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Video Attributes in Teaching and Learning: A Systematic Review

Muhammad Nuqman Mohd Nasir[1]*, Alias Masek[1], Siti Soleha Razali[1], Nur Liyana Rosman[1], Affero Ismail[1]

[1] *Faculty of Technical and Vocational Education,*
Universiti Tun Hussein Onn Malaysia (UTHM), 86400 Parit Raja, Batu Pahat, Johor, MALAYSIA

*Corresponding Author: nuqman.mnasir@gmail.com
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Abstract

This study was conducted to establish guidelines for video attributes for electrical subjects. Based on previous research, researchers have found several elements that must be present in the process of preparing video attributes. Data analysis conducted by the researchers found a total of 12 related papers from 32 sources of search. The results of the observations carried out by the researchers found that the elements that need to be in the preparation of the video are text, animation, movement, segmentation, and some related ones, as stated in the finding section.

1. Introduction

As we all know, the current education system in Malaysia is rapidly advancing towards digitization. The Ministry of Education has undertaken numerous initiatives to facilitate the development of this digital revolution. This transition is evident through various digital campaigns and courses designed for both teachers and students, integrating digital elements into teaching and learning sessions. Furthermore, since 2020, the world has been profoundly affected by the spread of the COVID virus, leading to restrictions in all sectors, including education. Consequently, a series of concerted efforts and initiatives has been launched to ensure the effective functioning of the education system during this challenging period. One noteworthy initiative involves the production of instructional videos that are accessible via social media platforms. These videos play a crucial role in ensuring that the teaching syllabus can be effectively delivered and aiding students in comprehending various topics, even in the absence of face-to-face instruction.

Furthermore, the rapidly evolving digital technology revolution is a significant catalyst for advancing the education system. Undoubtedly, one of the most notable aspects of digital development is its impact on the teaching and learning process, particularly through the creation of effective instructional videos. However, the production of such videos must adhere to proper guidelines to ensure clarity and enhance students' learning experience when watching these videos as a complement to traditional instruction.

The 21st century is marked by globalization and the rapid growth of communication technology. Malaysia, like many other nations, is not exempt from the challenges and ever-changing technological demands. In response, education plays a pivotal role in nurturing competent and globally competitive students who can effectively confront the challenges posed by the Fourth Industrial Revolution, as noted by Siong & Osman [1]. The Malaysian Ministry of Education (MOE) has undertaken significant reforms in the national education system to cultivate expertise and skilled labor for research and the country's core industries, in accordance with the research by Shanmugam & Balakrishnan [2].

In the Tenth Malaysia Plan (RMKe-10) period, a concerted effort was undertaken to mainstream and expand access to quality Technical and Vocational Education and Training (TVET) to cater to the demands of industries that require skilled manpower. The TVET education system emphasizes practical, industry-based training. To fulfill the objectives of establishing TVET, students in TVET programs require practical training. Practical training involves the application of knowledge in specific fields, and to facilitate this, TVET training providers, such as the Industrial Training Institute (ILP), Majlis Amanah Rakyat (MARA), Vocational Colleges, and other institutions, must provide the necessary equipment to ensure students gain real-world work experience.

On January 25th, 2020, our country faced a significant challenge when the government announced the onset of the COVID-19 pandemic. By April 2020, the Malaysian government had directed students to return to their hometowns and continue their studies through online learning. This shift posed challenges for both instructors and students, particularly when it came to teaching activities involving practical training. To address this, one of the transformative measures in online teaching and learning involved the application of Information and Communication Technology (ICT).

Multimedia, including video, audio, and images, was recognized as a valuable teaching aid, promoting more effective and engaging learning experiences. According to Che Ahmad et al. [3], multimedia can serve as a support tool for conveying information to students during the teaching and learning process. In the context of Technical and Vocational Education and Training (TVET), one of the ICT elements applied is the use of videos in practical classes. Donkor [4], in his study, found that video is particularly beneficial for skill development, though its utility is less pronounced in the theoretical aspect. Another advantage of video use is cost reduction, including savings on equipment and consumables during practical exercises. It also allows students to work independently, albeit monitored by a laboratory assistant. A primary benefit of using video is that students can replay and review the recordings, indirectly enhancing their understanding of essential skills, such as hand movements and techniques used during practical work.

Numerous instructional videos are available on the internet for instructors and students to use as guides. However, the majority of these existing videos are unsuitable for practical teaching due to the absence of specific guidelines for videos that pertain to practical work. Therefore, the development of guidelines for creating instructional videos for skill-based subjects can greatly assist instructors and trainees in their endeavors to optimize teaching activities, whether they are conducted face-to-face or through the use of instructional videos.

The 'hands-on' activity is a complicated matter because it involves work steps that need to be researched and given constant focus in addition to complying with safety measures throughout carrying out skill work for instructional teaching of electrical installation and wiring in vocational colleges. These specific skills in practical installation and electrical wiring are challenging to explain through verbal communication alone. Students need to master these skills to carry out maintenance work on single-phase electrical wiring systems based on drawings. They must also use wiring equipment, materials, and tools in compliance with the Electricity Act 1990, Electricity Regulations 1994, and other relevant rules and regulations. For those without prior experience, instructors may need to demonstrate the procedures repeatedly, as students require constant guidance to avoid mistakes that could result in significant wastage of raw materials, tools, and wiring accessories.

Moreover, there is a significant dearth of instructional videos tailored to electrical installation and wiring in Malaysia. Most available videos are in foreign languages and do not reflect the local context. Furthermore, the attributes of these existing videos fail to meet the specific needs and expectations of Malaysian students, particularly those in vocational colleges for this reason, the researcher intends to explore into video attributes related to skill training for electrical installation and wiring, aiming to provide guidance for future development.

Therefore, a new guideline for instructional video attributes for skill training need to be developed to assist instructors in finding or developing higher quality instructional videos and making it easier for students to understand the instructional videos.

2. Methodology

2.1 Highlights of Systematic Works Based on the PRISMA Method

This is a Systematic Literature Review research. The researcher conducted a search and selection of articles using PRISMA 2020, which has been used to gain an initial impression of the attributes of video teaching skills. The abbreviation PRISMA stands for "Preferred Reporting Items for Systematic Reviews and Meta-Analyses." It is a well-known and extensively used set of recommendations that were created to assist researchers in conducting and documenting systematic reviews and meta-analyses of research findings. Systematic reviews and meta-analyses are research techniques used to synthesize and summarize the body of knowledge on a certain research question or topic by carefully looking for, identifying, and assessing pertinent papers.

For researchers to ensure transparency and thoroughness in reporting the various stages of a systematic review or meta-analysis, the PRISMA 2020 guidelines offer an organized framework. These steps involve

formulating the research question, performing a thorough literature search, choosing studies to include, evaluating study quality and bias, and synthesizing the findings.
The advantage of using a systematic highlighting method in conjunction with the PRISMA method in the field of social sciences is that it ensures the inclusion of works from high-quality data sources that are recognized by all researchers. Additionally, it helps explain the study's limitations through the use of keywords. These guidelines also assist authors in avoiding time wastage and uncertainty about the adequacy of the highlights in their work.
PRISMA aids authors in identifying the right literature in alignment with the study's objectives through four key processes: identification, screening, and inclusion. This study is centered on a primary research question: "What are the attributes of instructional videos for teaching skills in electrical wiring?". To conduct this study, five online databases will be utilized, including the main database Proquest, as well as IEEE Xplore, ScienceDirect, SpringerLink, and Google Scholar.

The process begins with the execution of a series of searches using search strings composed of keywords. These searches utilize the available search facilities and specific commands that have been configured within the databases. During this process, the authors employed keywords and were assisted by Boolean operator functions in the databases. The keywords and search strings used could be repeated to access the most recent materials and potential future research. They can recognize logical relations between words (using 'AND' and 'OR') and efficiently create combined sets, each representing a search result within the specified logical relations. This robust search capability allowed us to conduct a well-constrained and well-organized database search by generating keyword groups and defining logical relations related to education and electrical wiring. While conducting searches using these keywords, the authors identified 741 articles that needed to undergo a screening and eligibility process

During this stage, the authors conducted a screening process to refine their selection of articles for their research. They applied specific criteria to make their chosen articles more closely aligned with their research question. First, the authors only considered articles, books, book chapters, seminar articles, and proceedings, excluding other types of publications such as journal articles that were unrelated to the field of education. Second, the authors selected articles in both English and Malay languages that were relevant to instructional videos, instructional design, and the characteristics of video learning. Third, the authors did not impose a specific time frame for their search in the main database but instead focused on articles published between 2013 and 2023.

Following the screening process, the authors narrowed down their selection to 32 articles from an initial pool of 741. While the excluded articles were not included in the analysis, some of them were still used as additional references for their study. Table 1 displays the eligibility and elimination criteria for this study.

Table 1 *Eligibility and elimination criteria*

Criteria	Eligibility	Elimination
Type of literature	Articles, books, book chapters, seminar articles, proceedings	Journal articles that not in education field
Language	English and Malay	In addition to English and Malay
Duration	2013 - 2023	2012 and below

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2.2 Eligibility and Inclusion Process

At this stage, the authors exclusively concentrated on articles that addressed instructional video attributes for skill training. All 32 articles underwent in-depth analysis, involving thorough reading starting from the abstract and extending to the entire article, in order to identify the attributes of instructional videos. As a result of this analysis, only twelve (12) articles were identified as leading to discussions on instructional video attributes. The entire article selection process for the purpose of the systematic literature review (SLR) is illustrated and explained in the PRISMA flow chart in Figure 1 below.

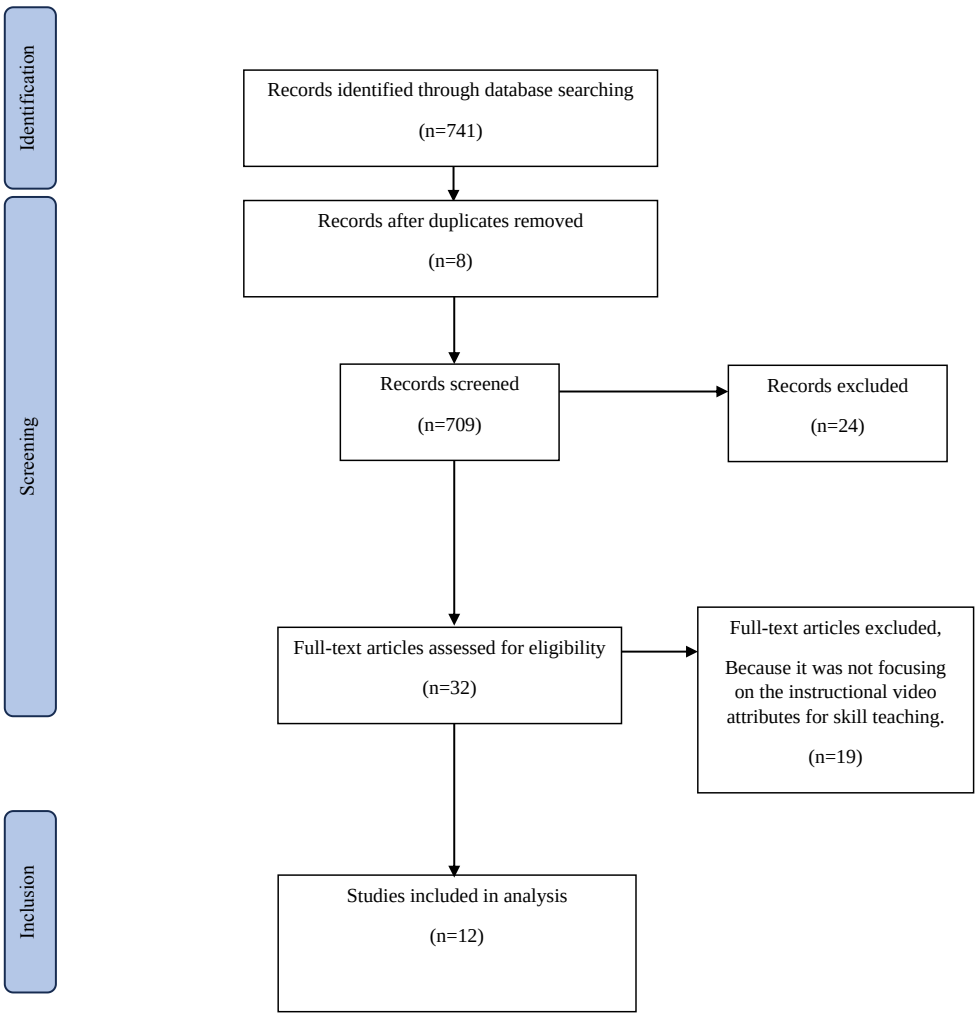

Fig. 1 *PRISMA 2020 Flowchart for systematic reviews (Page et al. 2020)*

2.3 Data Analysis

In the dynamic and data-driven world of research, the ability to efficiently organize, compare, and synthesize data from various sources is paramount. This is where matrix tables come to the forefront, offering a structured and uniform approach to data organization. Matrix tables serve as a versatile tool that provides researchers with an organized framework for handling the multifaceted aspects of their studies. The initial function of matrix tables is to streamline the data organization process. Researchers, engaged in activities such as systematic literature reviews, find matrix tables indispensable for managing and comparing data derived from multiple sources. This structured approach ensures that no valuable data is lost in the deluge of information, ultimately leading to more effective data management.

Table 2 shows the matrix table containing general information about the articles selected from journals, facilitating the comparison of essential study characteristics. Researchers can use these tables to contrast publication details, study design, sample size, and research studies related to instructional videos. This systematic approach helps in identifying recurring patterns and nuances among the selected studies, illuminating the unique features of each study and enhancing overall comprehension.

Table 2 *General information of articles and data sources from selected journal*

Author	Year of Publication	Study Location	Research Design	Research Topic
Syamsulaini Sidek, Mashitoh Hashim	2016	Malaysia	Qualitative	Video Based Learning

Mayer, R.	2001	Canada	Qualitative	Multimedia Priciple For Teaching
Azniwati Abdul Azizi	2020	Malaysia	Quantitative	Effectiveness of instructional videos
Winnifred Wijnker, Arthur Bakker, Tamara van Gog and Paul Drijvers	2019	Netherland	Qualitative & Quantitative	Educational Video Characteristic
Jack Koumi	2014	Philipines	Qualitative & Quantitative	Pedagogy Roles For Video
Siti Zulaidah Salsidu, Mohamed Nor Azhari Azman, Hendri Pratama	2018	Malaysia	Qualitative	Interactive Multimedia for Technical Education
Madhya Zhagan, Taye Zhi Hui	2021	Malaysia	Quantitative	Video Modelling
Afizal Md Sahir & Ahmad Fauzi Mohd Ayub	2015	Malaysia	Quantitative	Instructional Video
Dongsong Zhang, Lina Zhou, Robert O. Briggs, Jay F. Nunamaker Jr.	2006	USA	Quantitative	Instructional Video
Beheshti,M., Taspolat, A., Kaya, S.O. & Sapanca, F. H.	2018	Cyprus	Qualitative	Instructional Video
Melanie Hibbert	2014	Columbia	Qualitative	Instructional Video
Albert D. Ritzhaupt, Raymond Pastore, Robert Davis.	2015	USA	Quantitative	Video Learner

2.4 Thematic Analysis

In the first stage of the SLR process, out of the 12 papers, the researcher imports the publications into Excel. Each row represents a single publication, and the researcher creates a column for open codes. As the researcher reads each paper, they note down relevant open codes that capture the main concepts or themes. After completing open coding, the axial coding phase begins. In a separate worksheet or section, the researcher establishes relationships between the open codes, grouping them into categories and subcategories, and records these connections in Excel. Finally, during selective coding, the researcher creates another worksheet for the development of themes and overarching concepts. The researcher links categories and subcategories to these themes, providing a structured and organized framework for the systematic literature review. The example was given in table 3.

Table 3 *Example for Thematic Analysis*

OPEN CODE	AXIAL CODE	SELECTIVE CODE
In the procedural learning task, however, learners in the segmented interactive video group performed better than those in either the noninteractive video or interactive video groups. When producing longer-form lecture content, media is often chunked into shorter content segments. Producing 45-minute lectures that "copy the classroom onto the Internet" is not recommended. In order to provide interactive video, logic segmentation of the instructional video was performed. Segmenting refers to breaking a continuous multimedia presentation into meaningful segments with the learner controlling when the system moves on to the next segment Learners in the segmented interactive video group were better at performing the procedure than those in either the noninteractive video, or interactive video	SECTION MANAGEMENT	SEGMENTATION

The results suggested that segmentation of video contributes to low-experienced learners; but it is not seen in the learning experience of highly experienced learners. Breaking a lesson into user-paced, meaningful segments can help learners process the material more effectively through managing essential processing. The video length should be short to avoid students' boredom, keep them engaged by videos. In order to make cognitive load, you can create mini videos, range from 1–2 minutes for complicated topics. Moreover, the segmented videos allow students to have control over the sequence of their learning as they can engage with the material at their own pace and re-watch different segments. These findings suggest that students will often re-watch and jump to relevant parts of longer tutorial videos. Adding hyperlink bookmarks or visual signposts on tutorial videos, such as big blocks of text to signify transitions, might facilitate skimming and re-watching. In order to reduce the impact of video on learners' cognitive load, Mayer & Chandler (2001) used animated video "the Formation of Lightning" to experiment. The results of this experiment confirmed that segmented video has a positive effect on learning outcomes by allowing learners to choose their own learning pace.	USER PACED/CONTROL

3. Finding and Discussion

The results obtained by researchers in the study of several articles have revealed certain elements that should be included in instructional videos. These elements include text, images, audio, narration, design, duration, and segmentation. All of these findings have been reported in previous studies. According to Che Ibrahim et al. [5], the application of multimedia elements in the teaching and learning process aims to help teachers convey ideas through engaging teaching aids, thus motivating students and creating a conducive learning environment. This fact is also supported by Gamboa [6], who asserts that instructional videos should also incorporate elements such as sound, movement, color, and various settings to enhance students' ability to explore a subject or area of study.

As is known, the purpose of the instructional video is to help students and attract students to focus more on a particular subject. In addition, according to Berney & Betrancourt [7], the graphic included are intended to attract the attention of students in a particular field. In fact, according to Ploetzner et.al [8], graphic is different from rigid pictures because graphic can display changes in the form of space and time and at the same time graphic can also help students or viewers to better understand the changes in space and time.

Good and effective instructional videos possess several elements, often referred to as features. Among the effective video features are videos that include text, graphics, segmentation, pauses, timing, and audio. Furthermore, as stated in the article by Zaharon Lai & Ahmad [9], instructional videos that incorporate engaging entertainment and animation elements tend to attract students to watch the videos repeatedly. This assertion is also supported by Rozali & Halim [10], who emphasize that the interactivity capabilities of videos allow for repeated viewing, easy control, and compatibility across various platforms, making them suitable for use in classrooms or any learning environment.

In fact, according to Ahmad et.al [11], the use of multimedia which includes video, audio and images can be used as support in conveying information to students during the teaching and learning process. Likewise, elements such as graphics, animations and videos that can give students an easy overview of a subject. Thus, an important feature in video production is to involve visual symbols as well as the auditory system, because if only using the auditory or visual symbol system will cause less effective delivery of the video compared to a combination of these two elements (Beheshti et.al)[12]. The choice of audio for the development of instructional videos is important so that the production of videos is of quality and useful to students.

J. of TVET and Technology Review Vol. 1 No. 1 (2023) p. 1-10

Also, the uniqueness of video attributes for electrical compared to other subjects is the visual representation of circuits and components. According to Muthusamy [13], the effectiveness of video demonstration on three phase electrical wiring, indicated students perform better and remember the techniques and procedure of wiring installation. In fact based on Qusay & Noor [14], the use of multimedia tools during the assessment can increase students 'interest, motivation, and results in practical subjects while traditional methods do not affect students' results. Electrical subjects often involve complex circuits, diagrams, and components. The instructional videos in the electrical domain need to excel in visually representing these elements. Unlike some other subjects that may rely more on theoretical concepts, electrical videos may require a strong emphasis on graphical representations of circuits, symbols, and electronic components.

Besides that, the electrical domain often involves hands-on activities, and safety is a paramount concern. Instructional videos in this domain may need to include specific safety guidelines, procedures, and demonstrations to ensure that learners understand and adhere to safety protocols when working with electrical equipment. Thus, this finding coincides with a study produced by Frandrio & Hasan [15], whereby using interactive learning media, students become more enthusiastic, active, and creative in learning. This statement is supported by Salsidu et.al [16], the use of interactive multimedia modules or so-called instructional videos is the best and effective initiative in conveying information because it is easy for students to learn and understand.

Thus, according to Kamlin & Tan Choon Keong [17], there are several benefits that have been identified using video in teaching, namely access to video content for unlimited students and provide fun for students and provide freedom of time in class for interactive learning. Although, based on Harling's [18] study, the use of video in the learning process provides enormous benefits to instructors and students. This is because the teaching staff can achieve learning objectives easily, especially for subjects that involve practical because students can learn to be more focused on a given task.

In summary, the uniqueness of video attributes in the electrical domain stems from the need to effectively convey dynamic, practical, and safety-sensitive concepts. By tailoring instructional videos to these specific characteristics, educators can enhance the learning experience for students in the electrical field.

Table 4 *Element of video attribute for teaching and learning*

Author (Year)	Element						
	Text	Picture	Audio	Narration	Design	Duration	Segmentation
Syamsulaini Sidek, Mashitoh Hashim (2016)	✓	✓			✓	✓	
Mayer, R. (2001)	✓	✓			✓		
Azniwati Abdul Aziz (2020)	✓	✓			✓		
Winnifred Wijnker, Arthur Bakker, Tamara van Gog and Paul Drijvers (2019)			✓	✓			
Jack Koumi (2014)			✓	✓	✓		
Siti Zulaidah Salsidu, Mohamed Nor Azhari Azman , Hendri Pratama (2018)	✓	✓	✓				
Madhya Zhagan1, Taye Zhi Hui (2021)	✓	✓		✓			

Afizal Md Sahir & Ahmad Fauzi Mohd Ayub (2015)	✓	✓	✓				
Dongsong Zhang, Lina Zhou, Robert O. Briggs, Jay F. Nunamaker Jr. (2006)		✓	✓	✓	✓		✓
Beheshti,M., Taspolat, A., Kaya, S.O. & Sapanca, F. H. (2018)	✓		✓	✓	✓	✓	✓
Melanie Hibbert (2014)	✓	✓	✓	✓	✓	✓	✓
Albert D. Ritzhaupt, Raymond Pastore, Robert Davis. (2015)	✓	✓		✓			

4. Conclusion and Implication

Fig. 1 *The elements of video attributes*

This study serves as a valuable resource for instructional design practitioners such as video designer, providing them with insights and knowledge to enhance their instructional video development processes. Furthermore, it offers a practical benefit to trainers and teachers by delineating at least three video attributes that are indicative of effective instructional videos for teaching and learning. By employing these identified attributes, educators can make informed choices when selecting instructional videos, resulting in more engaging and impactful educational experiences for their students and trainees.

This study establishes the foundation for future research endeavors, offering various avenues for exploration. One promising avenue for further investigation involves conducting an in-depth analysis of storyboards in the context of enhancing instructional videos. Future studies can delve into the intricacies of storyboarding techniques and their role in improving the quality and effectiveness of educational video content. By exploring the use of storyboards, researchers can develop a more comprehensive understanding of their impact on the instructional design process, with the aim of refining the methods and tools available for creating engaging and informative videos for educational purposes. These future studies can provide valuable insights into the potential benefits of utilizing storyboards as a means to optimize the production and delivery of educational content.

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References

Ahmad, C. N. C., Yahaya, A., & Sani, S. S. (2020). Development of Practical Video Module (V-Lab) to enhance teaching and facilitation of form four biology: Pembangunan modul Video Amali (V-Lab) bagi mempertingkatkan pengajaran dan pemudahcaraan biologi tingkatan empat. Jurnal Pendidikan Sains dan Matematik Malaysia, 10(2), 1-7.

Ahmad, C. N. C., Yahaya, A., & Sani, S. S. (2020). Development of Practical Video Module (V-Lab) to enhance teaching and facilitation of form four biology: Pembangunan modul Video Amali (V-Lab) bagi mempertingkatkan pengajaran dan pemudahcaraan biologi tingkatan empat. Jurnal Pendidikan Sains dan Matematik Malaysia, 10(2), 1-7.

Ali, Q. A., & Sahab, N. M. (2022). The Effectiveness of Using Interactive Multimedia on the Learning Process for Enhancing the Connection between Education and Practice. *LC International Journal of STEM (ISSN: 2708-7123)*, *3*(3), 27-34.

Aziz, A. A. (2020). Keberkesanan Video Pembelajaran Dari Perspektif Pelajar.

Beheshti, M., Taspolat, A., Kaya, O. S., & Sapanca, H. F. (2018). Characteristics of instructional videos. *World Journal on Educational Technology: Current Issues*, *10*(1), 61-69.

Berney, S., & Bétrancourt, M. (2016). Does animation enhance learning? A metaanalysis. Computers & Education, 101, 150-167.

Donkor, F. (2010). The comparative instructional effectiveness of print-based and video-based instructional materials for teaching practical skills at a distance. International review of research in open and distributed learning, 11(1), 96-116.

Gamboa, R. (2019). Student Made Videos Used To Increase Creativity, Motivation, Problem Solving, Critical Thinking And Communication Competences. In ICERI2019 Proceedings (pp. 5582-5586). IATED

Hibbert, M. C. (2014). What makes an online instructional video compelling?

Kamlin, M., & Keong, T. C. (2020). Adaptasi video dalam pengajaran dan pembelajaran. Malaysian Journal of Social Sciences and Humanities (MJSSH), 5(10), 105-112

Koumi, J. (2014). Potent pedagogic roles for video. *Media and learning association*.

Lai, Z. S. Z., & Rosli, A. N. (2021). Keberkesanan Penggunaan Video Pembelajaran Bahasa Melayu dalam Kalangan Murid Tahun 6 Semasa Pengajaran dan Pembelajaran di Rumah (PdPR): The Effectiveness of the Use of Malay Language Learning Videos Among Year 6 Students During Home-Based Learning. Journal of Information and Communication Technology in Education, 8(3), 76-99.

Lee, C. I., & Tsai, C. L. (2017, May). A study of a segmenting learning video technique to improve learning achievement for elementary school students. In 2017 International Conference on Applied System Innovation (ICASI) (pp. 345- 348). IEEE

Muthusamy, J. (2016). Keberkesanan kaedah demonstrasi video dalam pengajaran dan pembelajaran bagi modul pendawaian elektrik tiga fasa. Journal of ICT in Education, 3, pp. 34-54.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. International journal of surgery, 88, 105906.

Ploetzner, R., Berney, S., & Bétrancourt, M. (2020). A review of learning demands in instructional animations: The educational effectiveness of animations unfolds if the features of change need to be learned. Journal of Computer Assisted Learning, 36(6), 838-860.

Ritzhaupt, A. D., Pastore, R., & Davis, R. (2015). Effects of captions and time-compressed video on learner performance and satisfaction. *Computers in Human Behavior*, *45*, 222-227.

Rozali, N. A., & Abd Halim, N. D. (2019). Kesan Pembelajaran Berasaskan Inkuiri Dengan Integrasi Video Terhadap Pencapaian Pelajar Dalam Pembelajaran Matematik (Effect of Inquiry Based Learning with Video Integration towards Students' Achievement in Learning Mathematics). Innovative Teaching and Learning Journal (ITLJ), 3(2), 42-60.

Rusli, N. F. M., Ibrahim, N. F. S. C., Raâ, M., & Nallaluthan, K. (2021). Persepsi Pelajar terhadap Aplikasi Multimedia Interaktif dalam Proses Pengajaran dan Pembelajaran Abad ke-21: Students' Perceptions of Interactive Multimedia Applications in the 21st Century Teaching and Learning Process. Online journal for tvet practitioners, 6(1), 15-24.

Sahir, A. M., & Ayub, A. F. M. (2015). Keberkesanan Penggunaan Video dalam Amali Masakan. *International Journal of Education and Training (InjET)*, *1*(2), 1-8.

Salsidu, S. Z., Azman, M. N. A., & Pratama, H. (2018). Trend of learning by using the interactive multimedia for technical education course: Literature review. Sains Humanika, 10(3), 21-27.

Shanmugam, K., & Balakrishnan, B. (2018). Kerangka Panduan Efektif Pengajaran Dan Pemudahcaraan (PdPc) Sains Menggunakan Information Communication Technology (ICT) di Sekolah Jenis Kebangsaan Tamil (SJK) (TAML). Sains Humanika, 10(1)

Sidek, S., & Hashim, M. (2016). Pengajaran Berasaskan Video dalam Pembelajaran Berpusatkan Pelajar: Analisis dan Kajian Kritikal: Video-Based Teaching in Student-Centered Learning: Analysis and Critical Review. Journal of Information and Communication Technology in Education, 3, 24-33.

Siong, W. W., & Osman, K. (2018). Pembelajaran berasaskan permainan dalam pendidikan STEM dan penguasaan kemahiran abad ke-21. Politeknik & Kolej Komuniti Journal of Social Sciences and Humanities, 3(1), 121-135.

Syahputra, F., & Maksum, H. (2020). The Development of Interactive Multimedia Learning in Information and Communication Technology Subjects. Journal of Education Research and Evaluation, 4(4), 428-434

Van Harling, V. N. (2021). Pengaruh Penggunaan Video Pembelajaran terhadap Kemampuan Berpikir Siswa pada Mata Pelajaran Kimia. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(5), 3332-3338.

Wijnker, W., Bakker, A., van Gog, T., & Drijvers, P. (2019). Educational videos from a film theory perspective: Relating teacher aims to video characteristics. *British Journal of Educational Technology*, *50*(6), 3175-3197.

Zhagan, M., & Hui, T. Z. (2021). Keberkesanan Pemodelan Video Dengan Sokongan Virtual Meningkatkan Kemahiran Mengurus Diri Murid Sindrom Down. *Jurnal Dunia Pendidikan*, *3*(4), 136-149.

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker Jr, J. F. (2006). Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness. *Information & management*, *43*(1), 15-27.