RITVET

Development of 3D Animated Video Application for Computer Evolution

Azita Ali[1]*, Pat Siew Chien[1]

[1]Faculty of Technical and Vocational Education,
Universiti Tun Hussein Onn Malaysia, 86400 Batu Pahat, Johor, MALAYSIA

*Corresponding Author Designation

Abstract: This project is aimed to design and develop a 3D animated video application for computer evolution. The development of a 3D animated video application of computer evolution aims to help educators present the topic of computer evolution to students in a simple and more creative method. At the same time, this application can also increase students' interest and understanding of the topic of computer evolution. A literature review was conducted to further assist in designing products that are suitable for the latest generation. The ADDIE model was used in the development of this product. The ADDIE model has five phases, namely analysis, design, development, implementation, and evaluation. In the analysis phase, the developer makes an analysis of the problems that occur and an analysis of the software and hardware requirements. For the design phase, the developer creates a storyboard that is used as a reference during product development. In the development and implementation phase, the developer develops a product based on a pre-designed storyboard. Products are developed using selected hardware and software. The evaluation and testing process was performed by five experts in the field of creative multimedia from the Faculty of Technical and Vocational Education. Three experts played a role in the evaluation of the product interface design. Meanwhile, two more experts are in the role and content design evaluation of the developed products. The instrument used was an expert checklist form. The collected data were analyzed using frequency and percentage methods. Through the results of the study, all experts gave good and positive feedback on the 3D animation video application of computer evolution developed.

Keywords: 3D Animated Video, Computer Evolution

1.0 Introduction

A computer is a fast electronic counting machine that can receive input from other sources, process the received input in accordance with the program, store commands and results from processing, and provide output to users in the form of information (Hamacher, Vranesic, &

Zaky, 2001). Along with the development of the times, this increasingly advanced computer technology has greatly benefited human beings in various aspects of employment, no matter in any field (Sudrajat & Masruri, 2014). According to Robinson Situmorang and Abdulah (2017), the computer serves as a facilitator of human work, as a communication tool, as an entertainment medium and educational tool. Computer play a very important role for human beings.

Evolution is defined as the gradual change or development of all creations in this world, from one generation to another (Dictionary of Chambers, 2007). Meanwhile, the evolution of computers is the development or change of computers that occur from the earliest generation to the latest generation. Computers in this age have evolved up to the fifth generation (Amrizal, 2013). However, computers change not only in terms of technology, while computer design also changes. This means that early computer forms continue to decline as they develop (Feri Sulianta, 2010). Computer forms are the most observable changes based on the evolution of computers. Computers are a combination of a group of electronic machines consisting of thousands of components that work together to form a neat and meticulous working system (Noersasongko, 2013). According to Muhamad (2010), the development and change of computers, and computer design continues to be due to the performance, capability, price, maintenance, and convenience of the user. The performance and capabilities of a computer are greatly influenced by technological factors, concepts, and techniques. Until now, computers have reached the fifth generation. Computers in each generation have their characteristics (Astutin, 2008).

According to Furoidah (2009), an animated video is a video that consists of an animation produced with a group of moving pictures that produce a real -life -like phenomenon. Animated video is a medium that can stimulate individual thinking in understanding a difficult concept and explained by using images in visual form (Azhar, 2010). 3D animation is an animation that exists in three dimensions, namely length, width and depth although not in actual 3D form (Abdullah, 2014). According to Mohamad Mohsin, and Hassan (2011), the use of interesting and clear animation allows students to understand in a short time and the animation can be repeated to further strengthen their understanding. Cognitivists believe that the learning process among students can be improved and enhanced by using additional multimedia because students see a concept through action or deed (Michelich, 2002). According to Edi (2009), students will be more sensitive and thorough in following the lessons because lessons that use interactive multimedia can further improve the understanding of the concept of the content and motivation of students in the learning process.

1.1 Research Background

According to Dadang Suhardan (2010), teaching is an academic activity that involves interaction and communication between educators and learners. Effective teaching is the action of educators who are skilled in delivering lesson materials by formulating various uses of teaching methods while presenting learning materials (Barak Rosenshine, 2010). Based on the statement described the level of students' acceptance of the learning content depends a lot on the educator's skills in imparting knowledge with the help of learning materials.

Teaching content in a dynamic form using traditional methods has brought problems to teachers to make students understand dynamic content by using static media, namely through printed modules or sketches on the whiteboard (Ahmad, 2013). Conventional learning environment and traditional patterned teaching that only gives priority to the teacher as a communicator of knowledge in the teaching and learning process, students will quickly get bored and find it difficult to absorb what has been taught.

According to Kleiman's (2000), educators lack competence in using technology, especially computers. Learning the development of computer technology that uses power point in the learning process has caused students to misunderstand the knowledge about computer technology evolution. This is because their description of the development of computer technology is only so far through power point. This fact is further supported by the study of Abdul Razak and Jamaluddin (2000) who said that the use of computers in teaching and learning among secondary school educators is less. Such educators' perceptions should be corrected for the sake of the future of the students.

The problems of traditional teaching methods and the lack of competence of educators in using technology have resulted in knowledge about the evolution of computers not being able to be communicated clearly to students who wish to acquire knowledge. According to Mumtazah (2012), one of the ways to improve the quality of education is by using an effective and appropriate learning approach for students. According to the research of Kayaoglu, Akbas, and Ozturk (2011), the use of animation in learning has a positive impact. Animations are useful because animations are more eye-catching than static ones. Animation can help in explaining a complex concept easily. This statement is supported by a previous study conducted by Astuti and Mustadi (2014), that students will have better motivation when learning using animated media.

1.2 Problem Statement

Problems such as conventional teaching and learning and teachers lacking skills in the use of these computers have made the knowledge of computer evolution difficult to communicate to students clearly. The 3D animation video application is an effective teaching aid in the teaching and learning process. Animation can help to enhance learning and minimize learning time as well as convey complex concepts easily. Boring content can be explained in a fun and creative way such as the evolution of computers using animation. In addition, animation can attract the attention of students and fun the atmosphere of the teaching and learning process. In line with the development of technology, the most suitable learning media used to convey the science of computer evolution is 3D animated video. In connection with the problems encountered, this study was conducted to develop a computer evolution 3D animation video application that aims to help educators can convey computer knowledge more easily and effectively and at the same time, students can understand its content more clearly and quickly.

1.3 Objectives

There are three objectives to achieve in this study:

i. Design a 3D animation video application of computer evolution

ii. Develop a 3D animation video application of computer evolution

iii. Test the functionality of computer evolution 3D animation video applications

1.4 Educators Lack Competence in Using Technology

According to a study by Muhamad (2020), many educators still lack skills in using the teaching media available in schools. This statement is further supported by the study of Masood (2003), the use of computers in the teaching and learning process is still lacking due to the lack of appropriate computer software and educators are comfortable using traditional teaching methods. According to Ali Yusron's (2019) study, the ability of educators in creating and using

learning media is still very low. Educators have not yet used the media to the fullest because educators still think that media making is very complicated and takes a long time to produce.

1.5 Conventional Teaching Method

According to Yussof and Tanlol (2005), the use of media that is still very conventional and pedagogy with the concept of 'chalk and talk' is less effective in the teaching and learning process. This greatly affects students' interest and motivation to learn. This is also supported by Ahmad (2013) who argues that the use of traditional teaching methods when teaching content in dynamic form has brought problems to educators to make students understand the dynamic content presented using static media educators still think that media making is very complicated and takes a long time to produce.

1.6 Teaching Aids

In the process of learning or delivering a lesson, the selection and use of teaching aids (BBM) that are appropriate and interesting is very important. Teaching aids can determine the success of the learning process as well as stimulate students' desire to learn something. According to Musa Sulaiman (2005), teaching aids are all the equipment used by educators and students as an aid in delivering lessons in the classroom. According to Ikhsan (2005), teaching aids are defined as materials used by educators in moving the teaching and learning process to achieve the objectives that have been set.

1.7 Important of Teaching Aids

According to Charlie (2008), teaching aids help in conveying information that is difficult to convey or protracted theory in a more creative way. For example, the content of a history lesson is presented in the form of a video that has other multimedia elements. In addition, the use of teaching aids during the teaching and learning process can reduce student boredom. According to Ng (2004), one of the reasons why students are not interested in following the lessons in class is because of their boring teaching patterns and patterns. Teaching aids are also important to be used as controllers of student discipline during the teaching and learning process. Students are more interested in more interactive teaching approaches rather than traditional methods that are solely educator-centered (Salleh, 2007). With the help of interactive teaching aids, students will pay full attention during the teaching and learning process.

2.0 Methodology

The ADDIE model (Figure 1) was chosen by developer as a design model in the development of 3D animated video application of evolution computer. The ADDIE model is an instructional process that consists of five phases, namely the analysis phase, design phase, development phase, implementation phase, and evaluation phase (Rahmat, 2019).
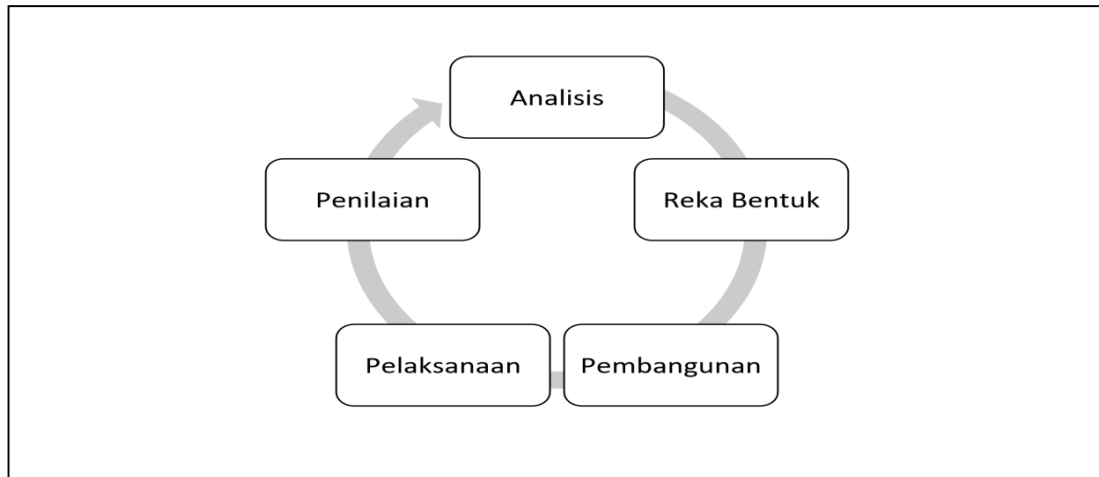
Figure 1: ADDIE Model (1987)

The application of the ADDIE model in the development of this computer evolution 3D animated video application can also help developers achieve the set objectives, ensuring the development process runs smoothly and the product can be completed within the stipulated time.

2.1   Analysis Phase

The analysis phase is the first phase in the ADDIE model. This analysis phase involves several activities, namely analyzing the problems and methods used to solve the problems encountered, determining the objectives of the study, identifying the construction needs of this 3D animation video application, namely computer software and hardware, and so on. The analytical process to obtain data and information can be implemented by looking at articles and journals to obtain the most accurate information.

2.2   Design Phase

The design phase is the second phase in the ADDIE model. This design phase is used to transfer the information found in the analysis phase to a physical sketch that is used during the development process. In this phase, the development will design a storyboard about the product to be produced, which is a 3D animation video application of computer evolution. The storyboard produced should involve multimedia elements as appropriate.

2.3   Development Phase

This developer phase is the third phase in the ADDIE model. This phase is the phase of developing a 3D animation video application planned at an early stage with the help of the information gathered in the analysis phase and the design phase. 3D animated video applications are developed with the help of hardware and various computer software. Product prototypes in the form of storyboards will be developed first before developing the actual product.

2.4   Implementation Phase

This phase is the fourth phase in the ADDIE model. This phase is the development and design process of a computer evolution 3D animation video application that was planned. After the 3D animated video application is successfully developed in this phase, the developed application is used first by educators who teach Information Technology subjects to test the effectiveness of the application and identify problems found in the application.
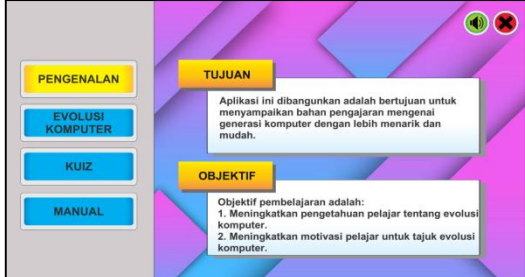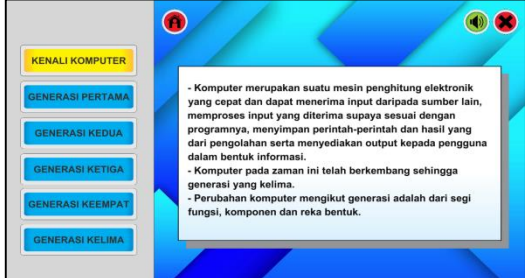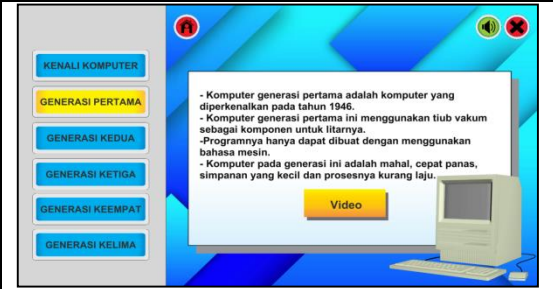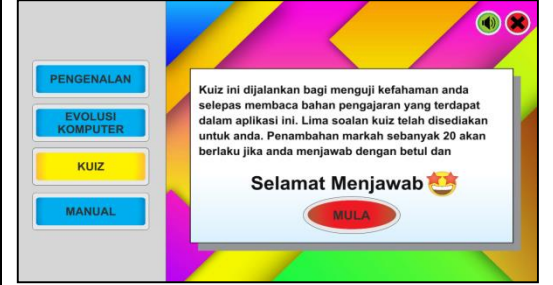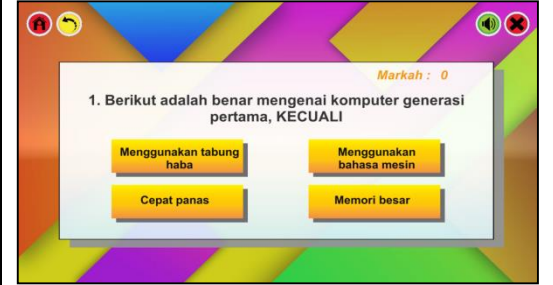
2.5   Evaluation Phase

In this phase, the computer evolution 3D video animation application developed by the developer will go through a formative and summative evaluation process to ensure the functionality of the development of this computer evolution 3D video application and the objectives of the study can be achieved. Formative evaluation is conducted at the end of each phase to ensure that no problems occur with the developed application. Meanwhile, a summative evaluation will be carried out at the end of the 3D animated video application produced. This summative evaluation was conducted by distributing questionnaires to experts, namely content and design experts.
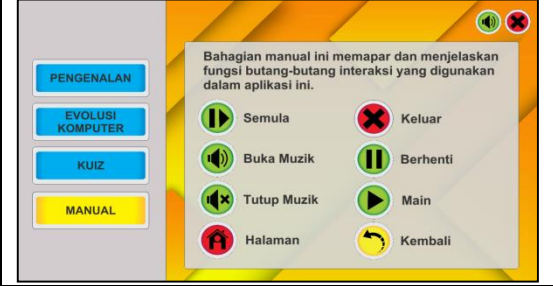
2.6   Develops 3D Animation Video Application of Computer Evolution Interfaces

Interface design is a combination of whole set of content, multimedia elements and several interactive elements. Table 1 shows the interfaces that had been develop.

Table 1: Application Interface

Application Interface	Descriptions
Home Screen	The home screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
Introduction Screen	The introduction screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
Introduction to Computer Screen	The introduction to computer screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
First Computer Generation Screen	The first computer generation screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons.

	Audio - Background music 'Digital World'.
First Computer Generation Video Screen 	The first computer generation video screen shows the use of text. graphic, audio, video, and animation. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World', and narrator sound. **Video** - 3D animated video. **Animation** - Komputer and components.
Quiz Screen 	The quiz screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
Quiz Question Screen 	The quiz question screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
Quiz Result Screen 	The quiz result screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
Manual Screen	The manual screen shows the use of text. graphic, and audio. **Text** - Title and button name.

	Graphic - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.
Exit Screen 	The exit screen shows the use of text. graphic, and audio. **Text** - Title and button name. **Graphic** - Design of the background screen and interaction buttons. **Audio** - Background music 'Digital World'.

3.0 Result and Discussion

Product testing and evaluation are very important to a developer because they can help measure product quality. Developer have used an expert checklist form to obtain confirmation of the reasons for the process of testing and evaluating 3D animation video applications of computer evolution. The measured aspects of the developed product are in terms of content design and interface design. A total of five experts were selected in the process of testing and evaluation of computer evolution 3D animation video application. The selected experts all consist of experienced lecturers in the field of creative multimedia. A total of 3 lecturers were selected to obtain validation on the application interface design. Meanwhile, 2 lecturers were selected to obtain application content design evaluation. Table 2 shows the demographic for these five experts.

Table 2: Demographic for Five Experts

Details	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5
Gender	Female	Female	Female	Female	Male
Educational Level	PhD	Master	PhD	PhD	Degree
Field of Specialization	Educational Technology	Software Mechanical	Instructional Design	Information Technology	Information & Multimedia Technology
Working Period	5 to 10 years	11 to 16 years	11 to 16 years	11 to 16 years	>17 years
Position	Lecturer	Industry Fellow	Lecturer	Lecturer	Instructor Engineer

3.1 Interface Expert Assessment Analysis

Interface expert evaluation is an evaluation conducted by an expert on the design of the interface about the multimedia elements found in the computer evolution 3D animation video application that has been developed. 31 question items had been prepared for the expert. Table 3 shows the frequency analysis and percentage of expert acceptance of product interface design.

Table 3: Frequency Analysis and Percentage of Expert Acceptance of Product Interface Design

No	Item	Frequency		Percentage of Acceptance (%)
		Yes	No	
Text				
1.	Texts colour used are suitable.	2	1	67%
2.	Type of font text used is suitable.	3	0	100%
3.	Size texts used are suitable.	3	0	100%
4.	Arrangement of texts are consistent.	3	0	100%
5.	Texts easy to read.	3	0	100%
Graphic				
6.	Resolution of the graphics used are high and clear.	3	0	100%
7.	3D graphics used are attractive.	3	0	100%
8.	Colour of the graphic used are suitable.	3	0	100%
9.	Graphics used are attractive.	3	0	100%
10.	Graphic of the icons used are suitable.	3	0	100%
Audio				
11.	Background music used are suitable.	3	0	100%
12.	Audio used in 3D animated video is clear.	3	0	100%
13.	Background music used do not disturb hearing.	3	0	100%
14.	Resolution of the audio and background music are high.	3	0	100%
Video				
15.	3D animated video easy to understand.	3	0	100%
16.	Quality of the 3D animated video are good.	3	0	100%
17.	Duration for the videos is suitable.	3	0	100%
18.	Video can be control.	3	0	100%
19.	Regular video play.	3	0	100%
Animation				
20.	3D animations deliver the information clearly.	3	0	100%
21.	3D animations are attractive.	3	0	100%
22.	3D animations made are suitable.	3	0	100%
23.	Design for the 3D animations is good.	3	0	100%
24.	Animation moves smooth.	3	0	100%
25.	Clear animations movement.	3	0	100%
Interaction Design				
26.	Arrangement for the interaction buttons is consistent.	3	0	100%
27.	Interaction buttons used function well.	3	0	100%
28.	Interaction buttons having suitable icon design.	3	0	100%
29.	Interaction buttons using suitable text size.	3	0	100%
30.	Interaction buttons using suitable text colour.	3	0	100%
31.	Design for the interaction buttons is suitable.	3	0	100%

Table 3 shows the results of the frequency analysis of the percentage of expert acceptance of the computer evolution 3D animation video application interface design. In the text section, the results of the analysis from the answers of the expert review form have shown that expert 1 disagrees with item one, i.e., the color of the text used is appropriate. Meanwhile, this item one was agreed upon by expert 2 and expert 3. For the next items in the text section, namely the second to fifth items, all three experts agreed. The items specified are the type of text font used is appropriate, the size of the text used is appropriate, the arrangement of the text is consistent, and the text is easy to read.

In addition, all three experts agreed on all items on the graphics section, i.e., from the sixth item to the tenth. The items described are the graphics used to have high resolution and clear, the 3D graphics used are attractive, the color of the graphics used is appropriate, the graphics used are attractive and the last item is the use of icon graphics is appropriate. Then in the audio part, all items in the audio part were also agreed by the three experts. The items mentioned are

the eleventh to fourteenth items, the background music used is appropriate, the audio for the animated video is clear, the background music used does not interfere with hearing and the au

Next, all the items in the video section were also agreed by the three experts. The items involved are the fifteenth item to the nineteenth item. The items are easy-to-understood animated video, the quality of the 3D animated video is satisfactory, the duration of the video used is appropriate, the video can be controlled, and the video travel is organized. On the animation part, all three experts also agreed on all the items, from the twentieth item to the twenty-fifth item. The items specified are the generated 3D animation can convey information clearly, the generated 3D animation is interesting, the generated 3D animation is appropriate, the 3D animation design is perfect, the animation movement works well, and the animation movement is clear.

In that sequence, all three experts also agreed on all items on the interaction design section, namely items twenty-six to item thirty-one. The items specified are the position of the interaction button used is consistent, the interaction button used can work well, the interaction button uses the appropriate icon, the interaction button uses the appropriate text size, the interaction button uses the appropriate text color and the design of the interaction button which is used is appropriate.

However, the three experts also gave their suggestions to the developers to make improvements and further enhance the quality of the computer evolution 3D animation video applications developed. Overall, expert 1, expert 2, and expert 3 were satisfied with the application developed and expert 3 stated that the application developed can be used in the teaching and learning process.

3.2   Content Expert Assessment Analysis

Content expert evaluation is an evaluation performed by an expert on the content contained in a computer evolution 3D animation video application that has been developed. There are 7 question items that have been provided by the developer to the experts. The second to seventh question items have five further question item fractions that are specific to the 5 generations of computers, namely the first generation, second generation, third generation, fourth generation, and fifth generation. Table 4 shows the frequency analysis and percentage of expert acceptance of product content design.

Table 4: Frequency Analysis and Percentage of Expert Acceptance of Product Content Design

No	Item	Frequency		Percentage of Acceptance (%)
		Yes	No	
1.	Information deliver in 3D animated video application of computer evolution are accurate.	2	0	100%
2.	Information deliver in 3D animated video are useful to students.			
	i. First Generation	2	0	100%
	ii. Second Generation	2	0	100%
	iii. Third Generation	2	0	100%
	iv. Fourth Generation	2	0	100%
	v. Fifth Generation	2	0	100%
3.	Information in 3D animated video are clear.			
	i. First Generation	2	0	100%
	ii. Second Generation	2	0	100%
	iii. Third Generation	2	0	100%
	iv. Fourth Generation	2	0	100%

v.	Fifth Generation	2	0	100%
4.	Information in 3D animated video easy to understand.			
i.	First Generation	2	0	100%
ii.	Second Generation	2	0	100%
iii.	Third Generation	2	0	100%
iv.	Fourth Generation	2	0	100%
v.	Fifth Generation	2	0	100%
5.	3D animated video gives a clear description about computer evolution.			
i.	First Generation	2	0	100%
ii.	Second Generation	2	0	100%
iii.	Third Generation	2	0	100%
iv.	Fourth Generation	2	0	100%
v.	Fifth Generation	2	0	100%
6.	Content in the 3D animated video deliver information correctly.			
i.	First Generation	2	0	100%
ii.	Second Generation	2	0	100%
iii.	Third Generation	2	0	100%
iv.	Fourth Generation	2	0	100%
v.	Fifth Generation	2	0	100%
7.	3D animated video delivers information accurately.			
i.	First Generation	2	0	100%
ii.	Second Generation	2	0	100%
iii.	Third Generation	2	0	100%
iv.	Fourth Generation	2	0	100%
v.	Fifth Generation	2	0	100%

Table 4 shows the results of the frequency analysis of the percentage of expert acceptance of the content design of 3D animation video applications of computer evolution. As described in the introduction, there are only 7 question items and there are five fractions for each of the second to seventh items. The results of the findings through the analysis of the content design expert review form showed that expert 1 and expert 2 agreed that the information presented in the 3D animation video application of computer evolution was accurate. Next, the information items presented through 3D animated videos were useful for students also agreed by both experts against the five generations of computers. Then, the third to seventh items addressed to each generation of computers, namely the first generation, second generation, third generation, fourth generation, and fifth generation were also agreed upon by the two experts. The items in question are the information in the 3D animation video is clear, the information in the 3D animation video is easy to understand, this 3D animation video gives a clearer picture of the evolution of computers, the content found in this 3D animation video explains the information correctly and finally, 3D animated videos of computer evolution convey information correctly.

Overall, both experts are satisfied and agree that the contents contained in the evolutionary 3D animation video application are accurate and can be used in the teaching and learning process. Both experts answered Yes for each item in the content design expert review form.

4.0 Conclusion

In summary, this computer evolution 3D animation video application has been well developed and successful with reference to the learning model used, namely the ADDIE Model. The phases found in this ADDIE Model have helped developers to produce quality products and be developed in a timely manner. In product development, there are several things that need to be emphasized, namely the objectives of the study, the scope, and the research questions. The developer develops this product with reference to these three things so that it can achieve the stated objectives. Therefore, hopefully, this 3D animation video application of computer

evolution can be used as a medium by educators in conveying information about computer evolution.

Acknowledgement

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