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Development of Chemistry Learning Videos in The Industries

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ABSTRACT: This study aims to develop chemistry learning videos in the industry and determine the feasibility of the developed learning videos. The development model used was adapted from the 4D development model which was carried out only up to the Develop stage. The used research instrument was the needs analysis instrument and the product feasibility assessment instrument. The needs analysis instrument is used to collect data on the analysis of needs and problems in the learning process in schools while the product feasibility assessment instrument is used to collect the feasibility assessment data for the learning video. The results show that the developed chemistry learning videos is feasible to be used as a learning resource.

Keywords: learning video, chemistry learning, the industries thematic

INTRODUCTION

Chemistry is a subject that is closely related to the daily life of students. Therefore, learning chemistry should be done by connecting and applying the concepts studied with all aspects of everyday life, so that students can find out the benefits of the learning material being studied. When students know the benefits of the material they learn in everyday life, it makes them happy and interested in studying chemistry [1], [2]. Chemistry can be applied in all aspects of everyday life, including the industries thematic. There are many chemistry applications in the industries that are certainly very interesting for students. Moreover, the industries thematic cannot be separated from the learning objectives that elaborate students to achieve the expected competencies after completing their education. Then, they can apply their knowledge in the daily life and the workspace. Based on the results of the analysis in five high schools in Yogyakarta, it was found that only 19% of teachers taught chemistry by connecting materials with industrial applications, and only 9% invited their students to conduct field studies in the industry in the learning process.

Context-based learning that connects the material studied by students with everyday life has been widely applied in the learning curriculum in various countries such as the United States, the Netherlands, Germany, Belgium, Israel, and New Zealand [3]. In addition to the learning process being carried out, the availability of learning resources containing chemistry applications in everyday life is also important. Based on the results of the needs analysis conducted in five high schools in Yogyakarta, it was found that only 39% of the learning resources used by teachers contained chemistry applications in everyday life. The learning resources used by the teacher were usually in the form of books, and it was not enough to make students enthusiastic and interested in learning chemistry. Only two out of five schools have used instructional videos to support learning and 83% of students feel satisfied by happy using these learning videos as a learning resource.

Based on several studies that have been conducted, the application of video in learning can increase students' interest in learning [4], [5]. The utilization of video in learning also increases the effectiveness of learning [4], [5], [6]. Learning videos is divided into three types based on their use and purpose, namely demonstration videos, narrative videos, and teacher recordings [7]. Demonstration videos have the purpose of presenting procedures or recording learners' performance to provide feedback. Meanwhile, narrative videos are usually used to learn a language. The recorded video of the teacher's lecture is a recorded video like what is done when the teacher teaches a class. Unlike narrative videos, in this type of video, learning material gets full attention while the visual element is not the most important component [7].

Based on the various descriptions that have been conveyed, it is necessary to develop chemical learning videos in the industry as a learning resource. The intended purpose is, through this learning video, students can find out about the application of chemical materials learned in everyday life so that can make them excited and interested in learning chemistry.

METHODS

This research is development research with a development model used adapted from the 4D development model consisting of Define, Design, Develop, and Disseminate [8]. The stages carried out in this research are only up to the Develop stage. In the define stage, the needs analysis is carried out related to the product to be developed using a needs analysis instrument that has been arranged and validated so that it is suitable for use as a research instrument. Based on the results of the needs analysis, it is determined the type of the developed product that designed at the design stage. The design of the prompted product has been developed into a product in the form of a learning video. Furthermore, the assessment for its feasibility utilized a product feasibility assessment instrument that has been arranged, validated, and declared fit as a research instrument.

The data collection technique in this study used a non-test technique in the form of a questionnaire. The used instruments in this study consisted of the needs analysis instruments and the product feasibility assessment instruments. The needs analysis instrument consists of the aspects of chemistry learning that is carried out and the learning resources used. The product feasibility assessment instrument consists of material, presentation, visual, and audio aspects [9]. The data analysis technique in this study is the descriptive quantitative approach, for instance, that method was applied for the results of the needs analysis. Here, the Likert scale is used from the product feasibility assessment. The Likert scale used consists of four scales, namely a score of 1 to 4. The obtained average score is then converted into an assessment category as presented in Table 1. The developed product is declared feasible for use if the results of the product feasibility assessment get a minimum good category.

TABLE 1. Product feasibility data analysis techniques

Range of Score	Category
$M + 1.5\ SD \leq X \leq M + 3\ SD$	Very Good
$M \leq X < M + 1.5\ SD$	Good
$M - 1.5\ SD \leq X < M$	Poorly
$M - 3\ SD \leq X < M - 1.5\ SD$	Not Good

RESULT AND DISCUSSION

The development of instructional videos in this study uses stages adapted from the 4D development model:

1. Define

This stage is carried out to analyze the problems and the necessities in the chemistry learning process in schools. This was done by collecting information from teachers and students in five high schools in Yogyakarta. Those processes are using the needs analysis questionnaire instrument. That instrument has been prepared previously and has been validated by two validators with the result is that the instrument is valid so that it can be used as a research instrument. The results of the analysis conducted in five schools showed that 70% of students were interested in learning chemistry, but 88% of them had difficulty understanding the concept of chemistry. The teacher uses book learning resources and presentation slides. 79% of teachers have connected the chemistry material taught with the daily lives of students, however, many of the learning resources that the teacher uses do not present the relationship between chemistry concepts and everyday life. Only 19% of teachers have taught chemical applications in industry and only 9% of teachers have invited students to visit industries to support chemistry learning. Only two out of five schools have used instructional videos to support learning and 83% of students feel happy using these learning videos as a learning resource. Therefore, it is necessary to develop chemistry learning videos in the industry as a learning resource so that students enjoy learning chemistry.

2. Design

The next stage after determination of the developed product is the design of the chemistry learning video in the industry based on the results of the needs analysis that has been carried out at the define stage. Before taking direct learning videos in the industry, a video script is made which contains scenarios from the learning videos that will be developed, to be used as a guide in taking learning videos.

3. Develop

This stage aims to produce learning videos that have been designed at the design stage.

a. Production of learning videos

The video contains the process of making aluminum and batik. The video is made in MP4 format with a size of 1920x1080 pixels so that the resulting video has a high resolution. The duration of the video is 9 minutes. The short duration will make it easier for students to remember and understand the contents of the video [10]. The technique used in the production of instructional videos is the video roll technique. This technique is that objects to be recorded in the video are sorted according to the scene that has been designed. This technique is used because of the ease during the shooting process because, in this technique, the shooting process only takes a short time. After the shooting process is carried out, the dubbing process is carried out by recording the voice of the narrator according to the script that was made previously. The next stage is editing by combining the video that has been taken with the dubbed results, and adding some music as an accompanying instrument. This video production stage ends by rendering the video in MP4 format.

b. Assessment of the feasibility of learning videos

Assessment of the feasibility of the learning videos that have been produced is carried out by material experts and media experts. Two material experts and media experts assessed the feasibility of the instructional video from the material, presentation, visual, and audio aspects using a product feasibility assessment instrument that had been prepared previously and that had been validated and the result was that the instrument was valid so it was feasible for use as a research instrument. The results of the feasibility assessment of the instructional videos by material experts and media experts are presented in Table 2. Based on the results of the assessment presented in Table 2, it can be seen that all aspects of the assessment of the instructional videos get a very good category. This means that the contents of the resulting learning videos contain contextual insights in the industry, the material can be applied in everyday life and is easy to understand. The content of the learning videos also fosters positive attitudes such as building motivation, curiosity, and love for the nation's culture. The presentation of the learning video is clear, the manufacture of products is presented in a coherent manner according to what is in the industry and does not contain elements of pornography, racial issues, and violence. In addition, the learning video presentation format is also educational, narrative, and tutorials according to the video content, and interesting. Based on the visual appearance, the video quality is clear, the image resolution in the video is clear, and the resolution in the video is constant. The image in the video is also proportional in size. Transfers between scenes in the video use transition effects and the point of view of shooting in the video are also correct. Apart from the visual appearance, the narration in the form of audio is heard clearly, the accompanying instruments in the video are also clear and unobtrusive, and there is no noise in the video. The narrative in the learning video is also in accordance with the video content and the placement is also appropriate and not intermittent.

TABLE 2. Instructional Media Appraisal Results by Material and Media Experts

Aspect	Average score	Category
Content	7.0	Very good
Media display	8.0	Very good
Visual	7.0	Very good
Audio	7.5	Very good
Average	7.4	Very good

c. Product Revision

In addition to assessing the feasibility of the resulting learning videos, material and media experts also provide corrections and suggestions for the products being developed. The given corrections and suggestions are used as the basis for improving the resulting learning videos.

Based on the results of the feasibility assessment of the learning videos, it was found that all aspects of the assessment including the material, presentation, visual, and audio aspects were in a very good category so that the resulting learning video was said to feasible for use as a learning resource.

CONCLUSION

Based on the research results, it can be concluded that the development of chemistry learning videos in the industry is carried out using the stages of the 4D development model including define, design, and develop. The define stage is carried out to obtain data on problems and needs related to chemistry learning in schools from teachers and students. The design stage is carried out to design a video script. The develop stage is carried out to produce and edit the video so that it becomes a learning video that is ready to be assessed for its feasibility. At this stage, an assessment of the feasibility of learning videos is also carried out by material experts and media experts. The results of the assessment show that the resulting industrial chemistry learning videos are feasible for use as a learning resource.

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