

The Pedagogical Role and Attributes of a Video Clips for Teaching Skills in Electrical Wiring Installation and Maintenance Course



Fatin Syazwani Mohd Zuki, Alias Masek, Abd Rashid Mohamad, Norsuhaidah Mohamad

Abstract- Didactic teaching for electrical wiring installation and maintenance courses is a tricky task as it involves careful work steps as well as adherence to specific safety measures. The existence of errors during the execution of the techniques and procedures will be hazardous and wasting materials. Therefore, this study aimed to explore the role of pedagogy and the usage of video as a teaching aid along with didactic teaching strategy, implemented while teaching electrical wiring installation and maintenance courses in vocational colleges, in Malaysia. This study was done qualitatively by using case study approach by interviewing two experienced teachers from vocational colleges and an officer from State Education Department, Johor, Malaysia. The deductive thematic analysis was used to analyse the pedagogical elements and the use of videos in the practical teaching of electrical wiring installation and maintenance courses. Findings show that there are four main domains of the pedagogical roles of a video clip namely cognitive, experience, affective and skill. Six video attributes were also explored, which are the video content, slow motion, realistic, extreme close up, chronology and interactive footages. As a result, the pedagogical roles and the attributes of a video clips can serve as a guideline to the educators and practitioners for the development of video-assisted materials for teaching skills in the electrical wiring installation and maintenance courses.

Keywords : didactic teaching, attribute, video presentation

I. INTRODUCTION

Malaysia Educational Development Plan (Pelan Pembangunan Pendidikan Malaysia) 2013-2025 points out the importance of Information Technology, and Communication (ICT) in the education system and the teachers must attend courses and training provided to equip themselves with ICT knowledge. The plan was to make sure that the teachers can support the teaching and learning in the classroom using ICT instruments. Apart from that, the plan highlights the development of vocational education institutions in providing highly-skilled human capital for the vocational education transformation. The plan also aims at collaborating with industrial organizations to improve the skills and trust-worthiness in quality assurance.

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The hands-on activity is a complicated task to be executed since it requires detailed steps and continuous focus. The instructors also have to consider the safety requirement during the execution of installation and wiring activities in the classroom. This didactic teaching approach to expose the students with practical experience is a hassle, and thus, some teachers opted to teach the courses using theories and lectures. Currently, there are practical videos that contain information regarding electrical installation and wiring. However, those videos are not suitable for Malaysian context due to the language barrier and the content.

The traditional teaching method that has been utilized is not contributing to the effective feedback from the students since different students possess different arrays of knowledge (Idris, 2005). Teachers might want to try out for different teaching approaches in order to get the students to grasp the knowledge in the classroom. For example, by using videos, live demonstration, teaching aids, and various kinds of teaching materials. The human resource for vocational education sector will be strengthened through various training and service scheme by introducing Technical and Vocational Education and Training (TVET) (Ministry of Education Malaysia, 2012). At this moment, vocational colleges are among institutions that are focused on the development of TVET. Teaching and learning in technical and vocational education involve practical works through various hands-on exercises/activities. Video usage will help the students to see the lesson realistically, and they will have real-life exposure towards the content. Furthermore, videos can enable the students to maximise their senses, such as listening and seeing, in the classroom. The optimisation of senses in the classroom through visual and auditory stimuli will encourage the cognitive of the students to work actively during the learning (Brecht, 2012). The current video attributes should be improved, so it can liaise with practical learning. Hence, this study was done to study the role of pedagogy and video attributes on video usage while performing a didactic teaching approach in electrical installation and wiring courses in vocational colleges.

II. CONCEPTUAL FRAMEWORK

Figure 1.1. shows the conceptual framework that highlights the importance of video usage in learning and the roles of pedagogy and video attributes as a teaching aid in didactic teaching of electrical installation and wiring courses in vocational colleges.

The effective roles of pedagogy and video attributes can stimulate more than one domain and vice versa.



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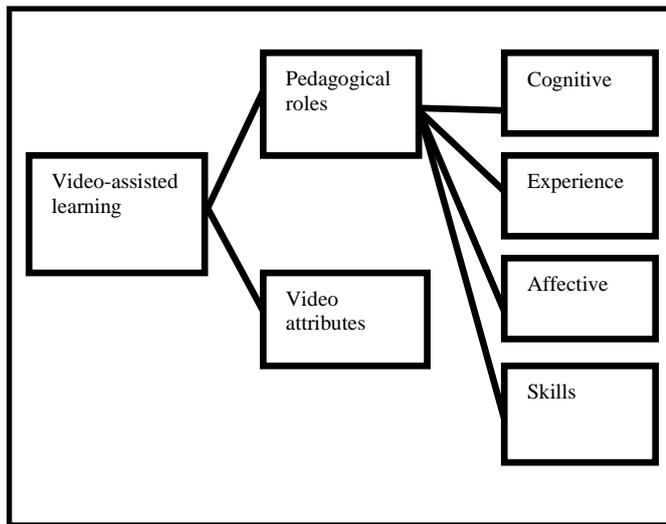


Figure 1.1: Conceptual Framework (Adapted from Kuomi, 2014)

III. METHODOLOGY

A qualitative study was implemented using a case study approach. The data collection was done through semi-structured interviews. The selection of the method used for this study was made through the consideration of aspects related to the teaching and learning process in Electrical Technology program for the first semester student in their first year (code: ETE 1024), which involves practical learning of electrical wiring installation and maintenance in vocational colleges. The qualitative method was chosen since quantitative approach might provide limited perspective for this study. Secondly, to study such limited area of study, the qualitative approach will provide more insights and understanding towards the subjects (Creswell, 2012). Next, a qualitative study will enhance the knowledge of the teaching and learning process and the practices of teachers throughout an electrical installation and wiring course. In addition, this study aimed to study the experience and the perception of the event itself. Lastly, this is a narrative and descriptive study which is supported through the opinions and comments from the participants in this study.

A. Participants

For this study, three participants were interviewed as part of the collection data process, identified as Participant 1 (P1), Participant 2 (P2), and Participant 3 (P3).

Participant 1 (P1) is a lecturer at a vocational college. He possessed a Bachelor's Degree in Electrical Engineering, and he has been teaching Electrical Installation and Wiring subject for 24 years in a few vocational colleges. He is also Vocational Training Officer (VTO) and Skills Department Manager for Vocational Collage. Apart from that, he also gained Malaysian Skills Certification (Level 4). She/he has been adapting technological instruments in his/her classroom, for examples, videos from Youtube, as a teaching aid material. He is highly interested in ICT implementation in teaching and learning.

The second participant, Participant 2 (P2), is also a lecturer in a vocational college and has been teaching Electrical Installation and Wiring subject for almost 21 years. He is also a Vocational Training Officer (VTO) and possessed Malaysian Skills Certification (Level 3). He is responsible as

a Level 1 examiner for practical test papers and as a Head of Electric Workshop at Vocational Collage, Muar. He has a bachelor's degree, specialized in Technical and Vocational Education (Electrical). He always introduces video simulations in his/her class, and thus, he was a perfect participant for this study.

Participant 3 (P3) is an officer at the Technical and Vocational Education Department State Education Department. Previously, he was an officer at Information Technology Department. P3 was in charge to provide ICT training and courses for the teachers around Johore state, while he was still with the IT department. Since currently he is in charge of technical and vocational education, he could provide this study with his/her points of view regarding the usage of videos in teaching and learning within the vocational colleges' environment.

B. Instruments

A face-to-face interview was done to gather the information and responses from the participants (P1, P2, and P3). The face-to-face interview is a suitable instrument for collecting the data for this study since the researcher could get the clearer idea and understanding from the participants, and it is easier when an interview was done face to face between interviewer and participants. The responses can also be visible and sincere through interviewer's eyes, and this will give a better insight for the interviewer, other than giving high validity and reliability for a qualitative study. The interviewer must be aware of the current situation during interviewer and must listen attentively to every word said by the participants. The interview must be recorded and transcribed for the analysis part (Abdul Wahap, 2013).

C. Analysis of data

The data were analysed by using the deductive method, adapted from Kuomi (2015). After that, open coding, selective coding, and axial coding must be performed (Ismail & Mohd Ali, 2011). The collection of data was done through the interview and open-ended questions provided through the interview. The questions were designed to include the aspect of didactic teaching approach in teaching electrical installation and wiring subject, other than the usage of technology in the workshop.

IV. FINDING

The findings found that the use of videos as a teaching material does contribute pedagogical effects to teaching and learning. The videos impact the four domains mentioned previously which are cognitive, experiential, affective, and skills. Under cognitive domain, six themes and four attributes were extracted from the analysis of the interview with the participants which includes illustrating with real example attribute, summarizing video, modelling through step-by-step process attribute, providing images through split-screen attribute, and simulation through a flexible attribute. For experience domain, there are eight theme and two attributes that the researcher managed to extract from the interview. Motions, angles, lighting with a clear attribute, slow motion, person, chronology, material resources with analysis attribute, and compact experiment.

Next, the findings from affective domain provide this study with two themes and six attributes such as motivation with attraction, spirit, and excitement attribute and emotion theme, attached with attitude, confidence, and enjoyment attribute.

There are four themes, and four attributes under skills domain gathered through the findings. The four themes and four attributes are, learning theme with seeking information and collaborative attribute, question theme with observation, and verbal theme with language proficiency attribute. The second research question aimed to explore the video attributes as a teaching aid material used in didactic teaching of electrical installation and wiring subject in vocational colleges. There are six attributes that were collected through the interview with participants. The attributes are the slow-motion, real-life situation, extreme close up, chronology, and transitional footages. The existence of various elements throughout the interview with the experts has contributed to the new ideas and approaches. This study concluded four main domains with twenty themes and sixteen attributes that are related to the roles of educational videos to help the students with the practical part of electrical installation and wiring.

A. Cognitive Domain

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

Through this study, several themes were analysed, and the statements from participants were extracted to understand the cognitive domain for the role of educational videos as a teaching tool for didactic teaching of electrical installation and wiring subject in vocational colleges.

i) Exploring

The three statements in Table 3.1 show that there exists the exploring theme during the screening of the educational videos in the classroom.

Table 3.1: Statements from participants related to exploring the theme

P 1	... not only for classroom use, but they can explore it (the video) even outside the classroom.
	...Diploma students own handphone, so they can explore by themselves (through video).
P 2	...actually, there is no book that can be referred to (about the subject) after the vocational colleges' educational transformation.
P 3	... They can also explore (the video) outside the class time, and not limited to the classroom situation.

is performing simulation theme. The flexible attribute comes together with this theme. The statements that support the attribute can be seen in Table 3.3.

Table 3.3: Statements from participants related to the flexible attribute.

P1	... these teachers need to utilise their talent, so their skills will be improved.
P2	For technical work... we need to show the procedures, too.
P3	...to, help out these students to recall everything clearly, other than exhibiting the steps, shown by the lecturers.

As a conclusion, the cognitive domain has six themes which are exploring, illustrating, summarizing videos, modelling, providing images, and performing simulations, as stated in Figure 3.1.

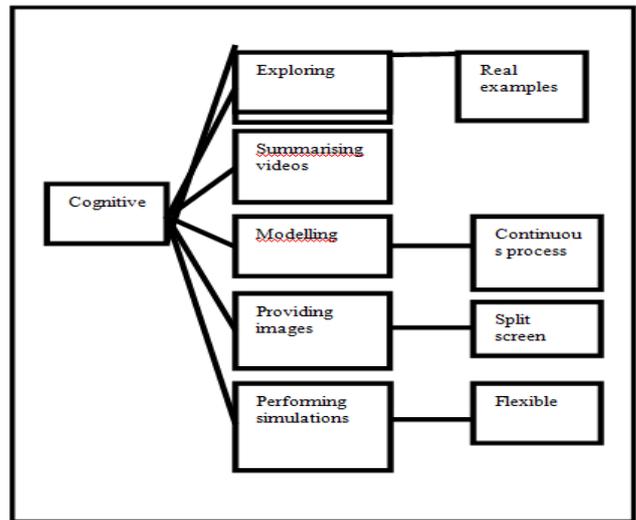


Figure 3.1: Cognitive domain with six themes and four attributes.

B. Experience Domain

There are several examples of theme generation and statements from the participants that are related to the experience domain of using videos as a part of didactic teaching for electrical installation and wiring subject in vocational colleges.

i) Motions

P1 and P2 agreed that motions that are shown in the videos

P 1	They want a live streaming or real practice based on a real situation.
P 2	...during teaching and learning session, the teacher must demonstrate the procedures, other than using the videos with a real person in it.
	... real picture. I mean not in animation or cartoon, and what not or in other words, a real person that is doing them (the steps).
P 3	... after the teacher has finished teaching the theoretical part, the teacher must show the video if it is available for the session.

would help the students to create an experience (see Table 3.4).

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Table 3.4: Statements from participants related to motions.

P1	Yes... from motions and techniques, they can understand and learn, but the delivery is still unclear.
P2	Video presentation because they can directly observe the motion of the motor. The authentic motion of the motor will be viewed as clearer.

ii) Slow Motion

The fourth theme is the slow motion. Statements from Table 3.5 were extracted to discuss this theme.

Table 3.5 : Statements from participants related to slow motion

P1	Slow-motion... it means the starting of the process will be shown first, then the most important part...
P2	... the starting of the steps is shown, then when it comes to the crucial part, it has to be zoomed in with slow motion.
P3secondly, the image inside slow-motion footage is suitable to draw attention to the method presented.

Figure 3.2. concludes the experience domain which has eight themes under that domain.

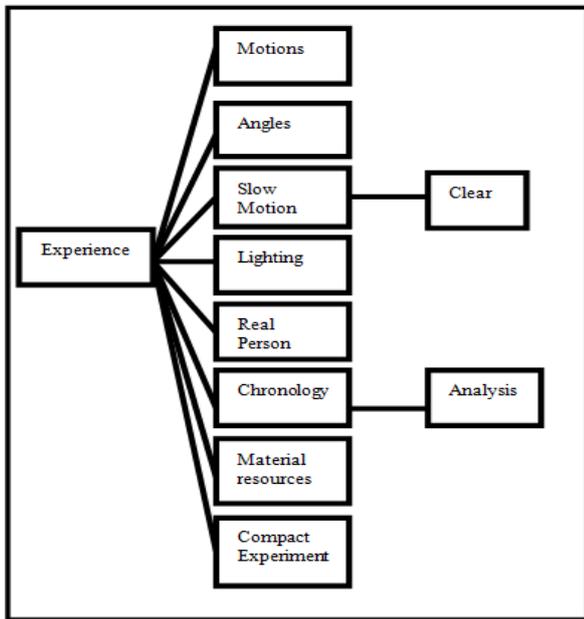


Figure 3.2 : Experience domain's summary

C. Affective Domain

There are several examples of theme generation and statements from the participants that are related to the affective domain of using videos as a part of didactic teaching for electrical installation and wiring subject in vocational colleges.

Motivation (Attractiveness)

The first attribute of a motivation theme is attractiveness. The statements given by Participant 2 and Participant 3 are as shown in Table 3.6.

Table 3.6: statements related to attractiveness

P1	... and (it) motivated and (it) will empower them to think broadly.
P2	...As a teacher, we need to be smart. What I mean is, attract them (the students) to imagine and reflect a situation...
P3	... can draw attention to the methods presented and to some parts...

i) Emotion (Enjoyment)

The third attribute of an emotion theme is enjoyment. The participants' statements are as shown in Table 3.7.

Table 3.7 Statements from participants related to enjoyment

P1	... a new environment will make learning more enjoyable ...
P2	... (by using) a video approach, they will enjoy it more than just the voice of their teacher ...

In conclusion, the affective domain comprises two themes, and each theme comprises three attributes that have been analyzed from the interviews conducted. The themes identified are motivation and emotion. Attributes to motivation themes are attractiveness, enthusiasm and excitement while emotion attributes are attitude, confidence and fun, as shown in Figure 3.3.

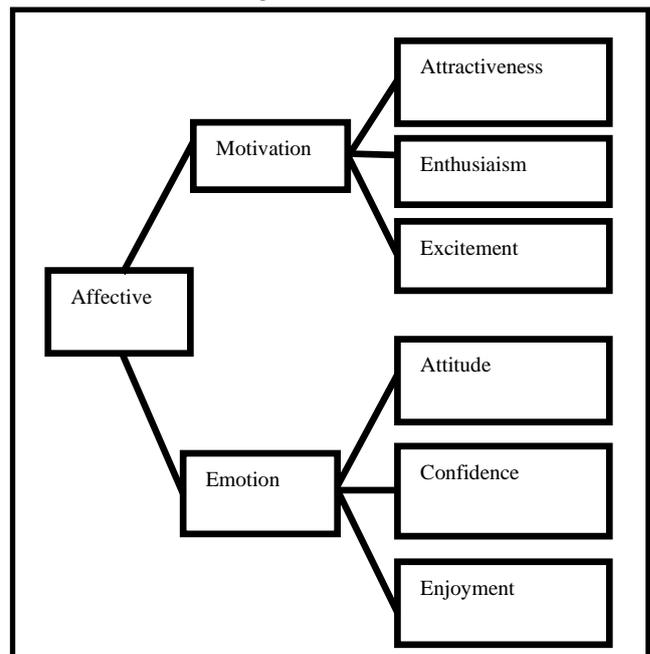


Figure 3.3 : Summary of the Affective Domain

D. Skills Domain

There are several examples of theme generation and statements from the participants that are related to the skills domain of using videos as a part of didactic teaching for electrical installation and wiring subject in vocational colleges.

i) Learning (Information Seeking)

The second theme is learning. In this theme, there are two attributes, namely information seeking and collaborative. The first attribute of this learning theme is information seeking. The participants' statements are as shown in Table 3.8:



Table 3.8: Statements from participants related to seeking information

P1	So, they will think and seek (for the information)
P2	... students will be able to review the methods that were presented to them at the beginning of the learning session.
P3	... it is necessary because, in this new era, our students are exposed to information on social media.

ii) Study (Collaborative)

The second attribute of learning theme is collaborative. The statements of the participants are as shown in Table 3.9.

Table 3.9: Statements from participants related to collaborative

P1	... they did not know that the wiring can be done in various methods, and then we can show the students why a certain situation is necessary ...
P2	... students will be able to review the methods that they have been shown ...
P3	... for example, mistakes are often made during the process. If there is something wrong, then what is the consequence?

To summarize, for the skills domain, there are four themes analysed from the interview conducted, namely manual, learning, questions and verbal. There are four breakdowns of attributes of the created theme, as shown in Figure 3.4.

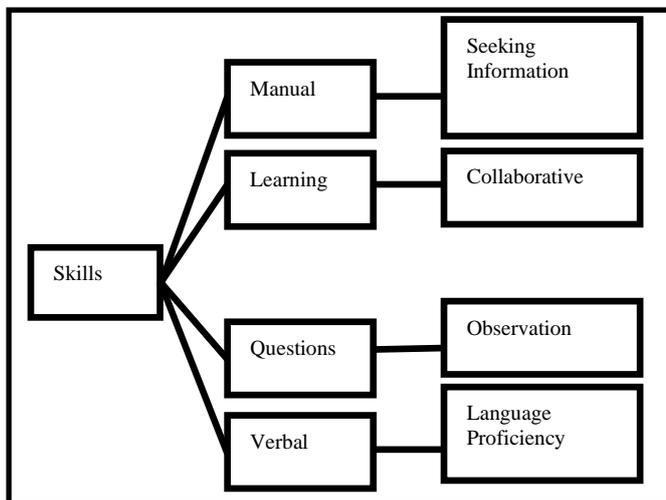


Figure 3.4: Summary of Skills Domai

For the second part of the analysis, the researcher also identified several themes related to video attributes and the researcher identified six themes for the video attributes when using video as a teaching tool for didactic teaching of electrical installation and wiring subject in vocational colleges. The themes are a variety of videos, slow motion, real-life situations, extreme close-ups, chronology and transitional footages.

i) Variation of Videos

The first theme, the variation of the videos, has to do with the video recording. One participant emphasized that the camera needs to be closer or adjustable so that the messages that are

being communicated through the videos can be mastered by the students. The background sound of each step, as mentioned by the two participants shows that the videos are not merely static, but it is comprehensive. The statements the participants are as shown in Table 3.10

Table 3.10: Statements from participants related to videos Variation

P1	If the camera is far away, it is feared that the message it is trying to convey cannot be reached by the students.
P2	Each aspect also needs to have voices narrated each step that is emphasized so that these students know what process is being demonstrated.
P3	... step by step, at a slower pace to make sure these students understand and can fulfil each assignment given ...

ii) Slow Motion

The second theme of video attributes is slow motion. All participants mutually agreed that the videos must slow down the footages when they talk about important steps or procedures. Two participants stated that the videos should be played with normal speed and only need to be slowed down when it comes to the important methods. The participants' statements are as shown in Table 3.11.

Table 3.11: Statements from participants related to slow motion.

P1	Slow-motion means videos need to be played normally until the important parts come in...
P2	... Later, when it (the video) reaches an important point, it needs to be zoomed in slowly.
P3	... both images in slow motion are appropriate because they can draw attention to the method presented ...

iii) Real-Life Situations

The third theme found in the interview session was real-life situations or better known as a real person. This statement was supported by the P2, saying that videos should not be part of cartoon or animation, but must involve the real person who did it. The participants' statements are as shown in Table 3.12.

Table 3.12: Statements from participants related to real people.

P1	... I mean, get their attention by bringing or showing them a reflection of a real situation, for example, purposes.
P2	They want to live streaming or real-life style based on real situations. I mean, it is not in the form of cartoon or animation or in other words, real people are doing it.

iv) Extreme Close Up

Extreme close up is the fourth theme for video presentation attributes. The participants'



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statements are as shown in Table 3.13.

Table 3.13: Statements from participants related to extreme close-ups.

P1	Focus on the techniques currently being shown through the zooming method and so on ...
	... when it reaches an important point, it needs to be zoomed in slowly.
P2	This means that the beginning of the work, use normal speed, but later when it reaches an important point, zoom in slowly.
	... techniques that are being shown through the zooming method is to make sure that the technique shown is clearly visible.
P3	It means compact and only zooms in on certain steps that need to be learned on that day.

v) Chronology

The fifth theme is a chronology. All three participants agreed that chronology is important. Each procedure and steps from the beginning until the end must be followed, and it is important that the video is clearly and successfully received by the students. The statements of the participants are as shown in Table 3.14.

Table 3.14: Statements from participants related to chronology.

P1	... from the beginning, when we start with marking, it should be already focused. Because these students sometimes make mistakes. So, it will lead to another wrong step.
P2	... This work of electricity requires an emphasis on the safety and orderly aspects of each step.
	the beginning of the work is shown later when it reaches an important point...
P3	... use simple terms and demonstrate step by step procedures or instructions...
	Step by step and the final 'outcome' of the video...

vi) Transitional Footages

The sixth and final theme for this video attributes is transitional footages. These transitional footages convey the interactive footage of the video by loading some of the uploaded images to capture the attention and better demonstration of the method to the students. The participants' statements are as shown in Table 3.15.

Table 3.15: Statements from participants related to transitional footages.

P1	The interactive feature plays a role such as split-screen, stop and pause, and videos should not be too long.
P3	When they read, they could not understand. So, learning that emphasizes graphics like pictures (snapshots)...

In conclusion, there are six video attributes found during the interview and analysis, namely slow motion, real-life situations, extreme close up, chronology and transitional footages, as shown in Figure 3.5.

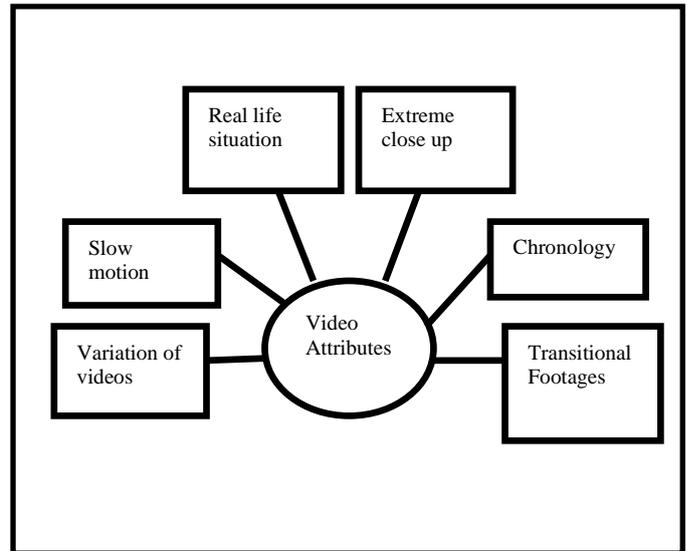


Figure 3.5: Summary of Video Attributes

V. DISCUSSION

The exploration of four main domains that are cognitive, experience, affective, and skills has figured out that the participants of this study directly or indirectly mentioned those domains while answering the questions given by the interviewer. Each statement and theme gathered from the interview session was identified and categorised properly. The roles of educational videos that are narrated throughout this study have been supported by some literature. According to Mason, Cooper, and Wilks (2015), teaching aid materials such as videos are among frameworks that can be beneficial to explore the effectiveness of the instructional strategy and it has been supported by other researchers as a cognitive load theory. The findings related to the cognitive domain extracted six themes which are exploring, illustrating, summarising videos, modelling, providing images, and performing simulations. There are also a few attributes under those themes. For example, illustrating theme with a real-life example, step-by-step process attribute for modelling theme, split-screen attribute under providing images theme, and flexible attribute for performing simulations theme.

The second domain, which is experience domain, relates to the reality of the practices, regardless of a live demonstration or video. This domain includes eight themes which are motions, angles, lighting, slow motion, real person, chronology, material resources, and compact experiment. There are two attributes that are a clear attribute for lighting theme, and analysis attribute from material resources theme. Chen and Xia (2012) mentioned that the use of media would give three advantages to the teaching process which one of them is clear and quality representation, so the students will easily recognize and remember the information throughout the lesson for a long term.

Through the use of technology, multimedia applications can incorporate several processes such as recognition and affective processes to enhance efficiency and enhance the quality of teaching efficiency (Chen & Xia, 2012). The third domain is affective, which consists of two themes, i.e. motivation and emotion.

In terms of motivational themes, there are three attributes, collected from this study which are attractiveness, enthusiasm and excitement, while emotional themes are made up of attributes of attitude, confidence and enjoyment. Other researchers in previous studies also mentioned motivation and emotion theme. Video-assisted learning can also increase motivation, interest, and learning experience, which most teachers found it strength and an added-value in a teaching and learning process (Berk, 2009; Jamalludin & Zaidatun, 2003). Apart from that, other previous studies are less comprehensive than the study conducted by Kuomi (2015) since it combined both motivation and emotion element under the affective domain. For the affective domain, there are six elements that matched the findings of this study. However, some of them might not be relevant to the Malaysian context, such as providing a well-known speaker to impact students' emotional state.

The fourth domain is the skills domain. There are four themes illustrated for this study which manual, learning, questions, and verbal are included. As for the learning theme, there are two attributes which are informative and collaborative. Whereas for the question theme, the attribute is observation and lastly the verbal theme, the attribute is language proficiency. The element of skills is also mentioned in a few previous studies. Md Sahir and Mohd Ayub (2015) stated that mastery of a skill that students need is based on stimulating the use of video that integrates animation, text, pictures and audio. Additionally, the replay of the videos utilizes various existing platforms as technology advances make it becomes possible and easier. Students will learn and gain information easily and quickly. There are four domains that are identified through the findings, together with twenty themes and sixteen attributes that exist for the role of video pedagogy as a teaching tool for didactic teaching of electrical installation and wiring subject.

There are six video attributes gathered throughout the interview. These attributes are slow-motion, real-life situations, extreme close-ups, chronology and transitional footages. The application of the various elements in the interview session can draw on new ideas and approaches. Past studies have also stated that interesting video features can have an impact on learning outcomes. Video features such as play and pause will benefit students compared to other activities (Md Sahir & Mohd Ayub, 2015).

The findings of this study are in line with the statement in Muthusamy's (2016) study that the effectiveness of the learning process depends on several teaching features as well as teaching styles such as clarity, the accuracy of language, questions, encouragement, stimulation, feedback, engagement, assessment and summary. These features are in line with the findings of a study conducted by Kuomi (2014), which states that video attributes comprise twelve elements. However, only six of them were identified by the researcher in this study. Among the elements were not found in this study, but some in previous studies, they existed such as visual metaphors, the construction of specially constructed physical models to show related objects or concepts, as well as different segments, are animated. The findings of this study are appropriate for the electrical installation and electrical wiring subject in Malaysian vocational colleges context and cultures. A study conducted by Albó, Hernández-Leo, Barceló, and Sanabria (2015) identified some key elements of video such as visual variation, real-life situations, chronology and transitional footages. All four

attributes have been found and existed in the exploration of this study. This finding supports the idea of video development to assist in the didactic teaching process for electrical installation and wiring subject.

VI. CONCLUSION

In conclusion, the findings from both research questions were finally achieved through the interview conducted with the participants. For both research questions, the researcher applied thematic analysis to analysis the data. The first research question is concerned about the roles of educational videos as a teaching aid in didactic teaching of electrical installation and wiring subject in vocational colleges. This educational videos will encourage the students to be aware of the real-life practices of the subject and enhance the learning into an interesting and fun classroom experience. Furthermore, a video is a medium that could be spread without boundaries over the internet. Hence, students can go home and have the videos with them through WhatsApp or Telegram, so they can observe the lesson and practices related to their subject repeatedly. Eventually, they will grasp the references in the videos which will help to acquire the knowledge for the subject effectively and with confidence. In addition, the video should also be shorter and compact with attractive and appropriate content. Based on the findings, the researcher concluded that the use of video would stimulate students' cognitive, experience, affective and skills. There are four domains, twenty themes and sixteen attributes of the role of educational videos as a teaching tool for didactic teaching of electrical installation and wiring subject, discussed previously. Next, the second research question tried to explore the video attributes as a teaching aid for didactic teaching of electrical installation and wiring subject in vocational colleges. There are six attributes of video found during through the analysis of this study which includes variety of montage, slow motion, real-life situation, extreme close-ups, chronology and transitional footages.

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