A Review Survey on the Use Computer Animation in Education

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Abstract. The use of animation computers in today's world is beneficial in many sectors. Animations development has changed over time and usage context, and illustrate phenomena and concepts that difficult to understand. Animations may not always be useful, however, and teachers using animations need to understand the importance of it. This paper focused on illustrating potential applications of animations in language learning and education, on identifying evidence-based principles for their design and use, and on proposing possible research works. The animation in animation involves the use of compelling graphics, including images, audio and video in the form of technology. However, the use of animations or computers is not limited to education alone, in addition to the education sector, the economic sector, the business sector, the medical sector. However, there is a great deal of debate about the effectiveness of computer animation in various fields. The general findings can be concluded that the role of computer animation is constructive in mostly in language learning.

1. Introduction

Nowadays, many teaching materials can be used in the teaching process to support a teaching and learning process and improve students' achievements. Today's computer technology makes a considerable contribution to the education world. The necessary combination of three aspects is text, voice, and visual to create multimedia-based simulation [1]. Today's rapid development of information technology has given new life to the use of computers in education. One of the most popular nowadays is multimedia technology that incorporates various media such as text, graphics, animation, video and computer-
controlled audio. Various elements of multimedia can be developed to improve the quality of education
[2]. The Japanese government, "Society 5.0" is defined as the "future society that Japan should aspire to"
and is said to solve social problems with the use of Big Data, IoT, AI, and robots there. For this reason,
the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has concentrated on
teaching computing skills from an early stage informal education [3]. Ruiz [4] have reviewed the
importance of computer animation application for medical education. Their study has found that medical
educators have used animations in a variety of computer-assisted learning applications and shows
conflicting results for studies comparing animations with static images.

2. The Use of Computer Animation: Pro and Cons
Computer animation is the art of creating moving images through a computer application. It is a
Computer Graphics and Animation subfield. It is created increasingly through 3D computer graphics,
although 2D computer graphics are still widely used for low bandwidth and faster real-time rendering
requirements. Animation, which is essentially a visual presentation, has become the most prominent
feature of the technology-based learning environment. It refers to a simulated motion picture that shows
the movement of a drawn object. To date, computer animation in education has become one of the most
powerful tools for presenting multimedia materials for students, and its importance in helping to
understand and remember information has increased since the advent of compelling graph-oriented
computers [5].

From the previous studies, there are several positive impacts have been widely discussed in the context of
teaching and learning. Teaching and learning in schools based on computer animation can change existing
methods as examples of verbal and traditional instruction. Interactive learning can respond positively to
blending techniques, namely computer-aided, by other means [6]. Interactive animations are a great
learning medium for students today. This is because learning how to use animations is not as boring as
studying in a school just by paying attention to the teachers who make it clear in the classroom [7].
Limited learning causes children or students to become bored and less interested in teaching and learning.
Creative and innovative teaching with an interactive learning system is an example of Jawi Learning
interactive animation used by both students and students [8]. Animation-based learning about asma’ul
Husna has been designed for children so that they do not get bored of everyday activities [9]. Multimedia
technology can be used in many ways to develop a teaching tool that incorporates various learning media
such as text, graphics, animation, audio and video [10].

Besides, the animation plays a vital role as an exciting learning medium. This is because the visual form
of the mobile is accompanied by audio that can be used to explain the content of the lesson that is difficult
to convey. Efforts to facilitate the introduction of alphabets in interest then designed an interactive
alphabetical introduction for students [11]. In other studies, that are related to language. The use of
animated language-based learning has been developed for the student level especially in relation to the
mother tongue or the regional language to be maintained [12, 13]. Learning outcomes differ from oral
learning styles especially in the application of Java programming concepts, procedures and principles
[14]. Animation is one of the elements of multimedia that is also applied in the teaching and learning
process as it can bring a human fantasy to the real world. This study involved the use of animation in
Arabic language learning [1]. Other studies on early childhood education on how to interest them in the
process of recognizing colors, numbers, letters and shapes are related to their environment [2]. This is
where the system and technology needs to be in their interest. The combination of media in PPBK
software such as text, graphics, animation and audio makes teaching and learning more interesting, active
and fun [3]. Sometimes people have no interest or knowledge of the importance of using media in
learning, especially computer-based animation applications [4]. When it comes to choosing a model, the
use of specific learning media is essential. One of the media that can be used is computer animation
media for example Advance Organizer [5].
However, the uses of the computer animation are also allowing several challenges and limitation during teaching and learning process [15, 16]. Firstly, needs skill in using the animation software such as Flash. As such, high skills are needed to integrate such media into one multimedia product especially in the field of education. The teachers normally required to at least have basic programming technology and experiences to implement this computer animation programs. Therefore, animation is not easy for every subject teacher. Besides, certain aspects like graphic design, audio selection, animation presentation, color selection need to be considered in developing a multimedia product to make the teaching and learning process more effective [17]. Besides, a complex animation on a page can be distracting and even annoying where, for example too many animated adverts on a page. Animation requires extensive storage and memory space; it uses more resources for system processing and storage than graphics and text as it consists of graphic objects and mathematical calculations. Furthermore, the computer animation is challenging to fit the different type of the student’s background and subject. Different cognitive load and learning style make computer animation is not suitable to be applied in a particular subject like mathematics and music.

3. Computer Animation in Language Learning

Animation traditionally usually involves animations, comics, or special effects. Research has however revealed that animation contributes significantly to education. Language learning has shown positive improvement in years, particularly after inserting technology-based methods. The importance of the computer animation and the uses animation in teaching and learning have widely discussed in literature. For example, Hat [18] have identified the effectiveness of the use of animation in Arabic language teaching and learning among diploma students and advocate the idea that animation technologies can be incorporated into language teaching aids to enhance student performance, learning environment and student motivation positively. Besides, Hannah [19] proposed an e-learning Arabic language for mastering fluency in reading the Qur’an by using the Flash Multimedia application. Ayadi [20] Present the improvement and enhancement of the Arabic Sign Language (ArSL) learning and teaching prototype based on a high-performance translation system from Arabic texts to their ArSL equivalent using 3D animations. In this case, computer can be used to produce accurate animations grammar and vocabulary learning in three-dimensional space. These animations have the potential to facilitate the students’ understanding of difficult sentences or feminine words. They encourage students give more attention during teaching and learning session.

4. Software in Computer Animation

With the rapid development of technology, software has evolved and become one part of the real-life stimulation. Various of the software was developed and used by the animator to design a good digital image. Chaudhary [21] have developed 3D modeling (i.e. creating 3D model from 2D pictures) by using the Autodesk 3Ds Max. This is matter, Autodesk 3Ds Max is user-friendly in modeling and complex animation. Besides, Autodesk 3Ds Max also can supports powerful and multiple tools for animation and supports the Material Editor that allows the user to create and edit materials and maps in their scenes. Furthermore, Richardson [22] have stated that virtual 3D animations and 3D printed models are promising to facilitate the learning of complex developmental processes in embryological education. Sedova [23] designed to model sea surfaces are characterized by the lack of accounting wind and wave effects by using 3DS MAX and Cinema4d software. This selected on this software is due to 3DS MAX software useful in fixing bugs and to export as it is compatible with a variety of other programs. While, Cinema4d is used for surface vessel modeling because of its relative simplicity. Ahmadi [24] shows the positive results that of the application of the learning media design of adobe animate cc in improving student learning outcomes of social studies at class XI. Besides, Adobe Illustrator also allows a positive impact for students. It is supported by [25] that develop Adobe Flash-based mathematics learning media for 7th-grade students of junior high school and found that Adobe Flash learning media is also an effective learning media that can be used by teachers as a tool in the process of teaching and learning activities in the classroom. Table 1 presented some of the software application in previous studies.
Table 1: Computer Animation Software and Application

| Researcher | Autodesk 3ds Max. | Autodesk Maya. | Cinema 4D. | Adobe Animate CC. | Blender 3D | Adobe Flash |
|------------|-------------------|-----------------|------------|-------------------|-------------|-------------|
| Chaudhary [21] | ✓ | | | | | |
| Yong [26] | ✓ | | | | | |
| Bhatti [27] | ✓ | | | | | |
| Jin [28] | ✓ | | | | | |
| Richardson [22] | | ✓ | | | | |
| Sedova [23] | ✓ | | ✓ | | | |
| Ahmadi [24] | | | | ✓ | | |
| Putrama [29] | | | | ✓ | | |
| Astuti [25] | | | | | ✓ | |

5. Conclusion

Based on the review mentioned above, this study can summarize that there is several importance, an advantage of using computer animation as teaching material. However, some of the limitations may arise on the subject suitability and student’s background. In this case, teachers play an essential task to determine the best and suitable teaching approach to be used in class and effective teaching deliver that can help to improve student’s visualization skills and understanding [15]. Several positive insights have been found in the context of teaching and learning. Firstly, computer animation helps learners visualize content or subject that is not easily seen in the real world. Besides, the animation can explain materials that are hard to imagine. Moreover, the use of computer animation in language development can be explained by many theoretical paradigms: constructivism, which stresses the active participation of the learner in the learning process intending to construct meaning from the available data [2, 6, 10, 30]. Computer animation one of the compelling way in teaching and learning language, for example, vocabulary and grammar. Computer animation found to be useful in explaining verbs such as reading, writing and listening as compared to the traditional static picture and image. Using computer animation in education has expanded, and continues to increase. Based on the importance of computer animation, technology takes place which changing the animation itself, for example, from 2D to 3D and low-resolution image to high-resolution image. The evolution of the animation is contributing by the advance software and application for a digital image. Various of the software and implementation (i.e. editor) have been used to develop the high indexed model and vector, such as Autodesk 3ds Max, Autodesk Maya, Cinema 4D and Adobe Animate CC. Likewise, teachers also have been to train with the necessary foundation of producing animation as teaching material. With this information, computer animation can be further research in various context, particularly in language learning. This study has suggested new research on the effectiveness of computer animation in Arabic Language study among the different type of students and schools. The finding of this study will be published in the subsequent publication.
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