%. The media developed is included in the "very suitable" category for use in learning.

V. CONCLUSION

A. Conclusion

The development of interactive learning multimedia in this research is considered very feasible to be implemented in learning activities. This is because it has gone through appropriate development procedures and been validated by experts (media and materials). The ADDIE development model consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The results of the media expert trial produced a feasibility percentage of 91.6%, which indicates a very feasible feasibility level. Likewise, the material expert trial resulted in a feasibility percentage of 95%, which indicates a very feasible feasibility level. In a small group experiment, it resulted in a feasibility percentage of 94.16% which indicated a very feasible feasibility level. In a large group experiment, it resulted in a feasibility percentage of 91.52% which indicated a very feasible feasibility level. Therefore, the interactive learning multimedia developed by researchers, using Articulate Storyline on LAN cable crimping material, is very suitable for supporting the teaching and learning activities of class X TKJ students at SMK NU Tulungagung.

B. Suggestion

To ensure effective use of the product, several recommendations are related to the results of the development of interactive learning multimedia at Vocational School NU Tulungagung:

1) *For students*

   Students are required to utilize smartphones for studying.

2) *Bagi educators*

   Teachers are required to be creative in developing smartphone-based learning media in all subjects to achieve learning success.

3) *For further research*

   Creating learning media that is compatible with various operating systems and offers enhanced functionality, including the ability to get updates via the Play Store, and can be accessed on smartphones with Android OS or iOS.

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