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Research paper

Development of Interactive Learning Media in Occupational Health and Safety Subject in Vocational High School

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ABSTRACT

Background: This research and development study aims to develop media in the form of learning videos on Occupational Safety and Health (K3) and to determine the feasibility of K3 learning videos in the Building Department of SMKN 5 Makassar.

Methods: The development model used in this study is 4D (Four-D), namely the stages of defining, designing, developing, and disseminating. In this case, the learning video feasibility assessment data collection was carried out using a questionnaire as the research instrument. This study further involved 2 material experts and 2 media experts to assess the feasibility of the video. Students were also involved in getting responses to the Occupational Safety and Health (K3) learning video.

Results: This study obtained interactive learning media through research and development methods with 4-D (Four-D) model development. Another result obtained is interactive learning media in the form of learning videos on occupational safety and health subjects in the Buildings Department of SMK N 5 Makassar. Furthermore, the results of the feasibility level of learning videos according to the material experts obtained a value of 89.13% which is categorized as very feasible. Meanwhile, the media experts gave a feasibility level of 89.84%, which is categorized as very feasible. In addition, the student responses as the users of learning video media gave value of 89.89%, which is categorized as very good.

Conclusion: Based on this research, it is concluded that interactive learning media in the form of learning videos on Occupational Safety and Health subjects in the Building Department of SMK N 5 Makassar are suitable for use as a learning resource for students in the Building Department of SMK N 5 Makassar.

INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process where students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by themselves, society,

nation, and state (Law No. 20 of 2003). Education now is expected to increase innovation and creativity in the field of technology utilization due to the rapid development of technology (Titania, 2020). In this case, the development of information and communication technology (ICT) in the last few decades has progressed very rapidly in line with the development of telecommunication technology, including computer networks and mobile phones (Mustadi, et al, 2022). In addition, education always changes along with the times as well as technological developments.

Learning media are tools, methods, and techniques used as communication means between teacher and students, so that the communication and interaction between them become more effective during the learning process at school (Sadiman, 2011). The use of learning media at the learning orientation stage will be very helpful in conveying messages and learning content (Nana, 2007). Providing learning that is in accordance with the demands of information technology development can be done by developing learning media (Tambunan, 2021).

It is undeniable that learning media in the forms of technology can give an impression because they can integrate text, graphics, animation, audio, and video (Mufarokah, 2009). Interactive multimedia is a multimedia equipped with a controller that can be operated by the user, so that the user can choose what he wants for the next process (Munir, 2012: 8). In order to avoid students experiencing boredom, teachers are required to be skillful in determining learning media to be implemented in the teaching and learning process so that it can assist the learning material presentation (Triaghosa, 2022).

The word media comes from the Latin word *medius* meaning middle, intermediary, or introduction (Arsyad, 2017). Wati (2016) defines media as a tool used to convey messages so that learning objectives can be conveyed. Throughout technological development, learning methods must change in accordance with the student learning and must improve the students' understanding on the materials (Wati, 2020). Therefore, the media is a tool used as a liaison or intermediary used to convey information.

Soenarto (2012) states that the general benefit of learning media is to facilitate the interaction between teachers and students. Meanwhile, the specific benefits of learning media in the student learning process are: 1) making the teaching more attractive will to the students; 2) making the teaching materials clearer; 3) making the teaching methods more varied; 4) making the students doing more learning activities since they will not only listen to the teacher's explanation, but also other activities such as observing, doing, demonstration, and others. Students can think critically in learning, but this skill sometimes does not develop well.

Therefore, it is necessary to use a method to develop students' critical thinking skills (Isnaeni, 2021).

England, et al. (2002) say that "Interactive Media is the integration of digital media including a combination of electronic text, graphics, moving images, and sound into a structured digital environment that can make people interact with data for the right purpose". Interactive learning media is everything related to software and hardware that can be used as an intermediary to convey the contents of teaching materials. Walker, et al. (1984) further mention that criteria for the quality of interactive learning media can be assessed based on the quality of the material and objectives, quality of learning, and quality of techniques.

Furthermore, et al. (2007) states that to produce learning videos that are able to increase the motivation and effectiveness of its users, the development of learning videos must pay attention to their characteristics and criteria. In this case, the characteristics of learning videos are message clarity, stand alone, user friendly, content representation, media visualization, using high resolution quality, as well as can be used classically or individually.

Interactive learning media is very important considering that getting students' interest is a difficult thing. Interactive learning media provides opportunities for students to learn not only from one source such as a teacher, but also make it easy for them to study independently. However, in practice, interactive learning media has not been used optimally in learning process and is still limited. This is as in the case with the Occupational Safety and Health (K3) subject in the Building Department of SMK N 5 Makassar which is still limited to the use of interactive learning media.

Occupational Safety and Health (K3) subject is subject that focuses on students in carrying out practical work both in laboratories and workshops, as well as when students carry out Field Work Practices (PKL). Occupational Safety and Health (K3) is a task for everyone who works, including students who carry out practical work. Since students are the school's most valuable asset (Erfian, 2020), they must understand and know occupational safety and health very well before going into industry or carrying out practices.

Based on the results of observations on the Occupational Safety and Health (K3) subject in the Building Department at SMK N 5 Makassar, it is known that the learning media used is Power Point. Hence, the students' lack of interest because the Occupational Safety and Health (K3) subject contains too many materials. In addition, some students affirmed that they did not understand the materials and were not motivated in participating in the learning process. Based on the observations made with students who have attended OSH subjects, they tend to only imagine how to apply the OSH correctly in the real world since there was no animated learning

video on Occupational Safety and Health (K3) subject to improve students' interest in participating in class learning.

METHODS

This research was carried out through Research and Development (R&D) study. In this study, students of the Building Department at SMK N 5 Makassar were the test subjects. In general, this research study aims to produce products in the form of interactive learning media in the form of learning videos in K3 subjects, thus learning video media that has been developed with maximum effort are expected to reap maximum results as well.

In accordance with the research objective of developing an interactive media that would be used as learning media, the development model used in this study refers to the 4D (four-D) development model. The 4D (four-D) development model, according to Thiagarajan, consists of four stages of development which include defining, designing, developing, and disseminating. The flow of the development model in this study is as follows.

1. Define

The purpose of this stage is to set and define the learning conditions. At this initial stage, an analysis is carried out to determine the learning objectives and the limits of the material to be developed. The definition stage consists of several analysis steps, namely:

a. Front-End Analysis

In the front-end analysis stage, it is necessary to find out information about the current conditions to emerge and determine the basic problems encountered in learning OSH subject at the Building Department of SMK N 5 Makassar, so that a development of occupational safety and health (K3) learning media is needed.

b. Learner Analysis

This stage aims to find out the characteristics of students, including their abilities, background knowledge, and the level of cognitive development. The results of this analysis were further used as a frame of reference in designing and developing the Occupational Safety and Health Subject

c. Concept Analysis

Concept analysis is an important step to fulfill the principle of building concepts on the materials used as a means of learning outcomes (CP).

2. Design

The second step is to design the learning media. In this case, the steps for designing media are as follows:

- a. Making flowcharts to facilitate the running of programs, especially the implementation on the computer.
- b. Making a written storyboard. This step includes drafting, writing and revising the storyboard along with its appearance, animation, graphics and music, then revising and validating it by the assistance of the material and media experts.

3. Development

The stages carried out by researchers in developing instructional video media are:

- a. Making flowcharts to make it easier for programs to run, especially for computer operations.
- b. Writing a storyboard. This stage includes drafting, writing, and revising the storyboard along with its appearance, animation, graphics, and music.
- c. Making the learning media by inputting objects that have been created in the Corel Draw application, sounds that have been created in the Audacity application, and animations that have been created in the Adobe Animate software.
- d. Reviewing the learning media through validation conducted by a team of media experts and material experts.
- e. Improving the learning media according to suggestions and input from a team of media experts and material experts so that there is a comparison of the initial media and the media after revision.

4. Disseminate

The development of learning video media used the 4D development research model. However, due to the limited time, the distribution was replaced with limited product trials of interactive learning media in K3 subjects through the dissemination of learning media in limited quantities to teachers and students after the product was developed in the Building Department of SMK N 5 Makassar.

RESULTS AND DISCUSSION

This section describes the results of the Occupational Safety and Health subject learning media making at the Building Department of SMK N 5 Makassar. The development of this media is based on a modified 4D development model. The four stages include define stage, design stage, development stage, and dissemination stage. The following is a description of the stages taken by researchers in developing interactive learning media in K3 subjects using the Four-D model:

1. Define

This stage was carried out through three main steps, namely: front-end analysis, learner analysis, and concept analysis. In the front end analysis step, the researchers conducted interviews with K3 subject teachers. Based on the interview results, there were several problems obtained in learning K3 subjects. In this case, the problems include the variety of learning resources used is not maximized, the learning media used in the K3 learning process is still lacking, and students tend to only imagine how to correctly apply K3 in the real world. The problems obtained from this observation were then used as reference materials to solve these problems. One option to solve this problem is to develop interactive learning media. Furthermore, the learner analysis step was done based on the students' observations during OSH subjects, where it was obtained that students were very unfamiliar with the application of OSH in the real world. Then, concept analysis step was conducted by identifying the main basics that will be presented in interactive learning media in the form of learning videos that were developed further.

2. Design

The design stage began by making a flowchart to facilitate the development process.

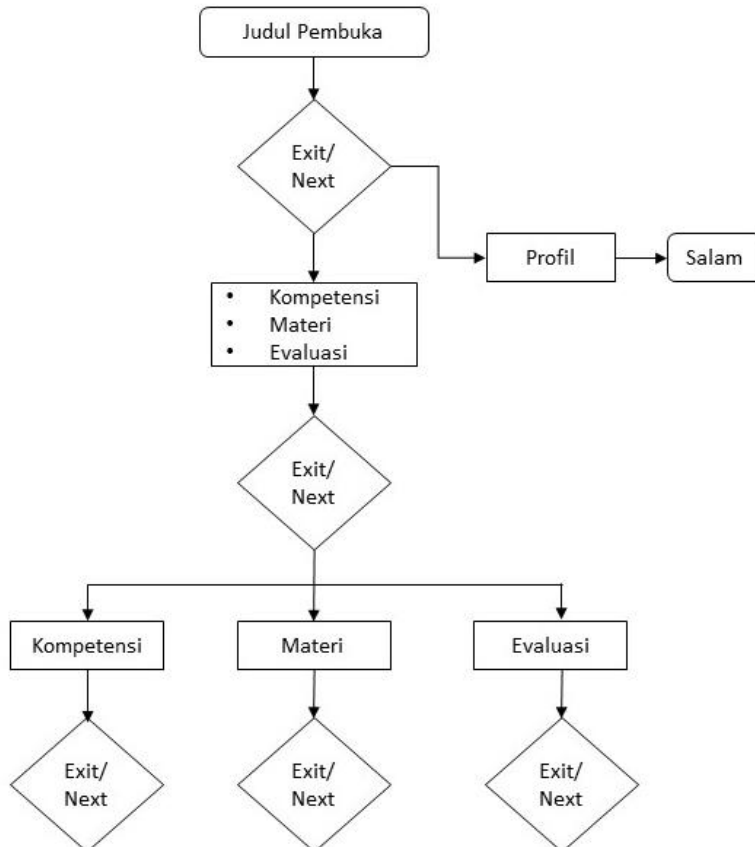


Figure 1. Flowchart of learning video development

3. Development

This development stage aims to develop K3 learning videos until they are valid and suitable for use. The steps taken by the researcher in this stage are expert appraisal and developmental testing. Expert appraisal was done to get input and suggestions to improve the material discussed in the K3 learning videos. Some of the experts asked to evaluate the K3 learning videos developed are material experts and media experts.

4. Disseminate

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The results of the instrument validation test for the assessment of the instrument validator are 45, indicating that the average is 3.46 with a feasible category, so it can be concluded that the questionnaire was feasible to use.

Table 1.

Assessment of material relevance aspect by material experts

Assessment Indicator	Item Mean Score
The material presented is in accordance with KI and KD	3.5
Learning objectives are clearly formulated	3.5
The material presented is according to learning indicators	3.5
The material presented is according to the learning objectives	4
The concept presented is in accordance with the facts	4
TOTAL ASSESSMENT SCORE	18.5

The results of the assessment show that the mean score of the material relevance aspect by material expert is 18.5. The validity percentage of the relevance aspect of the Occupational Safety and Health video material is 92.5% in the score range of > 80-100%. So, the aspect of material relevance for the Occupational Safety and Health learning video is categorized as Very Eligible.

The results of the assessment show that the mean score of the material organization aspect by material expert is 24.5. Meanwhile, the validity percentage of the organization aspect of Occupational Safety and Health video material is 87.5% in the score range of > 80-100%. So, the aspect of material organization for the Occupational Safety and Health learning video is categorized as Very Eligible.

Table 2.

Assessment of material organization aspects by material experts

Assessment Indicator	Item Mean Score
The material is presented clearly	3
The material is presented systematically	3.5
The material is packaged attractively	3
The material is presented in full	4
The material presented is actual	3.5
The level of difficulty and abstractness of the concept is in accordance with the level of thinking of students	4
Images are rendered correctly	3.5
TOTAL ASSESSMENT SCORE	24.5

Table 3.

Recapitulation of material expert assessment results

No	Aspect	Total Score	%	Category
1.	Material Relevance	18.5	92.5	Very Worth it
2.	Material Organization	24.5	87.5	Very Worth it
3.	Evaluation/practice questions	13.5	84.37	Very Worth it
4.	Language	7	87.5	Very Worth it
5.	Effects on Learning Strategies	18.5	92.5	Very Worth it
	Total score		82	
	Expected total score		92	
	Percentage		89.13%	
	Category		Very Worth it	

Based on the score given by the material experts as shown in Table 3, the validity percentage of the results of the Occupational Safety and Health video is 89.13% in the score range of > 80-100%. So, the results of the material expert's assessment of the Occupational Safety and Health learning is categorized as Very Eligible.

Table 4.

Recapitulation of Media Expert Assessment Results

No	Aspect	Total score	%	Category
1.	Appearance	39	88.63	Very Worth it
2.	Learning	18.5	92.5	Very Worth it
	Total score		57.5	
	Expected total score		64	
	Percentage		89.84%	
	Category		Very Worth it	

Based on the score given by the media experts as shown in Table 4, the validity percentage of the recapitulation of the results of the Occupational Safety and Health video media is 89.84% in the score range of > 80-100%. So, the results of the recapitulation of expert assessment results for the Occupational Safety and Health learning video is categorized as Very Eligible.

Meanwhile, the validity percentage of student responses to the Occupational Safety and Health video is 89.89% in the score range of > 80-100%. So, the results of student responses to the Occupational Safety and Health learning video is categorized as Very Good.

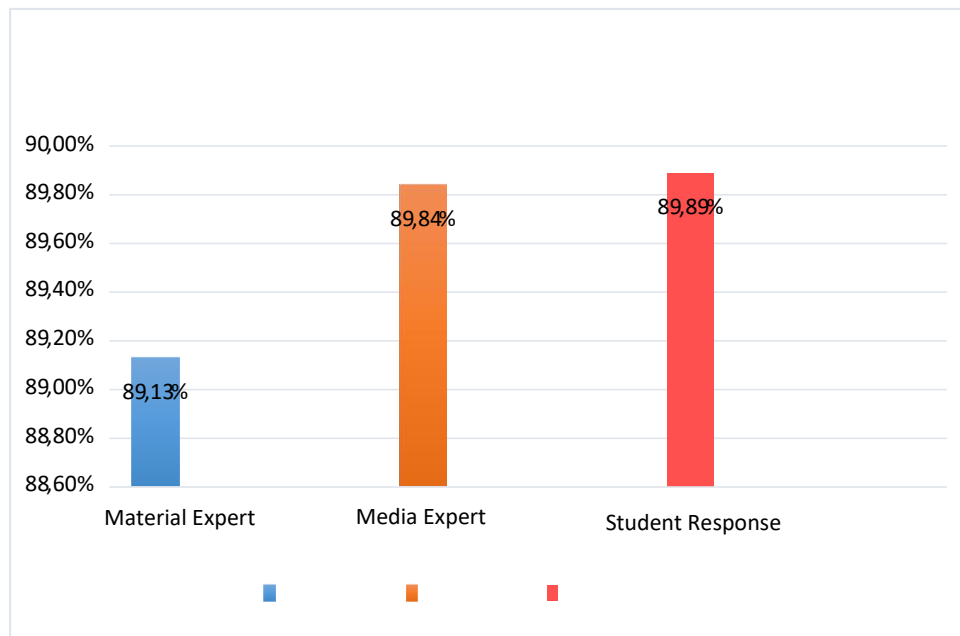


Figure 2. Graph of the feasibility of learning video feasibility

Based on the research conducted, nine learning videos have been produced for the Occupational Safety and Health (K3) subject. These 9 videos contain several subject matters. From the results of the research that has been described, the instrument validation obtained a result of 86.53% with the assessment criteria being very feasible to use.

Based on the assessment results by material experts, it can be concluded that the learning videos made are in the very feasible category. The aspect assessed is the feasibility of the material. Furthermore, based on the assessment results by media experts, it can be concluded that the learning videos made are in the very feasible category. The aspects that are assessed are the video display and the benefits of the video. Based on the results of the analysis and implementation, it was concluded that this K3 learning video is very appropriate to be used as a learning tool in Occupational Safety and Health Subjects in the Building Department of SMK N 5 Makassar.

CONCLUSION

Based on the results of the research and discussion on the Development of Interactive Learning Media in K3 Subject at SMK N 5 Makassar, it can be concluded that: interactive learning media through research and development method is obtained with the development model used

is 4D (Four-D). Furthermore, the development results of this study were in the form of interactive media products, particularly the occupational safety and health (K3) learning video on occupational safety and health subject in the Building Department at SMK N 5 Makassar. In this case, the material experts gave 13% in the very appropriate category, media experts gave a feasibility level of 89.84% in the very feasible category, while the students' responses as the users of the instructional video media gave a very good category with a percentage of 89.89%. Based on this research, it can be concluded that interactive learning media in the form of learning videos on the Occupational Safety and Health subject in the Building Department at SMK N 5 Makassar is appropriate to use as a learning resource. Based on the limitations of the research experienced, the researcher can provide suggestions, among others, subsequent research needs to carry out the dissemination and development of further research on learning videos that are equipped with applications that can accommodate all these videos offline for each learning activity and implement them in other departments.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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