The Development of 2D Animation Video Application for Arabic Daily Conversations

Nor Asidah Kalbun[1], Zurina Yasak[2*]

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

*Corresponding Author: zurina.yasak@gmail.com
DOI: https://doi.org/10.30880/ritvet.2024.04.01.013

Abstract

Arabic is often called the language of the Quran. It is considered one of the oldest languages in the world and develops according to current trends with various privileges and uniqueness, such as mediating the content of the Quran. This study was conducted for the development of a 2D animation video in Arabic (Daily Conversations) to provide exposure and basic knowledge about daily conversations to target users using the Android application platform. This daily conversation application (Arabic) has five parts, which are the application development introduction section, an animated video on the topic of saying hello, an animated video on the topic of self-introduction, an animated video on the topic of work and an animated video on the topic of time. The development of this animated video is interesting and suitable for the method of delivering information according to the current technological era, where individuals learn about daily conversations in Arabic through this 2D animated video. Meanwhile, the testing and evaluation of this 2D animation video were carried out by using expert verification checklist questions with three experts who were selected to carry out functionality testing and the design of this 2D animation video through vigorous expert testing. From the results of the study, all experts state that this 2D animation video can be used for learning Arabic communication. The paper concludes that 2D animated video can provide better and more interesting up-to-date exposure.

1. Introduction

In the context of the postmodern era, learning is carried out by progress along with the rapid development of technology. Therefore, to improve the quality of teaching and learning, the school curriculum has been renewed and improved from time to time. This can also be seen as one of the ministry's initiatives to ensure that students get a good, efficient, and systematic education. According to Ali (2012), this curriculum reform is said to be a major curriculum innovation or comprehensive reform according to the National Education Philosophy (FPK). Learning strategies or methods used by educators are among the elements of learning that have a great influence on student mastery.

The introduction of 21st-century learning, is seen as a necessity for educators and prospective teachers in prepare for teaching using the latest learning strategies in the classroom. To make it easier for teachers and students to refer to and learn all the subjects that can be applied in the implementation of PAK21, the teaching medium is e-learning, blended learning, and mobile learning. Technology that is constantly developing from time to time facilitates a T&L process as well as attracting students' interest and saving money. The use of technology

in the T&L process certainly brings many benefits to users such as reduced time in repeating the same content to different students, increased student learning motivation, and access coverage.

Examples of the use of technology in the T&L process are information channels or teaching materials that contain writing, graphics, visuals, words, animation, video, and audio. This is in line with the opinion of Mahat et al. (2020) who state that changes and techniques of teaching and learning strategies in teaching aids, is one of the important steps in delivering effective knowledge. Therefore, according to Che Ibrahim et al. (2021), the use of interactive multimedia as one medium in the teaching and learning process of 21st-century can have a positive effect on students. Therefore, animated video is an effective medium that could serve as teaching material to students because it can attract their attention.

1.1 Research Background

The teaching and learning process can be done effectively and delivery is more effective when an educator plans and practices teaching and learning activities that attract students' interest and take into account the level and abilities of students. Appropriate strategies and methods are very important to ensure that learning objectives are achieved. This is because according to Paudi, Din and Othman (2022), information and communication technology (ICT) helps in the development of teaching and learning materials (T&L) through various forms to increase diversity in resources and teaching aids to ensure that the T&L process can be carried out continuously and effectively. However, difficulties in the teaching of Arabic by teachers lead to a lack of control over how to manage computer-based learning materials (Che Omar, 2008), such as the failure to use teaching tools that might pique students' interest in the language. The use of teaching aids (BBM) and teaching technology is found to be underutilized by teachers in teaching Arabic language in schools (Ahmad, Marip & Pawi, 2008).

There are various problems faced by Arabic language teachers in Malaysia in delivering their lessons. The challenges faced by these teachers, especially in the 21st century are also very big and need to be dealt with well. According to Sahrir (2015), Arabic is no longer studied by religious students only, it is even offered at various levels of formal education whether preschool, elementary school, middle school, or in higher education such as colleges and universities. Issues and problems in the teaching of the Arabic language are not new to educators and researchers today. According to Ismail et. al (2011), language education research, especially Arabic, found that students' weakness in mastering Arabic was found to be related to the teacher's teaching weakness factor. According to Che Hat (2013), based on a study conducted by Che Omar (2008), 39.4% of Arabic language teachers face problems in terms of their inability to master the use of teaching aids (BBM) in teaching Arabic such as teaching based on the internet, graphics, videos, cassettes, the use of diagrams and computers. The problems faced by a few teachers reflect their weakness in mastering various types of teaching aids for teaching Arabic. According to Ahmad et. al (2008), the use of teaching aids and teaching technology is something that is still underused by teachers in teaching Arabic at school.

1.2 Problems Statement

Learning a third language is not something new. However, in reality, it is not easy for an individual to learn something completely different from what they have been exposed to in society. The learning process involved in understanding and ensuring that someone can speak and communicate in a third language requires effort and strong determination. In Malaysia, the second language often chosen by students to learn is English, Arabic, Mandarin, and Tamil. The selection of a second language by students is influenced by various factors, including current needs, religion, background, and students' interests (Daud & Abdul Pisal, 2014). The effectiveness of the teaching approaches used during the process of teaching Arabic speaking skills remains a question. There is a possibility that many students have a lack of proficiency in Arabic language skills, including speaking skills, due to the less solid teaching techniques used previously (Jamali, et al., 2017).

The selection of a second language by students is influenced by various factors such as current needs, religious considerations, background, and personal interests (Daud & Abdul Pisal, 2014). The effectiveness of teaching approaches used in acquiring Arabic speaking skills has always been a matter of concern. It is possible that many students lack proficiency in Arabic language skills, including speaking, due to the use of less effective teaching techniques in the past (Jamali, et al., 2017).

Therefore, the development of a 2D animated video depicting daily conversations in the Arabic language has been undertaken with the aim of creating a teaching tool using Adobe Animate software. This animated video development is expected to assist in addressing the challenges faced by students and teachers in attaining proficiency in Arabic speaking. Additionally, the video aims to aid teachers, as well as aspiring educators, in providing suitable and engaging teaching materials.

1.3 Objectives

The objectives of this study as follow:
    I.   To design and develop an application of 2D animated videos of daily Arabic conversations.

II.   To evaluate the usability of the application 2D animated videos of daily Arabic conversations.

1.4 Literature Review

Research highlights contain statements of facts, theories, and opinions, as well as previous studies related to the selected topic. The highlight of the study is a retrospective review of previous research or recent research related to past research on the preparation of teaching aids to develop animated videos for learning Arabic.

1.5 21st century learning

Nowadays, the teaching of the 21st century is increasingly emphasized and is the initiator of current trends in teaching and learning. According to Rajikal and Hamzah (2020), 21st-century teaching (PAK21) is an appropriate approach in line with the era of globalization in producing a skilled and competent generation. The Malaysian Education Development Plan (PPPM 2013-2025) outlines six student aspirations to be achieved. Teaching and learning (T&L) are considered important as a process of completing the dynamic needs of students (Yahaya, et al., 2019). Thus, T&L in the classroom becomes a platform for implementing this policy with a variety of methods used by teachers (Rajikal and Hamzah, 2020).

1.6 Learning through digital media

Digital media has had a big impact on the learning environment. According to Taat et al. (2022), digital media is non-print media that is broadcast and non-broadcast media that uses bit data. Whereas, according to Nayyar and Watson (2016), digital media are products and services resulting from the media, entertainment and information industries.

The advantages of digital media bust up the online learning method. Students benefit from the implementation of online learning. According to Taat et al. (2022) online learning implemented by teachers involves the use of digital media such as YouTube, games and so on to replace conventional face-to-face methods. Margaret (2014), states that the use of digital media becomes a teaching method or an important element to ensure the effectiveness of the teaching. According to Dorasamy and Abu Samah (2022), the use of educational technology and digital media such as Google Meet, Google Classroom and so on in a flipped classroom learning environment is beneficial because it provides students with wide access to rich resources and unlimited learning materials in class only.

1.7 Video-based learning

Learning through video can be applied 'synchronously' and 'asynchronously', that is 'synchronous' videos can display interactivity and take place in real-time while 'asynchronous' videos allow students to watch at any time determined based on learning needs (Geri, 2016). While according to Choudhury (2011), learning using video elements can transform static images into moving objects and the addition of animation allows the display of content to be presented more clearly. According to Kamlin and Keong (2020), nowadays the 'Youtube' application is a popular video-viewing platform. In addition, videos are used in various ways to support today's learning pedagogy such as in the context of problem-based learning through video clips and the delivery of topic content through the medium (Rasi & Poikela, 2016).

2. Methodology

The researcher has chosen a study in the form of product development. In this study, the researcher used the ADDIE model as a guideline for developing products. The researcher chose the ADDIE design model because this model is very suitable for the research being conducted. According to Cohen. L, Manion. L, & Morrison. K. (2018) research design is the main planning and strategy for answering research questions presented through data collection and analysis procedures.

This ADDIE model was chosen to develop an Arabic 2D animation video (Daily Conversation) because the design of the model emphasizes repetition for each phase which is interconnected with each other. If one of these stages cannot be carried out correctly, the process can be repeated until it can be completed completely. Through the ADDIE design model, it is a model that allows the development process to be carried out continuously where this 2D animation video can be evaluated from time to time and returned to the previous process for improvement. This is to improve and to make adjustments so that the developed animated video becomes better.

The analysis level is the basis for all other levels in the design of a material that aims to identify the objectives, content, suitability to the target, and the achievement of the learning and teaching model. This purpose and the objective statement are to ensure that the 2D animation video that is developed can achieve the development objective of this 2D animation video which is to design a 2D animation video of daily conversation in Arabic, develop a 2D animation video of daily conversation in Arabic and evaluate the functionality of a 2D animation video of daily conversation in Arabic Arabic.

The process of designing a video is done by sketching the content of a 2D animated video using a storyboard. Storyboarding is one of the methods used to sketch the development of animation, video, graphics and so on. Through this design phase, the storyboard method shows the arrangement of graphics in the form of sketches presented for the development process of this 2D animated video. This development phase requires a lot of process and creativity in turning ideas from sketches into visual designs. This phase discusses the role of the use of elements and components that have been described in the previous phase. Here the process of designing an interface involves the appearance of each object or element that needs to be arranged according to the rules as planned on the storyboard.

The implementation phase is the next step after going through the design and development phase because a 2D animated video has been created to be shown, tested, and evaluated by a panel of experts and then presented to users. This step is carried out to identify whether the related elements and components can fully function as well as to get feedback if problems arise about the 2D animated video being tested. Expert evaluation is conducted to verify the validity of the evidence from the aspects of functionality and user acceptance involved in this research field. This shows that any study or project developed in a study must go through an evaluation process to determine the reliability of the study results.

3. Results and Discussion

The expert evaluation is through the checklist form which is 3 experts who are involved in this evaluation Two lecturers from the Faculty of Technical and Vocational Education (FPTV) and one schoolteacher. Two lecturers from the Faculty of Technical and Vocational Education (FPTV) are evaluating the design of interaction and design of the interface while one schoolteacher is evaluating content design.

Interface design is the design of each display in a product that has various multimedia elements and interactive elements. The home page interface is shown in Figure 1(a) and consists of an introduction, sound, User Manual, Quiz and help button. Figure 1(b) shows an introduction page with multimedia elements such as video, text, graphics, audio (narrator, background music), and consistent buttons.
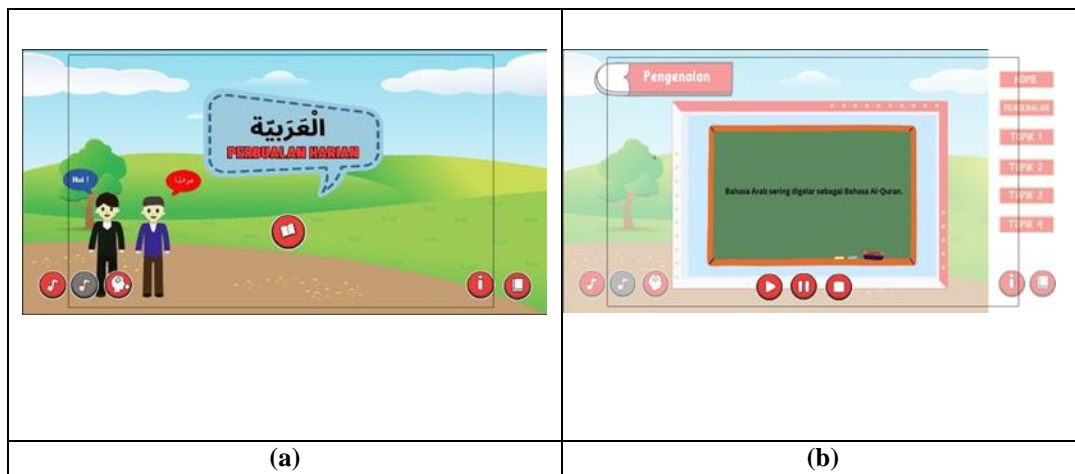

| (a) | (b) |

Fig. 1 *(a) Home Page; (b) Introduction Page*

Next, developers use multimedia elements in designing the interface. For example, Fig. 2(a) showsthe Topic 1 page of an application where the developer used element multimedia like animation and graphics to make the video look interesting. Figure 2(b) shows the Quiz Page of an application where the developer arranged answer buttons, audio buttons, text, and graphics to make it look interactive.
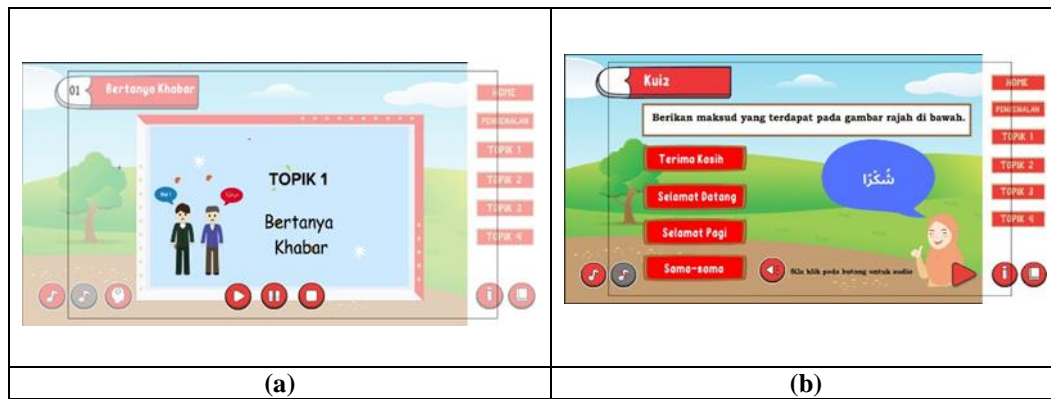
| (a) | (b) |

Fig. 2 *(a)Topic Page; (b) Quiz Page*

3.1 Results

The results of the data analysis of the frequency of expert acceptance of the content design section are show in Table 1. The result of the analysis carried out through the expert verification form, shows that the content used by the experts agrees on the correct conversational audio pronunciation question item where the audio pronunciation is appropriate, clear, and easy to understand by users for all topics. Experts also agree that the conversation text used is correct, clear, and easy for users to understand for all topics. Next, experts choose to disagree on the correct Arabic Text question item because there are spelling mistakes on all topics in terms of using Arabic text. Overall, the experts have chosen to agree on the item questions Correct conversational audio pronunciation and Correct conversational text. Meanwhile, the expert has chosen to disagree on the correct Arabic Text item question, and he has stated to revise the incorrect spelling in the animated video for each topic.

Table 1 *Analysis of Content Design*

Bil	Item	Frequently		
		Yes	No	Notes
Contents of 2D animation topic saying hello				
1.	Correct audio pronunciation of the conversation	1	0	
2.	The correct text of the conversation	1	0	
3.	Correct Arabic text	0	1	Spell check
Contents of 2D animation topic of self-introduction				
4.	Correct audio pronunciation ofthe conversation	1	0	
5.	The correct text of the conversation	1	0	
6.	Correct Arabic text	0	1	Spell check
Contents of 2D animation topic of jobs				
7.	Correct audio pronunciation ofthe conversation	1	0	
8.	The correct text of the conversation	1	0	
9.	Correct Arabic text	0	1	Spell check
Contents of 2D animation topic of time				
10.	Correct audio pronunciation of the conversation	1	0	
11.	The correct text of the conversation	1	0	
12.	Correct Arabic text	0	1	Spell check

Table 2 shows the result of the interaction and interface design analysis in the development of thisapplication. Both experts agree that the font size used is appropriate and the type of font used is easy tounderstand. In addition, both experts also agree that the size of the text is consistent, and the use of text coris appropriate. However, there is a comment on the text that the use of color in Malay words needs to be countered. On the graphics question, these two experts agreed that the graphics used in thevideo are appropriate to the study title and that the arrangement of the graphics used is appropriate. In addition, the two experts also agree that the graphic colors found in the video are compatible with thegraphic background. Nevertheless, one of the experts did not agree with the eighth item question whichis that the use of graphics in the video is very easy to understand, the expert commented that the developers put fewer graphics in the video.

Next, in the video question section, both experts agreed that the duration used in the video was appropriate. In addition, one of the experts did not agree with the tenth question, which is that the videoprovided can attract the interest of users. Experts commented that developers should add characters to the video to make the video more interesting. On the audio question part, both experts agree that the use of audio is appropriate to the content and that the audio can be heard clearly. In addition, both experts agree that audio narration parallel to the video display or animation and background music usedare appropriate. Both experts also agree that the narrator's voice is appropriate, and the use of the narrator's voice can be heard clearly. Through the results of the analysis on the animation question part,one of the experts did not agree with all the question items that the use of animation is appropriate to the study title and that the animation used can attract the interest of users.

In addition, on the navigation side, both experts agree that the navigation used is attractive and the navigation position is consistent. Both experts also agree that the navigation buttons can work well andthat the navigation buttons and icons are easy to understand. One of the experts disagreed that with theitem question, the displayed navigation button was appropriate. Experts commented that developers should resize the button to the menu on the main page to be enlarged. Next, on the design side, both experts agree that the position of the displayed multimedia elements is appropriate, and the layout of themultimedia elements is easy to understand. Both experts also agree that the layout used follows the latest trends.

Table 2 *Analysis of interactive and interface design*

Bil	Item	Frequently		
		Yes	No	Notes
Text				
1.	Size the font used appropriately	2	0	
2.	Type the font used to easily understood	2	0	
3.	The size text is consistent	2	0	
4.	The usage of color text is appropriate	2	0	* Color words in Malay need cons.
Graphics				
5.	The graphics used in the video are appropriate by title research	2	0	
6.	The arrangement graphics used is appropriate	2	0	
7.	Color the graphics found in the video are appropriate by background back graphics	2	0	
8.	The usage of the graphics in the video is verysimply understood	1	1	*Lack of graphics in the video
Videos				
9.	The duration of the video is appropriate	2	0	
10.	The video provided can attract interested users			
Audio				
11.	Appropriate use of audio by content	2	0	
12.	Audio is available heard by clear	2	0	
13.	Audio narration parallel with video/ animation	2	0	
14.	Music background used is suitable	2	0	
15.	Voice the narrator is suitable	2	0	

16.	Usage voice the narrator can heard by clear	2	0	
Animation				
17.	Usage animation is appropriate by title research	1	1	
18.	Animation used can attract interested users	1	1	
19.	The animation used easy for understood	0	2	
Navigation				
20.	Used navigation is attract	2	0	
21.	Position navigation is consistent	2	0	
22.	Button navigation can work in good	2	2	
23.	Button easy navigation and icons understood	2	0	
24.	The button displayed navigation appropriate	1	1	*Button to introduction page is small
Design				
25.	Position multimedia elements displayed appropriately	2	0	
26.	The design puts simple multimedia elements understood	2	0	
27.	Design place used according to the latest trends	2	0	

3.2 Discussion

The results of the data analysis of the frequency of expert acceptance of the content design section are shown in Table 1. This design process is aimed at confirming the design and the appropriate methods. The developers have chosen the ADDIE model as a design model in the development of a 2D animated video application of daily conversation in Arabic. According to Devi Chelliah and Masran (2021), the design phase is the transfer of information from the analysis phase to the sketch to be used during the development process. A storyboard was used a series of sketches to illustrate the sequence of content for a performance and it is also said to be a graphic layout in the form of illustrations or images presented for the purpose of pre-airing moving images, animation, or interactive media (Jamil, 2021). From storyboard, objects will be incorporated into the development of 2D animation video applications. The animations produced can visualize the real situation as well as brighten up in the delivery process. This animation is also the multimedia element that is most helpful in the understanding process as it attracts the user's attention to enable the user to focus on the information he wants to convey. This statement is also supported by Sarsikala and Mohd Nordin, (2023) who stated that animation is one of the elements of digital technology that is also applied in the educational process, as it can transform human fantasy into reality.

4. Conclusion

In conclusion, the developer found that the 2D animation video application development product of daily conversation in Arabic can work well and has all the multimedia elements such as text, audio, video, animation, and graphics. The purpose of developing this 2D animated video application is to help the public and students master daily conversation in Arabic. With the availability of this interactive 2D animated video application, it is hoped that it will be able to attract the interest of users to better understand this copyright issue. Finally, it is hoped that the improvements implemented from the suggestions given by the evaluator to produce this 2D animated video application development product will be more interesting and can help users master daily conversations in Arabic.

Acknowledgement

References

Ahmad, A., Marip, H. & Pawi, M. (2008). Kajian tinjauan pelaksanaan pengajaran dan pembelajaran Bahasa Arab Sekolah Menengah di Sarawak. Prosiding Wacana Pendidikan Islam Peringkat Kebangsaan.

Ali, M. J. (2012). Penilaian program peralihan kemahiran hidup (pilihan B) tingkatan satu di Wilayah Persekutuan. Tesis Sarjana Pendidikan (tidak diterbitkan), Universiti Kebangsaan Malaysia.

Che Hat, N., Sha'ari, S. H., & Abdul Hamid, M. F. (2013). Persepsi Pelajar Terhadap Penggunaan Animasi dalam Pembelajaran Bahasa Arab. Sains Humanika, 63(1). https://doi.org/10.11113/sh.v63n1.141

Che Ibrahim, N. F. S, Mohd Rusli, N. F., Shaari, M. R. & Nallaluthan, K. (2021). Persepsi pelajar terhadap aplikasi interaktif dalam proses pengajaran dan pembelajaran abad ke-21. Penerbit UTHM Online journal for TVET practitioners, 9, 15–24.

Che Omar, M. (2008). Guru Bahasa Arab terlatih di sekolah: satu keperluan di Malaysia . Prosiding Wacana Pendidikan Islam Peringkat Kebangsaan Siri Ke 6: Pendidikan Islam Teras Pembangunan Modal Insan. Halaman. 711-720

Choudhury, I. (2011). Does Watching Video Clips Affect Student Performance in a Construction Science Course at an Undergraduate Level?. American Society for Engineering Education.

Cohen, L., Manion, L., & Morrison, K. (2018). Research Method in Education (8th ed.). New York: Routledge Taylor & Francis

Daud, N., & Abdul Pisal, N. (2014) Permasalahan Pertuturan Dalam Bahasa Arab Sebagai Bahasa Kedua. GEMA Online Journal of Languages Studies Volume 14(1), February 2014 (http://dx.doi.org/10.17576/GEMA-2014-1401-08)

Dorasamy, M., & Abu Samah, N. (2022).Tahap Pengaplikasian Media Digital dalam Kalangan Guru Bahasa Tamil Di Sekolah Rendah. Sekolah Jenis Kebangsaan (T) Labis, Fakulti Sains Sosial dan Kemanusian, Universiti Teknologi Malaysia,Skudai Johor, 2-3.enilaian program peralihan kemahiran hidup (pilihan B) tingkatan satu di Wilayah Persekutuan. Tesis Sarjana Pendidikan (tidak diterbitkan), Universiti Kebangsaan Malaysia.

Geri, N. (2012). The Resonance Factor: Probing the Impact of Video on Student Retention in Distance Learning. Interdisciplinary Journal of E-Learning and Learning Objects, 8. 1-13.

Ismail, Z., Tamuri, A. H., Nik Yusoff, N. M. R., & Othman, M. A. (2011) Teknik pengajaran kemahiran bertutur Bahasa Arab di SMKA di Malaysia. GEMA: Online Journal of Language Studies, 11 (2). pp. 67-82. ISSN 1675-8021

Jamali, H.N, Abdul Rahman, A. & Ku Azizan, K.F. (2017) Pemantapan Tahap Kemahiran Bahasa Arab Melalui Kajian Tindakan. Jurnal Sultan Alauddin Sulaiman Shah Special Issue (2017) e-ISSN:2289-804

Jamil, I (2021). Video Animasi Sebagai Medium Pembelajaran dan Pendekatan Kreatif Terhadap Kesedaran Covid-19 bagi Pelajar dalam sesi pembelajaran terbuka dan jarak jauh. International Journal of Art & Design, UniversitiTeknologi MARA Cawangan Melaka,Volume 5, Number 01, Jun/2021, Pg. 1-13.

Kamlin, M., & Keong, T. (2020). Adaptasi Video dalam Pengajaran dan Pembelajaran. Malaysian Journal of Social Sciences and Humanities (MJSSH), 5(10), 105 - 112. https://doi.org/10.47405/mjssh.v5i10.508

Mahat, H., and Arshad, S., Saleh, Y., Aiyub, K., and Hashim, M., & Nayan, N. (2020) Penggunaan dan penerimaan bahan bantu mengajar multimedia terhadap keberkesanan pembelajaran Geografi. Geografia : Malaysian Journal of Society and Space, 16 (3). pp. 219-234. ISSN 2180-2491

Margaret. (2014). Kajian Pembentukan Istilah Sains Dan Teknologi Maklumat Dalam Akhbar Harian Bahasa Tamil. Laporan Tesis Ijazah Sarjana, Fakulti Bahasa Dan Linguistik: Universiti Malaya.

Nayyar, S., & Watson, W. T. (2016). Digital Media and Society: Implications in a Hyperconnected Era. World Economic Forum.

Paudi, M. H., Din, R., & Othman, N. (2022). Agricultural Video as A Learning Medium for Young Farmer. International Journal of Academic Research in Progressive Education and Development,11(1), 729–742.

Rajikal, W., & Hamzah, M. I. (2020). Kajian Sistematik Pengajaran Abad Ke-21 (PAK21) dalam Kalangan Guru Pendidikan Islam (GPI): Systematic Review of 21st Century Teaching Among Islamic Education Teachers. ATTARBAWIY: Malaysian Online Journal of Education, 4(2), 103–113. https://doi.org/10.53840/attarbawiy.v4i2.46

Rasi, P. & Poikela, S. (2016). A review of video triggers and video production in higher education and continuing education pbl settings. Interdisciplinary Journal of Problem-Based Learning, 10(1).

Sahrir, M. S. (2015). Bahasa Arab tembusi pengajian formal di sekolah, universiti. Berita Harian, Rabu, 23 Sept 2015.

Sarsikala T. Sivam, Mohd Nordin, N. (2023). Pembangunan Video Animasi Dalam Mempertingkatkan Pencapaian Murid Bagi Matapelajaran Sains. ASIAN SCHOLARS NETWORK, 3-13.

Taat, M. S., Talip, R., Ag Kiflee, D. N. & Mad Japuni, M. N. (2022). Pembelajaran atas talian, media digital dan sikap akademik pelajar: satu tinjauan di Negeri Sabah. Fakulti Psikologi dan Pendidikan, Universiti Malaysia Sabah. https://msocialsciences.com/index.php/mjssh/article/view/1912

Yahaya, M., Hanafiah, R., Zakaria, N.S. R., Osman, R., & Bahrin, K.A., (2019). Amalan Pembelajaran Abad Ke-21 (PAK21) Dalam Pengajaran dan Pemudahcaraan (PdPc) Guru-Guru Sekolah Rendah. Jurnal IPDA Bil. 26. Institut Pendidikan Guru Kampus Darulaman, Jitra, Kedah.