JOURNAL OF CREATIVE INDUSTRY AND SUSTAINABLE CULTURE

https://e-journal.uum.edu.my/index.php/jcisc

How to cite this article:
Othman, H. S., Zaibon, S. B. (2024). Formulating The Evaluation Model of Educational Music Video for Children's Learning (EMV4CL). *Journal of Creative Industry and Sustainable Culture,* 3 (6), 77-100. https://doi.org/10.32890/jcisc2024.3.6

FORMULATING THE EVALUATION MODEL OF EDUCATIONAL MUSIC VIDEO FOR CHILDREN'S LEARNING (EMV4CL)

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Received: 31/8/2024 Revised: 15/10/2024 Accepted: 22/10/2024 Published: 31/10/2024

ABSTRACT

This study, part of a Ph.D. thesis, explores the role of Educational Music Videos (EMVs) in enhancing children's learning within the framework of Video-Based Learning (VBL). EMVs, which adapt the traditional music video format by embedding educational content through singing narration, offer a novel approach to creating engaging and enjoyable learning experiences for young learners, particularly those aged 7-12 years old. However, the educational potential of EMVs has not been fully realized due to the absence of specific guidelines for evaluating their appropriateness for children's learning. To address this gap, the study develops the Evaluation Model of Educational Music Videos for Children's Learning (EMV4CL). Grounded in a Design Research methodology, the study follows a systematic approach involving iterative development and expert validation to ensure the robustness of the model. As a result, five critical components necessary for the effective evaluation of EMVs were identified: 1) video content, 2) audio-visual learning concepts, 3) video presentation style, 4) edutainment features and, 5) interactive activities. Each component was meticulously designed to capture the unique characteristics that make EMVs suitable for educational purposes. The EMV4CL model was subsequently validated by 11 academic experts, who unanimously endorsed its relevance and applicability in assessing the educational quality of music videos for children. The findings of this study highlight the EMV4CL as a significant contribution to the field, providing a structured and comprehensive tool that educators and developers can use to produce and evaluate high-quality educational music videos. The study's findings also have practical implications for educational content creators, helping them align EMVs with pedagogical goals and children's learning needs. This research advances the understanding of how music videos can be effectively utilized to support and enhance children's learning.

Keywords: Educational music video, Video-based learning, Evaluation Model, Edutainment, Children's Learning

INTRODUCTION

In the ever-evolving landscape of education, the integration of multimedia into teaching practices has become increasingly prominent, offering new avenues to enhance student engagement and learning outcomes. Among the various forms of multimedia, video-based learning (VBL) has emerged as a particularly effective tool for delivering educational content. VBL leverages the power of visual and auditory stimuli to create immersive learning experiences that can cater to diverse learning styles (Kay, 2012; Brame, 2016). Recent advances in educational technology have further solidified the role of video as a versatile medium, not only in higher education but also in primary and secondary education, where it has proven particularly effective for younger learners (Asad et al., 2021).

Educational Music Video (EMV), a specific subset of VBL, have garnered attention for their potential to engage children by combining music, narration, and educational content. Unlike traditional music videos, which are primarily designed for entertainment, EMV are crafted with pedagogical objectives, aiming to enhance children's cognitive and emotional engagement with the learning material (Koumi, 2006; Santos, Cook, & Al-Samarraie, 2022). Despite the growing interest in Educational Music Videos (EMVs) as tools to engage young learners, the educational potential of these videos has not been fully realized. This is largely due to the absence of structured guidelines for evaluating their effectiveness in children's learning contexts, as previous studies have primarily focused on the entertainment value of these videos rather than their pedagogical utility (Koumi, 2006; Greenberg & Zanetis, 2012). Without clear evaluation frameworks, educators and content creators face challenges in aligning EMVs with educational outcomes, which limits their application in formal learning environments (Santos, Cook, & Al-Samarraie, 2022). The development of the Evaluation Model of Educational Music Video for Children’s Learning (EMV4CL) addresses this critical gap. This model provides a comprehensive framework for assessing the quality and appropriateness of EMV, ensuring that they meet the educational needs of young learners. The EMV4CL identifies five key components—video content, audio-visual learning concepts, video presentation style, edutainment features, and interactive activities—that are essential for the effective evaluation and utilization of EMVs in educational settings.

This study is grounded in Design Research methodology, which emphasizes iterative development and validation of educational tools and models. The EMV4CL was rigorously tested and validated by 11 academic experts, who affirmed its relevance and applicability in various educational contexts. The model's validation underscores its potential as a valuable tool for educators and developers, guiding the creation and selection of high-quality EMVs that can significantly enhance children's learning experiences. As the educational landscape continues to evolve, the integration of EMV and other multimedia tools will likely play an increasingly important role in shaping the future of education. This research contributes to the growing body of knowledge on the use of video in education, offering new insights into how EMV can be effectively utilized to support and enrich children's learning.

LITERATURE REVIEW

Video-based Learning

Video-Based Learning (VBL) has become a cornerstone of modern education, revolutionizing the way content is delivered and consumed by students across various educational levels. The efficacy of VBL lies in its ability to combine visual and auditory elements to create engaging, interactive, and dynamic learning experiences that cater to a wide range of learning styles. Unlike traditional text-based instruction, VBL allows for the visualization of complex concepts, making abstract ideas more accessible and easier to comprehend (Brame, 2016; Mayer et al., 2020). The use of video in education has evolved significantly over the past few decades, transitioning from passive viewing experiences to more interactive and engaging formats. Early implementations of VBL often involved simply recording lectures or demonstrations, but advancements in technology have led to the development of more sophisticated tools that integrate multimedia elements, such as animations, simulations, and interactive assessments (Sablić, Mirosavljević, & Škugor, 2021; Kleftodimos, Lappas, & Evangelidis, 2023). These advancements have been instrumental in increasing student engagement, improving retention, and enhancing the overall learning experience.

However, the literature has yet to address the specific challenges in evaluating VBL, particularly when it is tailored for children. Numerous studies have documented the positive impact of VBL on student learning outcomes. For instance, video-based content has been shown to improve students' understanding of complex subjects, enhance motivation, and support self-paced learning (Panjaitan et al., 2023; Galatsopoulou et al., 2022). Furthermore, VBL is particularly effective in fostering deep learning, as it encourages students to engage with content more critically and thoughtfully, often allowing them to revisit and review material as needed (Hsu, Lin, Yeh, & Chen, 2022). The application of VBL in children's education has received considerable attention, particularly due to its potential to make learning more enjoyable and effective. Educational videos designed for children often incorporate elements of storytelling, animation, and music to captivate young learners' attention and enhance their understanding (Koumi, 2006; Santos, Kim, & Li, 2021). The use of EMV, which blend educational content with music and singing, is a prime example of how VBL can be tailored to meet the specific needs of children's learning. Studies have shown that educational videos can significantly improve learner's retention of information and foster a positive attitude towards learning (Greenberg & Zanetis, 2012; Coyne et al., 2018).

But, there is limited research on structured evaluation models for such content in children's learning environments. The lack of standardized guidelines for evaluating the educational quality of VBL, especially for younger audiences, underscores the need for more focused research on this topic. One of the primary concerns is ensuring that video content is pedagogically sound and aligned with learning objectives. Moreover, the effectiveness of VBL can be influenced by factors such as video length, content relevance, and the degree of interactivity provided (Beheshti et al., 2018). Another challenge is the digital divide, where unequal access to technology and the internet can limit the benefits of VBL for some students, particularly those in underserved communities (Lan & Hew, 2020). Within the broader scope of VBL, EMV represents a specialized approach that leverages the motivational power of music to enhance learning. EMV are particularly effective for younger audiences, as they use rhythmic and melodic elements to reinforce educational content. Besides, the music elements instilled in the educational videos are seen to improve memory retention, facilitate language acquisition, and support the development of social and emotional skills (Khaghaninejad & Fahandejsaadi, 2016; Mclntire, 2020). However, the absence of standardized evaluation criteria for EMV poses a significant challenge, making it difficult for educators to assess their appropriateness and effectiveness in children's learning contexts. This gap in the literature underscores the need for comprehensive evaluation models, such as the Evaluation Model of Educational

Music Videos for Children's Learning (EMV4CL), which is developed in this study to address these challenges.

Educational Music Video

Educational Music Video (EMV) represent a specialized form of video-based learning that merges the educational potential of multimedia with the engaging qualities of music. EMV adapt the concept of traditional music videos by incorporating educational content delivered through singing narration, which can significantly increase engagement and retention among children (Koumi, 2006; Fallin, Tower, & Tannert, 2021). Recent research has highlighted the effectiveness of EMVs in capturing children's attention and making learning more enjoyable. For instance, EMVs utilize the inherent appeal of music to create memorable and interactive learning experiences. This is especially beneficial for young learners, as music has been shown to enhance cognitive development and emotional engagement. Bokiev et al. (2021) emphasizes that integrating music with educational content can improve memory retention and foster a positive learning environment. Additionally, de la Mora Velasco, Hirumi, and Chen (2021) found that children exposed to educational videos with musical elements demonstrated higher levels of motivation and better comprehension of complex concepts compared to traditional video formats.

The integration of music in educational content is not just about increasing engagement but also about enhancing pedagogical effectiveness. Music in EMV can support various learning styles and cognitive processes, such as pattern recognition and auditory processing, which are crucial for young children's development (Young, 2018). For example, Sullivan (2016) reported that music-based educational interventions could facilitate language acquisition and support the development of social skills by providing contextually rich and interactive content.

Despite the promising benefits of EMV, challenges remain in ensuring that these videos meet educational standards and effectively address learning objectives. There is a need for well-defined evaluation criteria to assess the quality and educational value of EMVs. Papadakis (2021) highlight that without standardized evaluation tools, it is difficult for educators and developers to gauge the appropriateness and effectiveness of learning tool such as EMV for specific educational goals. Therefore, the development of structured evaluation model is crucial in addressing this gap and providing a systematic approach to assessing the impact of EMVs on children's learning outcomes.

Edutainment

Edutainment is a term that combines "education" and "entertainment" to describe media designed to educate while simultaneously engaging and entertaining its audience. The concept of edutainment is rooted in the idea that learning can be more effective when it is enjoyable and interactive (Allen, 2016). This approach leverages elements of entertainment, such as storytelling, games, and multimedia content, to make educational experiences more appealing and impactful. Edutainment can be categorized into several types based on its content and delivery methods. Basically, edutainment can be divided into three primary categories: educational games, interactive simulations, and multimedia presentations. Educational games use game mechanics and narratives to teach concepts, interactive simulations allow users to explore and experiment within a virtual environment, and multimedia presentations integrate various forms of media, including video, audio, and animation, to present educational content in an engaging manner. Each category offers unique advantages in enhancing the learning experience by making content more relatable and memorable.

The advantages of edutainment in audio-visual (AV) learning media are significant. Edutainment can enhance motivation and engagement, as it makes learning experiences more enjoyable and less monotonous. Lampropoulos, Anastasiadis, Siakas, and In (2019) argue that integrating entertainment elements into educational content can improve students' focus and retention, as they are more likely to be absorbed in content that is entertaining and interactive. Additionally, edutainment can facilitate a deeper understanding of complex concepts by presenting information in a more accessible and engaging format (Makarius, 2017).

Characteristics of edutainment applications include interactivity, multimedia integration, and the use of engaging narratives. Rigby and Ryan (2016) emphasize that effective edutainment applications incorporate interactive elements that allow users to actively participate in the learning process, rather than passively consuming content. These applications often use multimedia elements, such as animations and sound effects, to create a dynamic and immersive learning environment. Engaging narratives and gamified elements are also crucial, as they help to maintain users' interest and encourage sustained engagement (de la Mora Velasco, Hirumi, & Chen, 2021).

In summary, edutainment represents a powerful approach to enhancing educational experiences through the integration of entertainment and interactive elements. By leveraging the strengths of AV media and engaging content, edutainment can make learning more effective and enjoyable.

Learning Theories

Cognitive Theory of Multimedia Learning (CTML) provides a foundation for designing educational materials by focusing on how students process multimedia content. According to Mayer (2005b), multimedia learning involves constructing mental models from well-designed combinations of text, graphics, animation, audio, and video. This approach aims to optimize cognitive load and enhance learning by integrating elements from Paivio's Dual Coding Theory and Sweller's Cognitive Load Theory, along with extensions from Baddeley's Model of Working Memory (Mayer, 2004). CTML emphasizes the importance of effective instructional design to support mental processing, making it highly relevant for creating EMV that combine multimedia elements to improve learning outcomes.

Behaviorism, which has evolved since the late 19th century, focuses on observable behaviors and the ways they can be modified through stimuli and responses. Key figures such as Watson, Bandura, Skinner, and Pavlov contributed to this paradigm, with Skinner's development of the teaching machine in 1958 marking a significant advancement in educational technology (Kang, 2004; Overskeid, 2008). Skinner's teaching machine, which introduced programmed instruction, parallels modern educational technologies like interactive software. In the context of EMV, behaviorism's principles of reinforcement and practice are applied through interactive elements such as questions that help reinforce learning, similar to how Skinner's teaching machine facilitated learning through programmed instruction (Ertmer & Newby, 2013; Zaibon, 2011).

Cognitivism, emerging in the 1960s, emphasizes internal mental processes and their role in learning. It focuses on how individuals process, store, and retrieve information, stressing the significance of mental activities like memorization and reasoning (Walling, 2014; Duke, Harper, & Johnston, 2013). Cognitivism supports the development of educational programs by considering how prior knowledge aids in understanding new information (Pugsley, 2011). In Video-Based Learning (VBL), cognitivist principles such as coherence and attention guiding are crucial for designing effective instructional videos (Shim, Gottipati, & Lau, 2021). These principles ensure that educational content, including EMVs, supports the creation of robust mental models and enhances learning experiences.

Integrating these theories—CTML, Behaviorism, and Cognitivism—provides a comprehensive framework for designing and evaluating educational media. By applying these theoretical perspectives, EMVs can be optimized to support effective and engaging learning experiences for children.

Motivation Theories

Arousal Theory plays a crucial role in motivating students to engage with EMV as a supplementary learning tool. This theory posits that individuals are driven to perform actions that help them maintain an optimal level of physiological arousal, which varies from person to person. Seels, Fullerton, Berry, and Horn (2004) define arousal theory as the idea that communication messages can elicit varying levels of generalized emotional arousal, impacting the actions taken during this arousal state. Optimal arousal is essential for task performance, as both too much and too little arousal can lead to decreased performance (Yerkes & Dodson, 1908). Mitchell (1982) further elaborates that arousal theory addresses individual differences, acknowledges the impact of social expectations, and emphasizes the importance of current information. Additionally, arousal is significant for judgments, processing, and memory, particularly when considering the personal relevance and urgency of events (Storbeck & Clore, 2008). The connection between memory and music, as highlighted by Carr and Rickard (2011), underscores the relevance of arousal theory in the context of EMV content. Moreover, Husain, Thompson, and Schellenberg (2002) discuss the concept of "enjoyment-arousal," suggesting that music that is liked or preferred can increase arousal and foster positive attitudes, which indirectly enhance cognitive performance. Emotional arousal in response to music, therefore, acts as a memory modulator, making arousal theory particularly pertinent for this study.

Complementing the arousal theory is Keller's ARCS Model, introduced by Keller (1987), which focuses on motivating learners through instructional design. The ARCS model consists of four primary components—attention, relevance, confidence, and satisfaction—all derived from expectancy-value theory (Keller, 1999; Molaee & Dortaj, 2015). This model has been extensively applied in educational settings, particularly in video-based learning (Deng, Shao, Tang, & Qin, 2014; Gonen & Akbarov, 2016; Ma & Lee, 2021; Wahyudi, Joyoatmojo, & Sawiji, 2017). Although this study does not involve the creation of EMV content from scratch, the ARCS model's focus on motivation provides valuable guidelines for evaluating the suitability of EMVs for children's learning. By emphasizing attention, relevance, confidence, and satisfaction, the ARCS model ensures that EMV content not only engages young learners but also supports their learning outcomes effectively.

Learning Approaches

Active learning is a pedagogical approach that engages students actively in the learning process through activities such as problem-solving, role-playing, and paired discussions (Center for Education Innovation, 2019). This approach aligns with Bonwell and Eison's (1991) definition, which emphasizes student involvement in both doing and thinking, facilitated by instructional strategies that encourage active participation (Bonwell, 1999). Through active engagement, students can effectively gain knowledge, skills, and attitudes (Auster & Wylie, 2006; Sivan, Wong Leung, Woon, & Kember, 2000). Basic elements like talking, listening, reading, writing, and reacting are integral to active learning and can be incorporated into the learning material to enrich students' knowledge and enhance their learning experience (Freeman et al., 2014; Sivan et al., 2000). Activities such as informal discussions, problem-solving exercises, class games, simulations, role-playing, and reactions to educational videos are particularly effective in fostering active learning and are suitable for various settings, including classrooms, laboratories, and outdoor environments (Auster & Wylie, 2006). Although active learning is more commonly applied at higher educational levels (Martyn, 2007; Meng & Feng, 2019; Miller & Metz, 2014; Tendhar, Singh, & Jones, 2019), Aziz (2015) argues that it is also applicable at the primary school level, especially when multimedia elements are appropriately utilized. In this study, the integration of EMVs aims to engage children in enjoyable learning sessions, thereby fostering an active learning environment.

Self-paced learning has become increasingly prominent with the rise of e-learning environments, allowing students to learn at their own pace, anytime and anywhere, beyond the constraints of traditional classroom settings (Boyer, Edmondson, Artis, & Fleming, 2014). This approach enables students to formulate their learning goals, select appropriate resources, utilize learning strategies, and evaluate their learning outcomes independently (Cho, Cheng, & Lai, 2009). Knowles (1975), as cited by Srithar (2015), emphasized a similar concept known as self-directed learning, which is characterized by an individual-initiated process that may involve identifying learning needs, establishing goals, seeking resources, implementing strategies, and assessing outcomes (Boyer et al., 2014). In the context of multimedia learning, self-paced learning involves the use of various educational content delivery techniques, such as interactive instructional videos and other multimedia elements like animations, which enhance students' knowledge acquisition (Gureckis & Markant, 2012; Srithar, 2015; Zhang et al., 2006; Kühl, Eitel, Damnik, & Körndle, 2014). Although self-paced learning is often studied in the context of teenagers and adults (Zhang et al., 2006; Ziv & Lidor, 2015), it is also applicable to children's learning as long as the strategies are tailored to their needs (Dignath, Buettner, & Langfeldt, 2008; Srithar, 2015). In this study, EMVs leverage multimedia elements to support children's self-paced learning, enabling them to explore and understand content independently.

Visual, Auditory, Kinaesthetic (VAK) learning styles cater to different learning preferences, focusing on visual (sight), auditory (sound), and kinaesthetic (movement) modalities. This approach is particularly relevant to this study, which aims to assess the appropriateness of EMV content for children's learning. VAK learning is akin to multisensory learning but is specifically focused on these three sensory modalities (Çetin, 2009). Litta and Budiarty (2020) emphasize that VAK learning can help students learn more quickly and effortlessly by engaging multiple senses, thereby optimizing their learning performance. Similarly, Bakri, Rahman, Jabu, and Jassruddin (2019) highlight the benefits of VAK learning in improving skills such as speaking, particularly in language learning contexts. Additionally, Noor, Aini, and Hamizan (2014) note the effectiveness of video-based learning that incorporates cognitive load theory, suggesting that teachers should consider such videos when selecting or developing learning materials. In this study, the VAK approach is particularly suitable for evaluating the appropriateness of EMV content for children's learning, as it accommodates various learning styles, ensuring that the content is accessible and engaging for all learners.

The combination of active learning, self-paced learning, and visual, auditory, kinaesthetic (VAK) learning provides a well-rounded approach to enhancing children's learning through EMV. Active Learning engages students by involving them in hands-on activities that help them understand and remember the material better. Self-Paced Learning allows students to learn at their own speed, making the process more personalized and independent. VAK Learning ensures that the content is accessible to all types of learners by addressing different sensory preferences. Together, these approaches create a more engaging, flexible, and effective learning experience for young children, making learning both enjoyable and impactful.

METHODOLOGY

Design research was implemented in this study which focuses on creating practical solutions for real-world problems in various disciplines. Hevner, March, Park, and Ram (2004) highlight that its main goal is to generate knowledge that can be used to build and apply designed artifacts. This approach is particularly relevant for this study, which aims to develop the Evaluation Model of EMV4CL. Besides, March and Smith (1995) identify five key outcomes of design research: constructs, methods, models, instantiations, and theories. Geerts (2011); Hevner and Chatterjee (2010) stress that the artifacts should solve the main problem effectively and address unsolved issues innovatively. This study follows the design science research methodology by Vaishnavi and Kuechler (2007), which is widely accepted for developing complete artifacts like methods, prototypes, or models (Purao, 2002). The methodology includes five phases: (i) identifying the problem, (ii) proposing a solution, (iii) developing the model, (iv) evaluating it, and (v) drawing conclusions. This structured approach ensures that the research is thorough and that the resulting artifact effectively addresses the problem while contributing new insights to the field. Besides, a total of 11 experts were consulted during the model validation phase. These experts, who came from diverse fields such as education, multimedia design, and instructional technology, provided valuable insights that helped refine the model.

Phases of Design Science Research Methodology

Phase 1: Awareness of Problem

Gathering relevant literature is crucial to understanding the core concepts of edutainment and VBL. These sources include academic journals, conference proceedings, books, dissertations, online newspapers, and websites. A thorough and extensive search was conducted to ensure that only the most relevant articles, aligned with the study’s theme and objectives, were selected (Abdul Mutalib, 2009). Then, the literature review involved collecting, analyzing, and synthesizing existing studies. A comprehensive selection process was carried out using online tools like Google Scholar, ResearchGate, and Mendeley to gather articles related to the research problem. Key search terms included "video-based learning," "children’s learning," "educational video guidelines," and "music in learning," among others. The search was limited to publications between 2013 and 2019. Sixteen studies were identified as highly relevant and were used as primary references for extracting components of the Evaluation Model of EMV4CL. However, two studies, despite being outside the specified publication years, were included due to their significant insights into music's role in learning.

To deepen the literature study, a critique and review process was undertaken to propose the Evaluation Model of EMV4CL. Several researchers emphasize the importance of analyzing and comparing features to identify research gaps and classify key components (Abdul Mutalib, 2009; Ahmad, 2017; Zaibon, 2011). Besides VBL studies, the analysis also included music in learning, offering valuable insights into the critical role of audio elements in children’s learning.

Phase 2: Proposed Solution

Content analysis involves extracting relevant information from various sources, such as audio, video, and text (Preece, Sharp, & Rogers, 2015). For this study, it aimed to identify components and elements needed for the Evaluation Model of EMV4CL by analyzing pre-selected studies. This included extracting general components and specific elements from educational video design guidelines. Comparative analysis reviews and contrasts different models or frameworks to aid in proposing the Evaluation Model of EMV4CL. This involves a systematic examination of components and elements to build a conceptual model (Abdul

Mutalib, 2009). Data analysis software (ATLAS.ti) was used to identify and tabulate components from 16 selected studies. These were sorted based on their frequency of citation in the literature. Further analysis ensured the suitability of these components for integration into the proposed model. The outcome of this phase was a detailed list of components, elements, and principles for the Evaluation Model of EMV4CL.

Phase 3: Model Development

The development of the Evaluation Model of EMV4CL is a key aspect of this study, leading to its primary contributions. The main components of the proposed model were defined by extracting key concepts from the 'learning while entertaining' characteristic of edutainment. Relevant factors were identified as evaluation criteria for EMV4CL. Similar factors were merged and renamed to form the main components of the model. For instance, 'Goal' and 'Learning Goal' were combined into the main component 'Content'. Detailed categorization is shown in Table 1.

Table 1

Extraction of Edutainment Characteristics into Main Components

No	Factors	Main Component
1.	*Appropriate presentation:* Refers to how video content is presented to the viewer in terms of content relevancy	Video Presentation Style
2.	*Sense of enjoyment:* Refers to the action or condition of getting pleasure or satisfaction while watching the video. Feelings of enjoyment can be seen in facial expressions and physical movements.	Edutainment Feature
3.	*Entertainment:* Video content must have entertainment features that can be adapted for learning purposes. This feature should attract the attention and interest of viewers or gives pleasure and joy.	Edutainment Feature
4.	*User engagement:* The interaction between viewer and video content or refers to how the viewer reacts when dealing with video learning. The more engaged viewers are, the more it shows how effective the video content was created.	Activity
5.	*Learning goal:* The video must have a specific learning goal so the viewer can understand the entire content more effectively.	Video Content
6.	*Association through pleasure:* Children must associate learning with positive memories. This linkage helps the children remember the concepts.	Activity
7.	*Attraction:* Refers to the ability of video content to attract viewers to continue watching the whole video.	Edutainment Feature
8.	*Sensory stimuli:* It refers to the ability of video creators to enrich the learning activities in video content to make the learning process more enjoyable and memorable to the viewer.	Activity
9.	*Feedback:* The video should be able to provide clear directions for the viewer to avoid confusion in clarifying the purpose. The viewer must understand the reason for selecting the video in the first place so they can achieve the learning goal ultimately.	Video Content
10.	*Interface:* Refers to the whole content of the video being presented to the viewer right from the beginning until the end of the video.	Video Presentation Style
11.	*Content:* Refers to how content is presented in the video, including the use of multimedia elements.	Video Content
12.	*Multimedia elements:* Refers to the implementation of five multimedia elements such as video, audio, text, graphics, and animation in the EMV.	Video Presentation Style
13.	*Learning Theories:* The EMV should applied related learning theories in its content to enrich the learning process and knowledge absorption for children.	Audio-Visual Learning Concept

To ensure the relevance of these components and elements, a comparative analysis of 16 selected studies was performed. After analyzing the raw results from the comparative studies for each sub-component, the next step is to organize these results into the main components of the Evaluation Model of EMV4CL. This helps in simplifying the arrangement of the proposed model. To ensure the relevance of the main and sub-components, this study follows indicators from Abdul Mutalib (2009), Aziz (2015), and Ahmad (2017). Table 2 lists and describes these indicators.

Table 2

Indicator for Categories of Components

Indicator	Description	Condition of Classification
AM	All Models	All models apply the component (100%)
MM	Majority models	There are between 9 to 18 models that apply the component (50% - 99%)
FM	Few models	There are between 1 to 8 models that apply the component (1% - 49%)
NM	No models	No model applies the component (0%)
■	Compulsory to apply	The component is compulsory to be applied when **AM** or **MM** appear in the row
□	Recommended to apply	The component is recommended to be applied when **FM** or **NM** appear in the row

Phase 4: Evaluation

The evaluation phase is crucial for ensuring that the proposed model is effective and suitable for its intended users. Previous studies have used various methods for evaluating and validating research outcomes (Abdul Mutalib, 2009; Sarif, 2011; Zaibon, 2011). It is important to choose evaluation methods that align with the research goals. In this study, the proposed model was validated by 11 academics from both local and international institutions, each with at least five years of experience in computer science and multimedia. They reviewed the model's components, terminology, and the logical flow of its elements to ensure clarity and understanding. Due to COVID-19, interactions with experts were conducted online via email and phone, with face-to-face meetings held only when necessary.

Phase 5: Conclusion

In the final phase, the researcher detailed and documented all findings from the previous phases. This involved revisiting and addressing all research questions and objectives. The outcome of this phase includes the completion of the full thesis and publications, contributing to the body of knowledge.

FINDINGS AND DISCUSSION

The Findings of Expert Review

Table 4 tabulates the data gathered in the reviewing process from the experts (the experts listed in Table 3). Meanwhile, the frequencies of responses for questions one to six were plotted in clustered column chart in showing a clear representation which illustrated in Figure 1, Figure 2, Figure 3, Figure 4 and Figure 5.

Table 3

The List of Experts with Demographic Profile

Expert	Gender	Education	Field of Expertise	Year of Experience	Affiliation
A	F	PhD	Instructional Technology and Educational Technology	14	Universiti Pendidikan Sultan Idris (UPSI)
B	F	PhD	Multimedia Education	5	Universiti Pendidikan Sultan Idris (UPSI)
C	F	PhD	Educational Technology	8	Universiti Sains Malaysia (USM)
D	M	PhD	Multimedia	25	Universiti Malaya (UM)
E	M	PhD	Educational Technology	12	Universiti Teknologi Malaysia (UTM)
F	F	PhD	Educational Technology, Instructional Technology, and Visual Communication (Graphic Design)	5	Universiti Pendidikan Sultan Idris (UPSI)
G	F	PhD	Visual Design and Multimedia Studies	5	Universiti Malaya (UM)
H	M	PhD	Instructional Technology and Mobile Learning	10	Universiti Sains Malaysia (USM)
I	F	PhD	Instructional Technology, Behavioral Studies, and Human and Computer Interaction	18	Universiti Sains Malaysia (USM)
J	F	PhD	Information Management, Knowledge Management, and Research Method (Children)	21	Universiti Teknologi Mara (UiTM)
K	M	PhD	Instructional Design	40	University of Twente, Netherlands.

Table 4

Frequencies of Responses from the Experts Reviewer

	Items		Frequency (n=11)		
Q1	The proposed components and sub-components in the following section are relevant		Some are definitely not relevant	Some may be not relevant	All are relevant
	Video Content	Content Structure	0	2	9
		Content Composition	0	3	8
	Video Presentation Style	Music Criteria	0	2	9
		Video Criteria	0	2	9
		Visual Criteria	0	1	10
	Audio-Visual Learning Concept	Learning Theory	1	3	7
		Motivation Theories	0	3	8
		Learning Approach	0	4	7
	Edutainment Feature	Emotional Attraction	0	1	10
	Activity	Interaction Opportunities	0	3	8
Q2	The proposed *Video Content* elements and sub-elements for Evaluation Model of EMV4CL in the following section are understood		Need very detail explanation	Need some explanation	Need no explanation
	Content Structure	Opening	1	6	4
		Learning Content	5	3	3
		Closing	1	5	5
		Call to Action	2	6	3
	Content Composition	Video Pedagogical Strategies	0	7	4
		Learning Strategies	2	4	5
Q3	The proposed *Video Presentation Style* elements and principles for Evaluation Model of EMV4CL in the following section are understood		Need very detail explanation	Need some explanation	Need no explanation
	Music Criteria	Song Selection	1	4	6
		Pace and Sequence	0	2	9
		Theme and Concept	0	2	9
		Sound Recording	0	2	9
	Video Criteria	Content Presentation	0	6	5
		Duration and Pace	0	2	9
		Video Recording	0	4	7
	Visual Criteria	Colour	0	5	6
		Typography	0	5	6
		Graphic	0	5	6
Q4	The proposed elements in the following sub-component for EMV4CL are understood		Need very detail explanation	Need some explanation	Need no explanation
	Emotional Attraction	Musical Interest	2	1	8
		Speech Element	1	1	9
		Character Representation	0	2	9

	Interaction Opportunities	Social Interactivity	0	3	8
		Interactive Questioning	0	1	10
		Expand Learning Space	2	0	9
				Yes	**No**
Q5	The term use is easy to understand			10	1
Q6	The relationship and flows of all main components and sub-component are logical			10	1
Q7	Overall, the design model is readable			11	0

Note. Q = Question

Figure 2

The Relevance of The Proposed Components and Sub-Components for Evaluation Model of EMV4CL

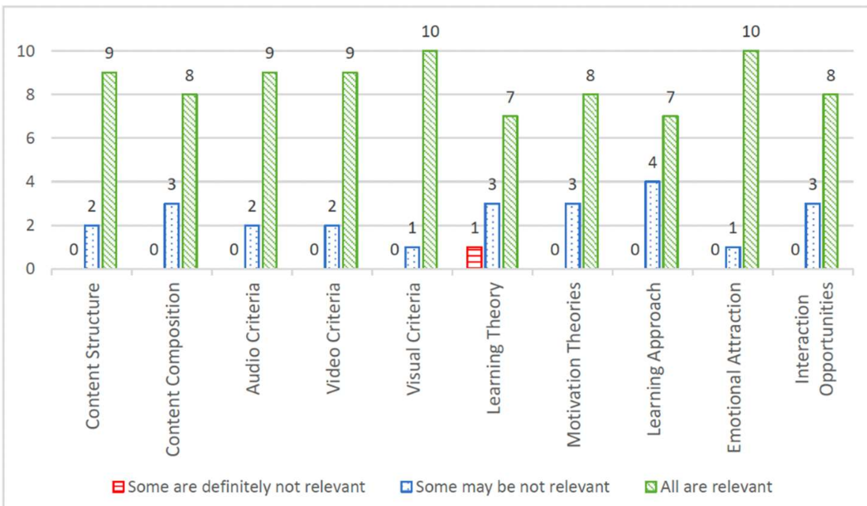


Figure 1

Understandability of The Proposed Elements and Principles in The Video Content Component

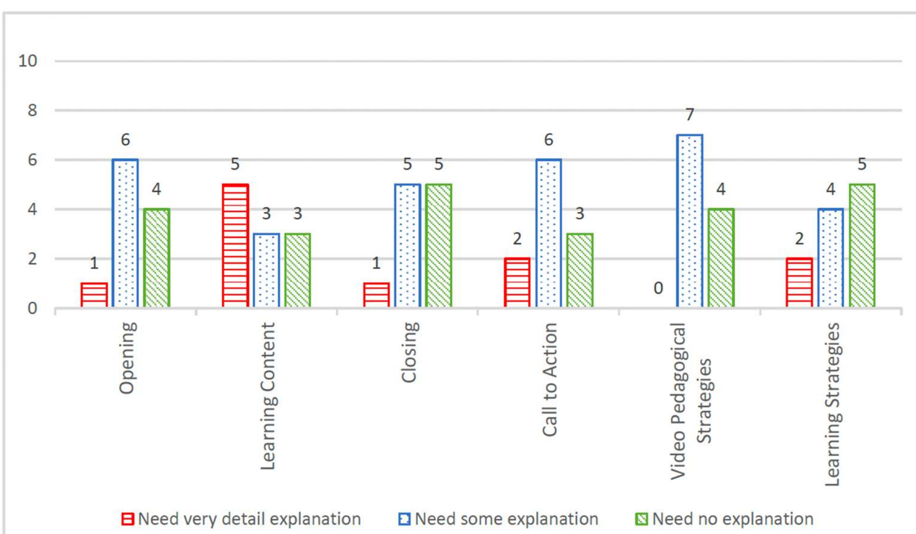


Figure 3

Understandability of The Proposed Elements and Principles in Video Presentation Style Component

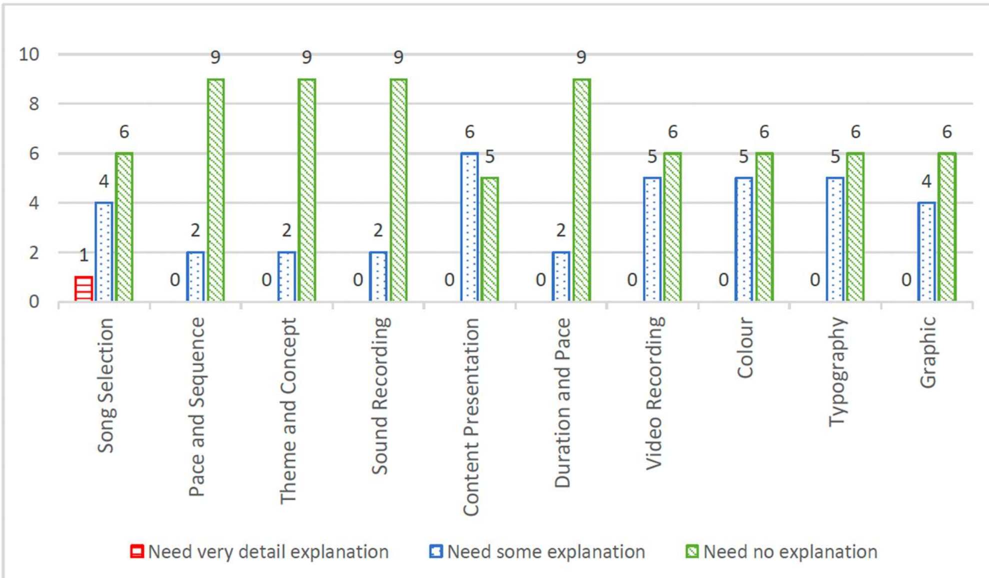


Figure 4

Understandability of The Proposed Elements and Principles in Emotional Attraction and Interaction Opportunities Component

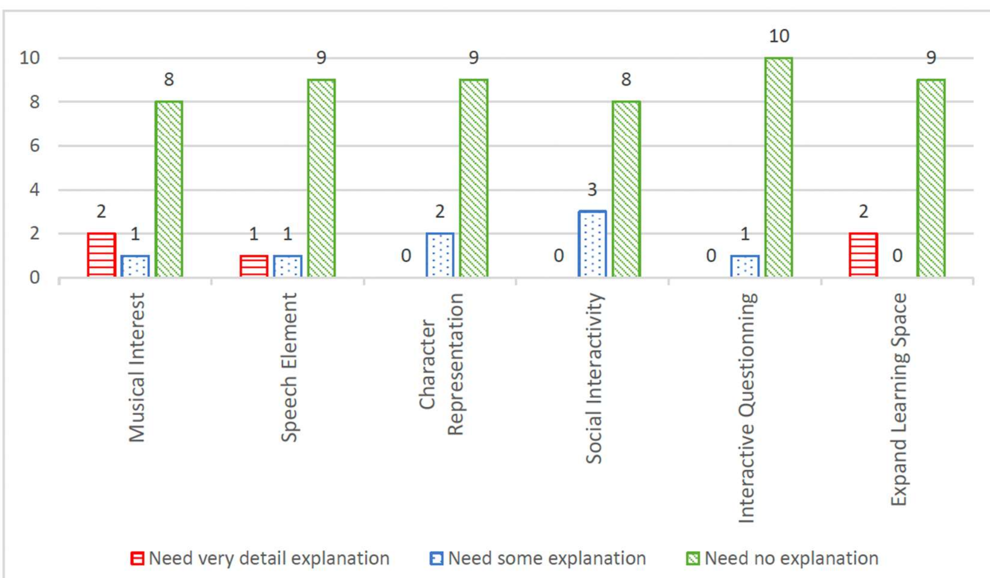


Figure 5

The Terms, Relationships and Flows, and Readability of the Proposed Evaluation Model of EMV4CL

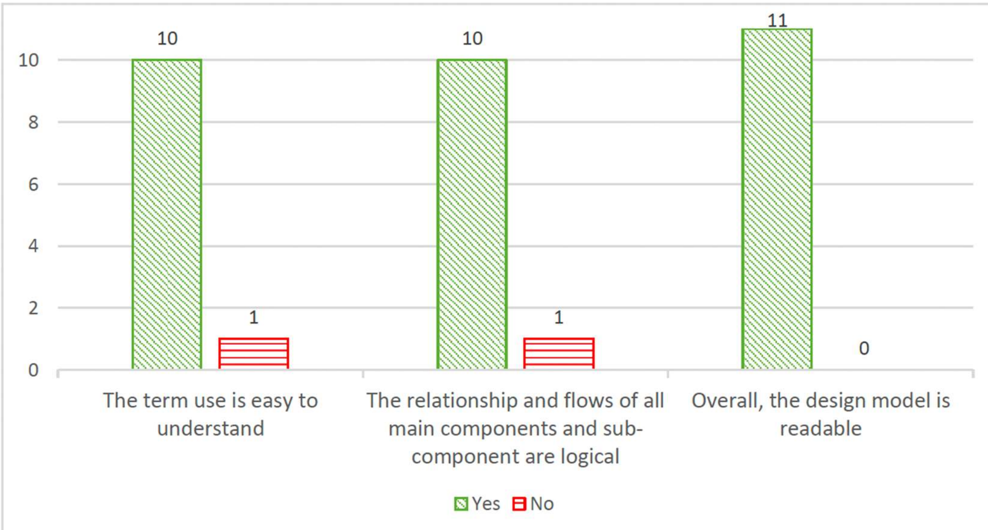


Figure 1 shows that most experts agree the proposed main components and sub-components are relevant, though some questioned the relevance of elements in two sub-components of the edutainment feature, one sub-component of the activity, and one sub-component of the audio-visual learning concept, and provided comments for revisions. Figure 2 indicates that understanding of the proposed elements and principles for video content is moderate, with five experts noting the need for more clarification on learning content.

Conversely, Figure 3 reveals that most experts understand the proposed elements and principles for video presentation style. Figure 4 shows that the majority grasp the elements for emotional attraction and interaction opportunities, though a few experts questioned the suitability of elements like musical interest and expanding learning space. Finally, Figure 5 demonstrates that most experts find the model's terms, logical relationships, and flows understandable, though one expert highlighted difficulty with certain terms and logical connections, suggesting that readability needs improvement. Besides, the experts also provide further comments and suggestions in reviewing the proposed model.

In short, most experts come from an instructional technology background and raised concerns about three main components: video content (seven experts), video presentation style (seven experts), and audio-visual learning concepts (eight experts). Their feedback will help improve the model by making it more readable and logical. Suggestions include renaming and rearranging terms, incorporating relevant learning theories and models, and clarifying ambiguous principles.

The Utilization of Learning Theories and Audio-Visual Learning Concept

Experts suggested incorporating specific learning theories into the model. Expert C proposed adding a theory specific to EMV subjects, but this was not adopted because the model is designed for general use. IMMS was also considered but excluded due to its extensive validation requirements. Meanwhile, Expert H recommended classifying "Cognitive Load Theory" under "Cognitive Theory of Multimedia Learning," which was accepted. Experts H, I, and K noted overlap between "VAK learning" and "multisensory learning," so "VAK learning" was retained. Expert H and Expert K suggested renaming "learning approach" to "learning style," which was also accepted.

In response to feedback, the study decided to streamline the use of learning and motivation theories. Expert G questioned whether to use all theories or focus on specific ones, and the study clarified that while all theories inform EMV, they are not used simultaneously. Reorganization of theories for clarity was agreed upon. Expert E and Expert H raised concerns about some motivation theories, leading to the removal of "short-term gratification theory" and the inclusion of the ARCS model. These changes aimed to improve the model’s readability and understanding.

Additionally, in response to expert feedback on the Audio-Visual Learning Concept, the study decided to streamline the use of learning and motivation theories. Expert G asked whether to use all theories together or focus on specific ones. The study clarified that while all theories inform EMV, they are not used simultaneously. To improve clarity, theories will be reorganized: "cognitive theory of multimedia learning" will support EMV production, while "behaviourism" and "connectivism" will address EMV interactions. Experts E and H questioned some motivation theories in the model. As a result, "short-term gratification theory" will be replaced with the ARCS model to enhance the model’s readability and understanding.

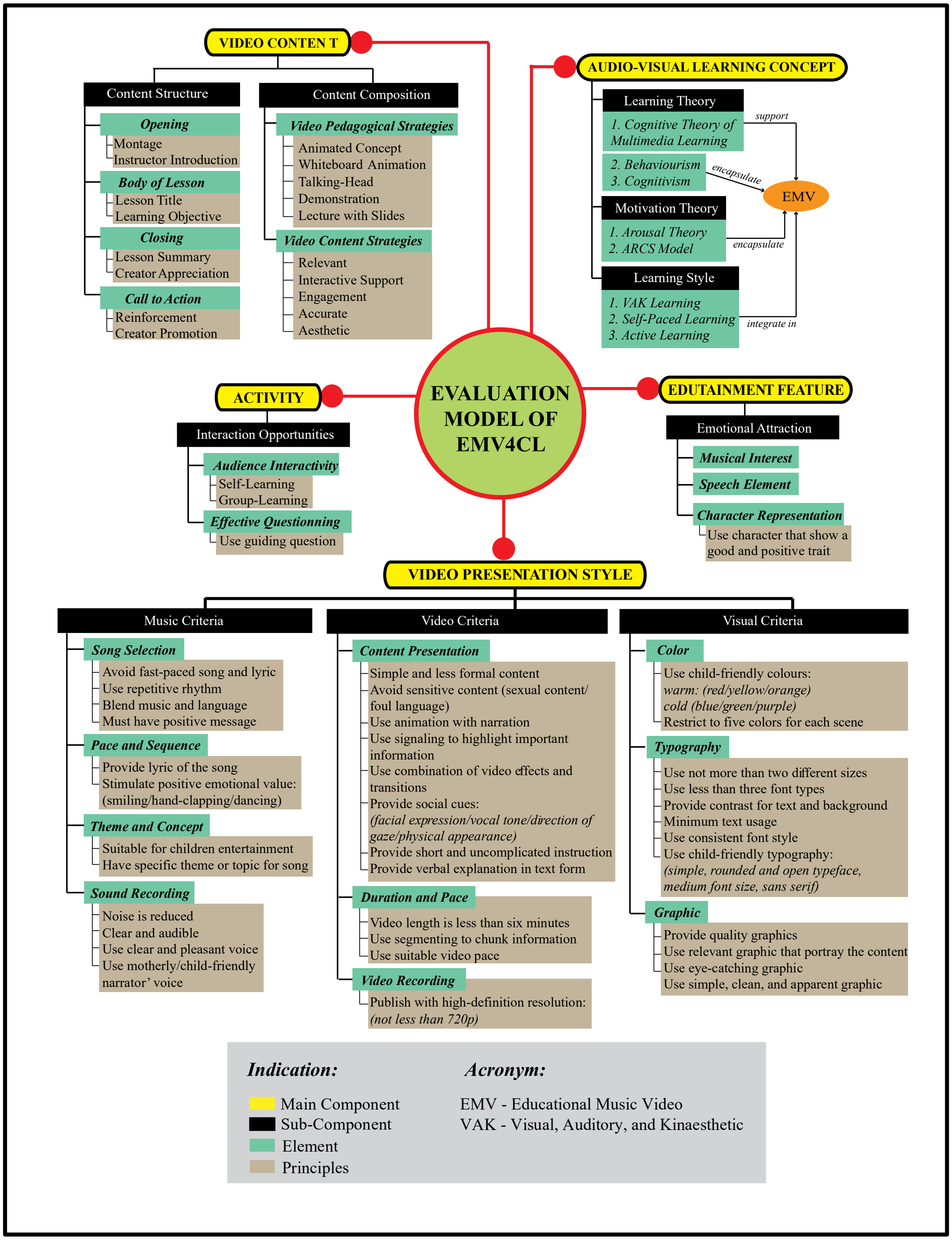
The Readability of The Proposed Model

One of the eleven experts raised concerns about the clarity of terms used in the model and the relevance of the connections between components and sub-components. Although this feedback came from only one expert, it was taken seriously to enhance the model’s readability. To improve understanding, unnecessary terms like “contain,” “contains elements of,” “has principles,” and “flows to” were removed to prevent misinterpretation.

On top of that, this study received feedback on several minor issues from the experts. Expert F recommended including children's psychomotor skills in the model, but this suggestion is outside the study’s scope and was not incorporated. Similarly, Expert H suggested adding Bloom's Taxonomy; however, this was not adopted because Bloom's Taxonomy is better suited for developing new content rather than evaluating existing educational videos. After reviewing and addressing all the expert comments and suggestions, the study revised the proposed model accordingly and Figure 6 shows the validated Evaluation Model of EMV4CL.

Figure 6

The Validated Version of Evaluation Model of EMV4CL



CONCLUSION

This study developed and validated the Evaluation Model of EMV4CL (Educational Music Video for Children's Learning) to help teachers choose appropriate educational video content for children. The research began by identifying key concepts from literature on edutainment and Video-Based Learning (VBL), followed by a thorough analysis to create the model. Expert feedback, mainly from academics in computer science and multimedia, was used to refine the model. While most experts agreed on its relevance, some suggested improvements, leading to adjustments in terminology, learning theories, and motivational elements. The final model offers a structured way to assess educational videos' effectiveness in supporting children's learning. Future work should focus on providing classroom implementation guidance and educator training to enhance the model's practical use, as well as integrating it with other educational tools and frameworks for real-world application.

ACKNOWLEDGMENT

We would like to thank the Ministry of Higher Education (MoHE) for financial support throughout the research study. Nevertheless, this research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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