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The Innovation Breakthrough in Digital and Disruptive Era

The Interactive Multimedia Learning Application for Visual Communication Classroom

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Abstract. Interactive multimedia is an excellent choice in online learning during the COVID-19 pandemic. Building attractive, interactive multimedia requires special skills and an established framework, so many teachers find it difficult to build it. This study aims to explain the implementation of an integrated interactive multimedia framework in the learning process and the techniques used to build learning media. We explain the integration of the multi-media framework between the components of the learning environment, behavioral activity, cognitive/metacognitive activity. We implemented these three components in visual communication learning and managed to build an interactive multimedia learning media that can truly represent all the components of learning in schools. We conclude that the integration of the three components results in an interactive learning media that has good quality in the learning process.

1. Introduction

The COVID-19 pandemic has made many adjustments to the learning model. The traditional model that is usually applied, such as face-to-face in the classroom between teachers and students, is replaced with face-to-face virtual. This of course requires the right media to convey learning material well so that it is easy to understand. This is not an easy thing to implement in developing countries that have limited information infrastructure. In addition, the problem of literacy and technology readiness is a serious problem for teachers and students. Solutions with interactive multimedia are the right solution to overcome this gap. This is because multimedia learning media provides an interactive mode that is simpler in its use so that no special skills are needed to use it. Teachers and students can easily and quickly use it and design content that fits the learning material to make the learning process more interesting and easy.

Interactive multimedia content must be built in an attractive and simple way. The main problem faced by teachers is how to create interactive multimedia content that can be used as learning media. Special skills are required, such as skills in using design tools, designing and developing interactive multimedia content. To be able to produce interactive multimedia content, the first factor that must be considered is the human factor, namely the user [1]. This is important because learning using multimedia gives positive and better results compared to learning with traditional learning models. If interactive multimedia learning is combined with traditional learning models in engineering learning, it can produce better and optimal learning [2]. This is due to the increase in visual abilities which spur increased cognitive abilities [3]. Interactive multimedia will play an important role in explaining difficult r can make

representative interactive multimedia learning with learning materials. Various factors will determine the success of presenting good interactive multimedia. These factors such as learning environment, user behavior, motivation or emotion, cognitive and even mental models. These factors, if implemented using multimedia product development tools, will appear an interactive multimedia product that is optimally used in learning.

The main problem in building learning materials using interactive multimedia is the difficulty of integrating an interactive multimedia model that can be adapted to produce an interactive multimedia product that can be used in learning. In developing countries, there are quite a lot of difficulties to build an interactive multimedia product. This is due to the lack of adequate infrastructure, the availability of teachers, technology technicians, and the low readiness of technology users. Although it is realized that interactive multimedia-based learning can improve learning outcomes in several learning subjects including history lessons [5]. This means that the school already understands how important the role of learning with interactive multimedia is. Even if adequate internet access is available, interactive multimedia learning can be done online using the website [6]. The solution achieved is to build a partnership with the multimedia industry that has sufficient technology and resources to build interactive multimedia products. But this is not easy because it requires special policies, adequate funding, and even stakeholder involvement to create an interactive multimedia product [7]. This has been implemented in several interactive multimedia products that are used for learning such as radiology learning in clinical practicum [8]. It is necessary to modify the interactive multimedia model caused by different contexts and techniques to validate the various content and techniques used [9]. We tried a solution by implementing a simple framework consisting of components of a learning environment, behavioral activity, and cognitive/metacognitive activity. This solution is expected to produce interactive multimedia products that are appropriate in the context of students' learning.

This paper tries to solve the problem of the difficulty of building interactive multimedia products. The purpose of this study is to implement the INTERACT framework in learning visual communication design in vocational high schools. This research also tries to do a usability test to find out that this interactive multimedia product is easy to use, has benefits to complement learning media, and is easy to learn according to the learning environment.

2. Method

This study uses the implementation of the INTERACT framework developed by Domagk, et.al [10]. The modified framework focuses on three components, namely the components of the learning environment, behavioral activity, and cognitive/metacognitive activity. See figure 1.

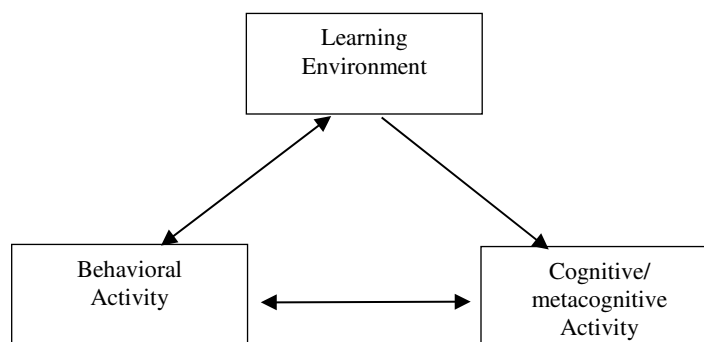


Figure 1. INTERACT framework

These three components will be implemented to build interactive multimedia products. The sample used is a vocational high school in Indonesia. This is in accordance with the context where many learning materials really need interactive multimedia-based learning media to explain the material that

is difficult to explain only with text. This interactive multimedia product is used to complement classroom learning.

The learning environment will explain the context of the learning environment that will assist in the process of creating interactive multimedia products. The behavioral activity itself will be seen how this interactive multimedia product will affect learner behavior. It is hoped that learners will be more active and motivated in the learning process. The results of this product are expected to increase students' cognitive/metacognitive. Teachers are also expected to have high enthusiasm in using this multimedia product in accordance with the context of the learning environment they are facing.

3. Result and Discussion

This multimedia product is produced by taking into account the learning environment. This helps us to build a product concept according to the learning environment we are facing. The concept begins with determining the purpose of making learning media and determining the users of the media. The purpose of making learning media is to make it easier for students and teachers to learn Graphic Design in the Visual Communication Design class. A mature concept will make it easier to describe what to do. The purpose of the design phase is to make a detailed specification of the architecture of the program, its appearance and requirements, and style. The specifications are made as detailed as possible so that at the next stage it is no longer needed, it is enough to use the decisions that have been determined at this stage. However, in practice, project work in the early stages will often experience additions or deletions of application parts or other changes. This stage uses storyboards to describe a description of each scene, by listing all multimedia objects and links to other scenes. The next stage is Material Collecting, where the collection of materials according to needs is carried out. These materials include images, photos, animations, videos, audio, and text, both ready-made and those that still need to be modified according to existing needs. These materials can be obtained free of charge or by ordering to other parties according to the designs that have been made in the previous stage. The results of the learning environment mapping produce a product as shown in figure 2.

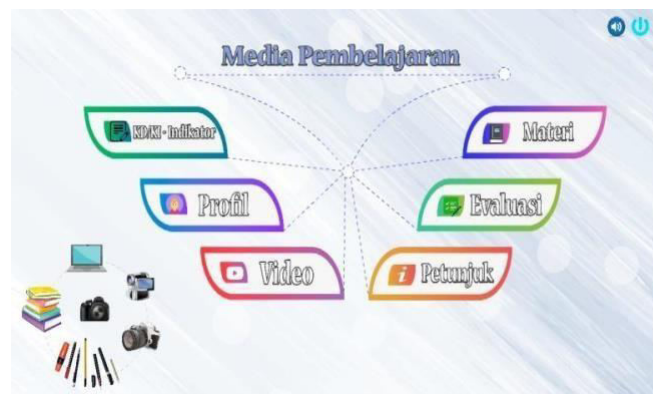


Figure 2. Product Design

The development of interactive multimedia products is continued with the assembly stage where the product is built by making the entire interactive multimedia product. Products are built based on the design phase, such as storyboards, flowcharts, and/or navigation structures. After completion of construction, the stage continues with testing. Tests are carried out to ensure that the results of making this interactive multimedia application are in accordance with the plan. There are two types of testing used, namely alpha testing and beta testing. Alpha testing such as displaying each page, the function of the button, and the sound produced. If it has passed the alpha testing, it will continue with beta testing. Beta testing is a test carried out by users, by making a questionnaire about the application that

is made. This test uses the white box testing method with the Cyclomatic Complexity testing technique. The Cyclomatic Complexity technique is a measurement system that in its testing uses a flowchart diagram to see several test cases in the learning media application that is made. The last test is carried out by users of this learning media application to find out whether the application is suitable for use or not. Tests carried out using the black box method. This learning media application was tested on Media Experts, Material Experts, and Students at SMK Negeri 3 Tondano. The last stage in the development of this interactive multimedia product is product distribution. Distribution can be done after the application is declared fit for use. At this stage, the application will be stored in a storage medium such as a CD, mobile device, or website. This stage can also be called the evaluation stage. An evaluation is needed for the development of products that have been made before to be better. Distribution is done by the way the application is stored in a storage medium. This application is saved in .exe format. After saving, the application is allowed to be used by users, namely, students and teachers of visual communication design subjects in vocational high schools.

The behavioral activity component is carried out by conducting tests to determine student behavior when using interactive multimedia products. Behavioral activity is obtained by doing a usability test. The usability test to ensure the game that has been built can be adopted and student behavior and will continue to be used in the learning process. The results of usability tests that have been carried out, the results show that 90.14%, stated that interactive multimedia products are very useful. The measurement was continued on the Ease of Use aspect and the results were 93.86%, which means that interactive multimedia products are very easy to use. In the Ease of Learning aspect, the results obtained are 91.67%, which means interactive multimedia products are very easy to learn. In the Satisfaction aspect, the result is 95.63%, which means that this interactive multimedia product is very satisfying. These results indicate that behavioral activities experience significant changes when using interactive multimedia products.

The cognitive/metacognitive activity component shows that the use of interactive multimedia products can improve cognitive abilities. Students experienced a significant increase in learning outcomes. Students become more enthusiastic and more motivated to learn the material presented and are able to remember well because attractive images, graphics, and interactive models help students to remember the material well. It also encourages students' creativity and imagination so that they experience an increase in cognitive abilities.

The results of this study indicate that interactive multimedia products can significantly affect students' abilities. This is in line with the results of other research which shows the same thing where students experience a significant increase in learning outcomes[5][11][12]. Classes that are made interesting with interactive learning media can make learning more interesting[13][14]. Multimedia products are very important to use in learning that has images [15] in explaining material concepts such as geometry lessons [4]. This is important to build an interesting learning atmosphere and encourage students to have high learning motivation. In addition to providing attractive multimedia products as learning media, mentors are also needed who master the use of these products so that technically the product can function properly according to the design that has been made [16]. An attractive design that pays attention to human needs as product users can produce designs that can actually be used by product users continuously[1][17]. Multimedia products must be designed attractively according to the learning context, learning environment, and learning objectives to be achieved so that the product does not become redundant and does not provide benefits [18]. The behavior will also be built if the multimedia used in learning is in accordance with what content is being studied so that it becomes relevant [19]. In developing interactive multimedia products, careful calculations are needed, including considering the costs required for its development [20]. It is important to know the efficiency and value of benefits needed in the development of interactive multimedia products.

4. Conclusion

We conclude that interactive multimedia products in learning must be built with special attention to the characteristics of the learner through the components of the learning environment, behavioral

activity, and cognitive/metacognitive activity. This research concludes that the interactive multimedia model can be implemented easily and produce interactive multimedia products that can easily be used in learning. We conclude that this framework is very easy to implement and very simple so that it can be easily implemented in developing countries that have many limitations.

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