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Exploring interactive video learning: Techniques, applications, and pedagogical insights

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ABSTRACT

Multimedia, interaction, and customized content make interactive video learning a popular and effective teaching tool. This pedagogical technique uses movies, animations, and graphics to create engaging and attractive instructional materials. Interactive aspects such as quizzes, simulations, and decision-making encourage active learning and critical thinking. Personalization is critical because it allows the educational process to be tailored to individual needs and preferences. This is done through adaptive learning systems and AI algorithms. This review examines interactive video-based learning methods, applications, and educational effects. This study examines how interactive video learning is impacting education in many sectors and locations. This technique allows students to view interactive videos at their convenience, accommodating different learning styles and schedules. The study also examines how interactive video-based learning affects knowledge, motivation, and participation in formal education and corporate training. This review analyzes existing studies and trends to assess the usefulness and future of interactive video learning in modern education. Interactivity, personalization, and multimedia help provide effective, learner-centered instruction. This study shows that interactive video learning can improve pedagogy and educational outcomes.

1. Introduction

Interactive video learning is a dynamic and effective way to engage students and enhance learning in the ever-growing field of education. Digital technology has made interactive video learning popular, which uses multimedia, personalized material, and interactive functions to provide immersive, learner-centered educational experiences (Hung and Chen, 2018). Multimedia features like films, animations, and graphics make video-based learning more engaging by delivering visual and audio stimulation that fits a variety of learning styles. Interactive films can be seen on a variety of digital devices, making them ideal for hectic schedules and remote learning. Interactivity, which lets students actively engage with content, is the main focus of this technique. Quizzes, simulations, and decision-making situations let students think critically, apply knowledge, and gain practical insights. Active participation improves comprehension and retention. Customizing educational content to match each student's requirements and preferences improves the learning experience. Artificial intelligence-powered adaptive learning systems change how students learn based on how well they're doing (Kee et al., 2019). This method makes sure each student gets a personalized and best possible learning experience. Interactive video-based learning is becoming more popular in schools and businesses. Teachers, designers, and trainers say this tool helps students engage more, learn on their own, and feel motivated because it focuses on what the learner needs. This review looks at how interactive video learning works, where it's used, and what it means for education. We want to understand better how effective interactive video learning is now and what it could offer in the future. Our study aims to gather and analyze the current research and trends in this area.

2. Literature review

Interactive video learning is becoming more popular in education because it improves learner engagement and retention. A thorough literature

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review reveals substantial scholarly research and improvements that have improved the understanding and application of this groundbreaking educational style.

Interactive video learning fits Mayer's (2014) cognitive theory of multimedia learning, according to Clark and Mayer (2016). This idea claims that humans learn better when provided with visual and aural information. Interactive elements like quizzes and simulations can improve active engagement, comprehension, and information transfer, according to Mayer (2014).

In addition, Kay (2012) found that interactive video learning promotes self-regulated learning. Learners can manage their content consumption speed and order with this method. Autonomy in schools boosts intrinsic motivation, which boosts engagement and interest in learning.

Li et al. (2023) compared interactive video learning to regular video-based teaching. Interactive movies improved information retention and problem-solving, according to the study. These studies demonstrate that interactive features aid active learning.

Cognitive load theory (Sweller, 1988) underpins interactive video learning by emphasizing the importance of controlling cognitive load to improve learning. Schraw and Robinson (2008) found that well-designed interactive movies reduce cognitive burden. These videos helped students focus on relevant topics, improving comprehension and recall.

Studies on the effects of interactive video learning on various learner populations have found promising results. Tugtekin and Dursun (2022) discovered that interactive films were effective at accommodating varied learning styles and preferences, making them a versatile tool for individualized teaching.

However, integrating interactive video learning is difficult. Technical limitations and disparities in equipment and internet connectivity may inhibit technology adoption (Kopcha, 2012). Accessible interactive films for students with impairments require careful design and modifications (Burgstahler, 2015).

Brown et al. (2020) emphasized the necessity of continual teacher training and professional development in implementing interactive video learning into pedagogy. Educators must know how to create interactive films that meet curricular goals and meet students' demands.

In conclusion, interactive video learning has great potential as an engaging and effective educational tool. Multiple studies have highlighted the benefits of this phenomenon, but technological infrastructure and accessibility issues must be addressed to fully realize its benefits. The literature provides a good theoretical framework and empirical evidence for interactive video learning research. This prepares the ground for future research and innovation, resulting in an education system that prioritizes learners and encourages inclusion.

3. Methodology

This review paper adopts a methodical approach to collate pertinent material and conduct a critical analysis of the extant research on interactive video learning. The process has multiple stages, which include doing a comprehensive literature search, establishing selection criteria, extracting relevant data, synthesizing the findings, and interpreting the results.

A thorough literature search is performed by utilizing academic databases, scholarly publications, conference proceedings, and reliable online repositories. Relevant articles are identified by employing keywords such as "interactive video learning," "multimedia learning," "educational technology," and "pedagogical implications." The researcher searched the following: Computers and Education, CBE—Life Sciences Education, User Modeling and User-Adapted Interaction, Education and Information Technologies, E-Learning and Digital Media, Learning Theory and Online Technologies, Review of Educational Research, Journal of Work-Applied Management, Journal of Computer Assisted Learning, Education and Information Technologies, Google Scholar, etc.

Selection Criteria: The initial search results undergo a screening process that is guided by pre-established criteria for inclusion and exclusion. The chosen articles should meet the criteria of being peer-reviewed, published in respected academic journals or conference proceedings, and have a direct focus on interactive video learning and its applications in the field of education.

The process of data extraction involves the identification and retrieval of pertinent information from a set of chosen publications. This information often includes details such as the names of the authors, the year of publication, the research environment, the methodology employed, the findings obtained, and the implications derived from the study. The objective of data extraction is to comprehensively and thoroughly capture the scope and extent of research within the given topic.

The process of data synthesis and analysis involves the examination of extracted data in order to uncover recurring themes, theoretical frameworks, and research trends. The review provides an analysis of the fundamental approaches, design principles, and technical platforms employed in the context of interactive video learning.

The chosen articles are subject to critical evaluation in order to assess the robustness of the research methodology utilized, the soundness of the findings, and the dependability of the conclusions. Discrepancies or conflicting outcomes are subject to examination, and subsequent resolution is pursued through additional analysis and consultation with reliable sources.

Interpretation and discussion: The synthesized data are analyzed and interpreted in order to get significant insights pertaining to the present condition of interactive video learning. The article

explores the potential ramifications of the research results for individuals involved in the field of education, including educators, instructional designers, and policymakers, within the framework of contemporary educational practices.

The potential limitations of the evaluated research are acknowledged and analyzed, encompassing factors such as sample sizes, methodological biases, and the extent to which the findings can be generalized. The review process acknowledges any limits observed in order to maintain transparency and accuracy.

Future research opportunities: This section outlines possible future research paths that could enrich the current knowledge base. These directions for future inquiry are determined by analyzing the outcomes and constraints of prior studies and identifying gaps that require additional exploration. Furthermore, it suggests new research avenues to improve the understanding and application of interactive video learning in educational contexts.

In conclusion, it is important to note that the aforementioned points have provided valuable insights into the topic at hand. The analysis conducted in the methodology section culminates with a concise overview of the review's approach and its adherence to rigorous scholarly standards. The literature review holds considerable importance in its contribution to the field of interactive video learning.

4. Result and discussions

4.1. Theoretical foundations

The theoretical underpinnings of interactive video learning are derived from diverse academic disciplines and learning theories, thereby establishing a robust framework for comprehending its design, efficacy, and influence on educational achievements. The development and implementation of interactive video learning in educational contexts are influenced by several theoretical viewpoints.

Cognitive Load Theory, as proposed by Sweller (1988), asserts that the cognitive system of humans has a finite capacity for information processing. The utilization of interactive video learning integrates the principles of cognitive load theory in order to effectively regulate the mental burden of learners. This approach involves presenting information in a manner that is conducive to optimal learning outcomes and minimizes unnecessary cognitive strain. Interactive video learning improves understanding and knowledge retention by directing learners' attention to pertinent material and preventing cognitive overload.

The theory of multimedia learning, as formulated by Richard Mayer in 2014, investigates the cognitive processes and educational outcomes associated with the consumption of multimedia presentations, encompassing various media forms such as videos, images, and textual content. According to the aforementioned hypothesis, the effectiveness of learning is enhanced when information is delivered through the utilization of both visual and auditory channels. The integration of interactive features inside video-based learning adheres to the concepts of multimedia learning since it combines the use of videos with interactive components to foster a multimodal and captivating educational encounter.

The constructivist learning theory is based on the research and theories of prominent scholars such as Jean Piaget and Lev Vygotsky. This theoretical framework places significant emphasis on the importance of active learning and the active production of knowledge by learners. The utilization of interactive video learning is in accordance with the principles of constructivism, as it promotes the exploration, engagement, and interaction of learners with the educational material, hence facilitating their active construction of knowledge (Harasim, 2017).

Self-Regulated Learning (SRL): The notion of self-regulated learning suggests that learners actively engage in the monitoring, management, and control of their own learning process. The utilization of interactive video learning provides learners with the ability to exert control over the speed, order, and engagement with the educational material, hence fostering the development of self-regulated learning practices. Learners possess the ability to effectively traverse the educational content, avail themselves of supplementary resources, and engage in the review of fundamental concepts, hence augmenting their metacognitive and self-directed learning proficiencies.

The Social Learning Theory, created by Bandura (1977), emphasized the significance of observational learning and social interactions in the process of acquiring knowledge. Interactive video learning systems have the capacity to integrate social components, including collaborative activities, conversations, and peer feedback, thus facilitating the acquisition of knowledge through mutual learning and the exchange of viewpoints among learners.

The theoretical underpinnings outlined in this study offer a thorough framework for comprehending the cognitive, social, and pedagogical dimensions inherent in interactive video-based learning. By incorporating these theoretical frameworks into the development and execution of interactive video-based educational experiences, educators and instructional designers have the ability to construct captivating and efficient learning environments that accommodate the varied requirements and preferences of learners.

4.1.1. Discussion about theoretical foundations

The integration of these theoretical frameworks within the design and implementation of interactive video-based educational experiences enables educators and instructional designers to cultivate engaging and effective learning environments. These settings have the capacity to cater to a wide range of student preferences and demands, hence

augmenting the educational efficacy of interactive video learning. This paper makes a valuable contribution to the scholarly discourse by engaging in a critical analysis and synthesis of several ideas. Through this thorough examination, the piece enhances our comprehension of the cognitive, social, and pedagogical aspects that are inherent in the context of interactive video-based learning. Fig. 1 depicts a conceptual diagram that clearly illustrates the interconnections between the theoretical foundations and their influence on the design and advancement of interactive video-based learning. This statement demonstrates how different learning theories contribute to the development of tactics and concepts utilized in interactive video learning, resulting in the establishment of educational environments that are both engaging and adaptive.

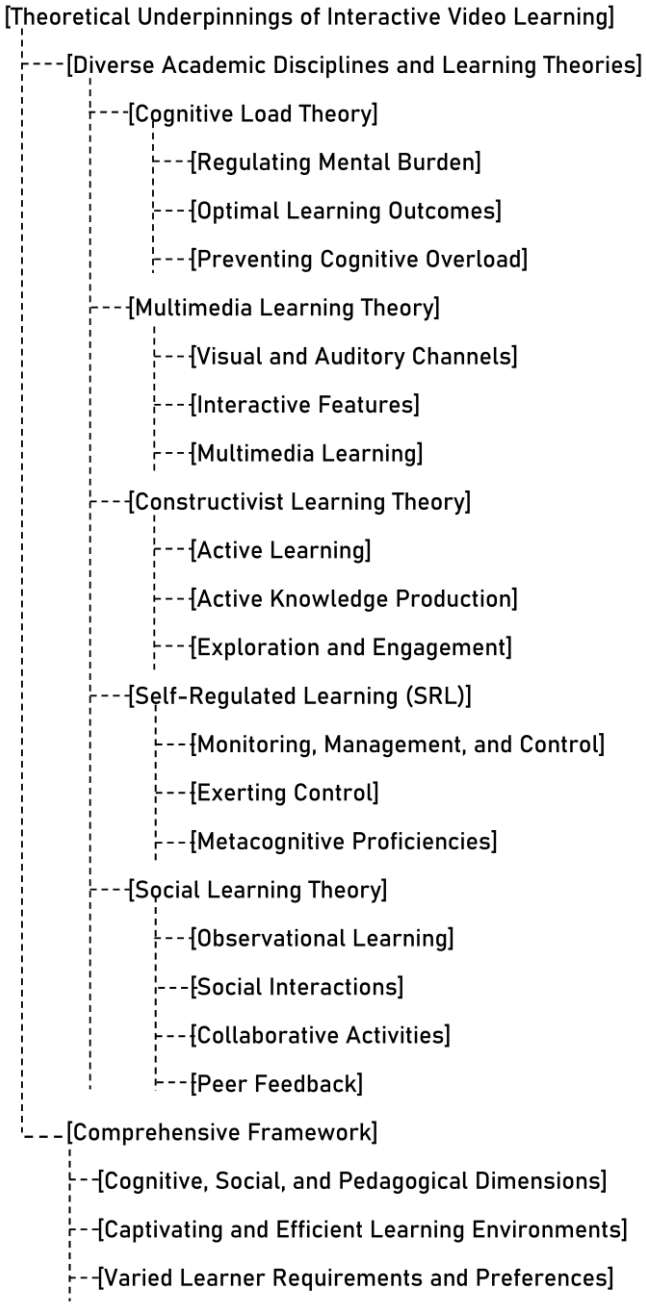

Fig. 1: Theoretical foundations and their influence on the design and advancement of interactive video-based learning

4.2. Design and development

The design and development of interactive video learning are crucial in influencing captivating and efficacious educational experiences. A design that is carefully planned and skillfully implemented has the potential to raise the level of engagement among learners, encourage their active involvement, and facilitate the acquisition of knowledge in a meaningful manner. Several critical variables play a significant role in facilitating the effective design and development of interactive video learning.

The systematic method of content mapping and storyboarding involves the initial step of establishing important learning objectives and subsequently matching them with the interactive video format. The utilization of storyboarding as a visual tool aids in the visualization of content flow, hence promoting

the creation of a coherent narrative that effectively sustains learner engagement throughout the learning experience (Brame, 2016).

The integration of interactive elements is crucial for the effectiveness of video-based learning. These elements encompass a range of interactive features, including quizzes, polls, simulations, and decision-making scenarios. According to Rosenberg (2001), these components facilitate learners' active involvement with the subject matter, thereby strengthening their comprehension through practical, experiential learning opportunities.

The process of personalization and adaptivity involves tailoring interactive films to cater to the specific needs of individual learners, hence enhancing the overall learning experience. According to El-Sabagh (2021), adaptive features have the capability to modify the difficulty level, material sequence, or tempo in response to learners' performance, hence facilitating customized learning pathways.

The integration of different modes of representation, including text, images, audio, and videos, within multimodal content serves to accommodate a wide range of learning preferences and augment the cognitive processes involved in information processing. According to Mayer (2014), well-designed multimedia features contribute to a learning experience that is comprehensive and immersive.

The consideration of accessibility is of utmost importance in the context of interactive video learning, as it plays a crucial role in promoting inclusive education. The inclusion of closed captions, audio explanations, and screen reader compatibility is essential in order to facilitate the accessibility and educational advantages of information for those with disabilities (Burgstahler, 2015).

The design of the user interface and user experience plays a crucial role in creating a favorable learning environment since it is imperative to have an interface that is easy to use and navigate, promoting a pleasant learning experience. According to Ally (2004), a seamless user experience is facilitated by a well-organized design, concise instructions, and user-friendly interactive elements.

The integration of assessment and feedback in educational settings involves the strategic design of assessment activities into interactive videos, enabling learners to assess their own progress and receive prompt feedback. According to Azevedo (2018), this formative assessment facilitates the process of reflection and serves to strengthen the acquisition of knowledge.

The integration of gamification elements, such as points, badges, and leaderboards, into interactive video learning, has been found to have a positive impact on motivation and the development of a sense of accomplishment (Hamari et al., 2014).

Mobile and cross-platform compatibility is crucial in ensuring that interactive videos may be quickly accessed by learners across different devices and platforms (Hoober and Berkman, 2011).

The process of pilot testing and iterative development involves the implementation of interactive video learning experiences with a limited number of participants in order to detect possible challenges and acquire significant input. According to Bates (2018), the process of iterative development, which involves incorporating input, facilitates ongoing enhancement and refinement.

Educators and instructional designers can generate immersive and engaging interactive video learning experiences by taking into account certain design and development ideas. The incorporation of interactive components, customization, multimodal materials, and deliberate user experience design enhances student engagement, knowledge attainment, and overall learning achievement.

Fig. 2 visually represents the critical variables and processes involved in the design and development of interactive video learning. It illustrates how these elements are interconnected and contribute to creating immersive and engaging learning experiences for students, ultimately leading to enhanced knowledge attainment and learning achievement.

4.2.1. Discussion about design and development

There are some crucial factors that are vital in the design and development of interactive video learning experiences. These factors encompass meticulous content mapping and storyboarding to establish explicit learning objectives and narrative coherence, the incorporation of interactive elements such as quizzes and simulations to foster active learning, personalization and adaptivity for tailored learning pathways, multimodal content to cater to diverse learning preferences, considerations for accessibility to ensure inclusive education, user-friendly interfaces for a smooth learning experience, integration of assessment and feedback mechanisms for reflective learning, inclusion of gamification elements to enhance motivation, and mobile cross-platform compatibility for wider accessibility. The iterative development method facilitates ongoing enhancements and refinements. In general, these factors emphasize the need for well-strategized design and development in the creation of interactive video learning experiences that are both entertaining and effective. This aligns with the overarching objective of improving student engagement, knowledge acquisition, and learning outcomes.

4.3. Pedagogical applications

Interactive video learning has several pedagogical applications that improve learning, encourage active engagement, and help meet educational goals. The following pedagogical applications demonstrate the versatility and efficacy of interactive video learning in many educational environments.

Interactive video learning allows educators to create pre-recorded interactive video classes for the

flipped classroom. Lopez (2022) reported that students use video-based learning activities outside of class to take quizzes and chat. They then arrive in class ready for deeper discussions and collaboration. Interactive video learning lets instructors add quizzes, polls, and self-evaluation to the video. El-Sabagh (2021) stated that rapid feedback allows students to track their progress and clarify any confusion. Scenario-based learning uses interactive movies to provide decision-making scenarios and require students to choose appropriate responses. Scenario-based learning improves critical thinking and problem-solving (Hmelo-Silver et al., 2007). Interactive video-based learning can recreate real-world settings or laboratory conditions for virtual experiments, simulations, and presentations. This strategy appears to be beneficial in research, engineering, and healthcare (Finkelstein et al., 2005).

Interactive video learning is useful for language acquisition and speech practice. Lyu and Qi (2020) suggested listening to native speakers, repeating phrases, and getting pronunciation feedback to improve language proficiency and communication.

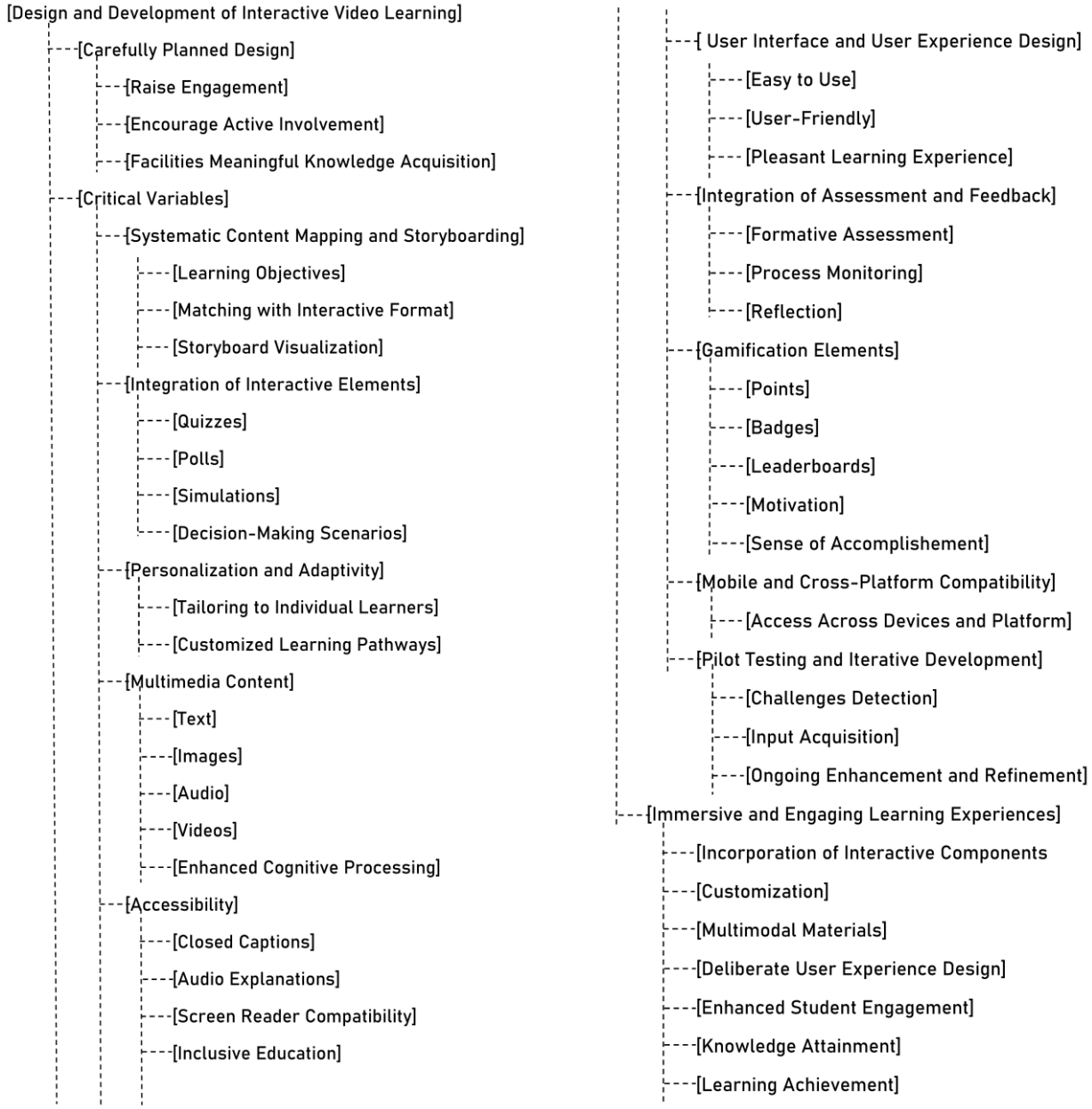

Fig. 2: Critical variables and processes involved in the design and development of interactive video learning

Professional development and corporate training: Interactive video learning works well for professional development and training. Castro and Tumibay (2021) stated that interactive training modules allow employees to build their skills actively.

Interactive movies with closed captions and audio descriptions are used in inclusive education to suit a variety of learners, including those with disabilities (Burgstahler, 2015).

Gamification elements like scoring, badges, and prizes in interactive movies can provide engaging game-based learning experiences (Hamari et al., 2014). Interactive video learning allows students to interact with educational content at their own pace or in real-time virtual sessions (Bower et al., 2015).

Collaborative Learning: Interactive movies with discussion prompts and peer-to-peer interactions encourage group learning and problem-solving (Azevedo, 2018).

The above pedagogical applications demonstrate the adaptability and efficacy of interactive video learning across academic subjects and educational levels. Interactive features allow instructors to create dynamic, learner-centered learning experiences that boost motivation, comprehension, and retention.

4.3.1. Discussion about pedagogical applications

Interactive video learning has been found to have diverse pedagogical uses, showcasing its versatility and effectiveness in different educational environments. The text underscores various significant applications, including the implementation of the flipped classroom model, which enriches classroom discussions by incorporating interactive video-based pre-class activities. It also involves the integration of formative assessment, enabling immediate feedback and monitoring of learner progress. Additionally, scenario-based learning is emphasized as a means to foster critical thinking and problem-solving skills. Simulation and virtual laboratories are identified as valuable tools in practical fields, while language training and pronunciation practice are recognized for their contribution to language proficiency. The text further acknowledges the relevance of professional development and corporate training, as well as the importance of inclusive education in ensuring accessibility for all learners. The incorporation of gamification components is highlighted as a means to enhance engagement, and the use of both synchronous and asynchronous learning methods is acknowledged for accommodating diverse learning preferences. Lastly, collaborative learning is emphasized as a means to encourage knowledge exchange among learners. These applications collectively exemplify the potential of interactive video learning to foster dynamic, learner-centered experiences that bolster motivation, comprehension, and information retention in many educational settings.

4.4. User experience and engagement

The success of interactive video learning is contingent upon the critical variables of user experience (UX) and engagement. The enhancement of learner satisfaction, motivation, and knowledge retention is facilitated by a favorable user experience, while active participation and meaningful learning outcomes are fostered by high levels of engagement. Several factors contribute to the user experience and engagement in interactive video learning.

The presence of user-friendly interfaces and intuitive navigation systems facilitates learners' ability to efficiently navigate and access interactive video content. This, in turn, leads to a reduction in cognitive load and an improvement in the overall learning experience (Ally, 2004).

The integration of interactive components, such as quizzes, polls, and tailored learning pathways, fosters active involvement and empowers learners to assume responsibility for their educational progression (Hattie and Timperley, 2007).

The integration of aesthetically pleasing multimedia components, such as movies, images, and animations of superior quality, enhances the overall educational encounter by fostering engagement and creating an immersive atmosphere (Mayer, 2014).

The provision of prompt feedback on quiz replies or learning progress has been found to enhance learner motivation and facilitate learners in monitoring their comprehension (Azevedo and Cromley, 2004).

The utilization of gamification elements, such as rewards, progress tracking, and success badges, has been found to be effective in motivating learners to advance via interactive video content (Hamari et al., 2014).

The implementation of responsive design allows for the accessibility of interactive videos on multiple platforms, including smartphones, tablets, and laptops. This accessibility feature enables learners to conveniently engage with the content, as supported by Hoober and Berkman (2011).

The incorporation of discussion forums or collaborative tasks into interactive movies enhances social interaction, hence promoting peer-to-peer learning and information exchange (Fischer et al., 2007).

The utilization of captivating storylines and real-life situations in interactive films has been found to effectively engage learners and enhance the relevance of the content (Brame, 2016).

4.5. Future trends and research directions

The domain of interactive video learning is undergoing ongoing development, propelled by breakthroughs in technology and pedagogical research. The development and implementation of interactive video learning are being influenced by several future trends and research objectives. These domains exhibit the potential for augmenting learner engagement, knowledge attainment, and the overall efficacy of interactive video-based learning encounters:

The utilization of virtual reality (VR) and augmented reality (AR) technologies presents promising prospects in the development of immersive learning environments. Further investigation could be conducted to examine the potential integration of interactive films with virtual reality (VR) and augmented reality (AR) technologies in order to augment experiential learning and foster increased engagement (Fernandes et al., 2021).

The amalgamation of artificial intelligence (AI) algorithms and adaptive learning systems enables

the customization of interactive video content in accordance with the unique requirements, inclinations, and achievements of individual learners. This integration results in enhanced learning experiences that are both more productive and time-efficient (Muñoz et al., 2022).

The utilization of learning analytics and data mining techniques on interactive video platforms has the potential to yield significant insights pertaining to learner behaviors, preferences, and knowledge gaps. These insights can be crucial in informing the instructional design and enhancing content quality (Macfadyen et al., 2020).

Microlearning and bite-sized content have become increasingly popular due to their ability to accommodate learners' limited attention spans and facilitate just-in-time learning. These short-form interactive videos are gaining traction in the educational landscape. Subsequent investigations could potentially center on the examination of the most effective duration of videos, the methods of delivering content, and the subsequent effects on the retention of knowledge (Leong et al., 2020).

The investigation of social learning and collaboration includes examining strategies to facilitate collaborative learning encounters within interactive films, enabling learners to actively participate in group conversations, exchange perspectives, and collaboratively address challenges (Eom, 2023).

The integration of affective computing approaches has the potential to enhance the capabilities of interactive films by enabling the detection of learners' emotional states and subsequently tailoring the information to align with those moods. This has the effect of increasing learner motivation and fostering emotional engagement (Yadegaridehkordi et al., 2019).

Future studies should explore methods for optimizing cognitive load management in interactive films, with the aim of aligning content display with learners' cognitive capacity and improving information processing (Ayres et al., 2021).

The integration of gamification features and gameful design concepts in interactive films has the potential to increase learner motivation and enhance their intrinsic motivation (Deterding et al., 2011).

4.6. Discussions

The utilization of interactive video learning has evolved as a highly promising and adaptable educational methodology, presenting a multitude of advantages for both learners and instructors. The use of multimedia components, interactive features, and personalized approaches adds to the cultivation of engaging and efficacious learning experiences within a wide range of academic subjects and educational environments.

The capacity to accommodate many learning styles is a significant advantage of interactive video learning. The integration of multimedia components, such as films, animations, and graphics, within interactive videos caters to the diverse learning preferences of visual, aural, and kinesthetic learners, hence fostering a comprehensive educational setting. The promotion of inclusion fosters the improvement of knowledge retention and comprehension among learners with diverse preferences.

The presence of interactivity within interactive movies serves to foster active involvement and stimulate critical thinking. Educational elements such as quizzes, simulations, and decision-making scenarios serve as catalysts for learners to actively engage in the application of acquired knowledge, critical analysis of information, and the exercise of informed decision-making. Active participation in the learning process facilitates a more profound acquisition of knowledge and guarantees that learners are not merely passive users of information but rather engaged participants in their educational endeavors.

Personalization is an additional characteristic that distinguishes interactive video learning from other forms of instruction. Adaptive learning systems, propelled by algorithms rooted in artificial intelligence, dynamically adjust the content and pace of instruction in response to the performance and progress of individual learners. The customized methodology employed in this approach accommodates the unique learning requirements and inclinations of individuals, so enabling learners to assume authority over their educational journey.

Furthermore, the adaptability and convenience of interactive video learning render it a useful asset in both formal educational settings and corporate training programs. Learners have the ability to conveniently access interactive films, which facilitates self-directed learning and accommodates individuals with demanding schedules. The aforementioned flexibility is especially advantageous in the context of remote and asynchronous learning, as it allows learners to actively interact with the educational material regardless of their physical location or the time at which they choose to engage.

The extensive implementation of interactive video learning underscores its capacity to revolutionize educational and training methodologies. Educators and instructional designers possess the ability to use the potential of multimedia, interactivity, and personalization in order to develop learning materials that are both captivating and efficacious. The integration of interactive movies into pedagogical approaches enables educators to augment learner motivation, information retention, and overall learning results.

As the field of interactive video learning progresses, it is imperative that future research directs its attention toward enhancing the design and execution of interactive movies. Further work is necessary in the areas of examining the efficacy of various multimedia elements, determining the ideal levels of engagement, and boosting personalization through the utilization of AI-driven systems. Moreover, it is imperative to comprehend the enduring effects of interactive video learning on

learners' retention of knowledge and their ability to apply that knowledge in real-world contexts in order to substantiate its effectiveness.

In summary, interactive video learning exhibits considerable potential as a novel and learner-centered teaching methodology. The incorporation of multimedia, interactivity, and personalization within this educational platform offers distinct possibilities for engaging learners, cultivating critical thinking skills, and facilitating effective knowledge acquisition. Through leveraging these inherent advantages and effectively tackling areas for enhancement, the utilization of interactive video learning holds the capacity to fundamentally transform educational and instructional methodologies in forthcoming times.

5. Conclusions

Interactive video learning uses diverse theoretical foundations to improve its design, efficacy, and impact on education. Cognitive Load Theory states that people have a restricted capacity for information processing, and multimedia learning theory examines the cognitive processes and educational results of multimedia presentations. Constructivist learning emphasizes active learning and knowledge production, while self-regulated learning emphasizes self-directed learning. The Social Learning Theory, created by Bandura (1977), emphasized observational learning and social interactions in information acquisition.

Educators and instructional designers can build interesting and successful interactive video-based educational experiences that meet a variety of student needs by utilizing these theoretical frameworks. This work critically analyses and synthesizes numerous ideas to improve our understanding of cognitive, social, and pedagogical elements of interactive video-based learning.

Education needs interactive video learning to improve interest and learning. Content mapping and storyboarding help visualize the content flow and create a narrative. Quizzes, surveys, simulations, and decision-making scenarios encourage participation and comprehension. Customizing interactive films to individual needs improves learning. Text, graphics, audio, and videos support many learning styles and improve cognition. For inclusive education, closed captions, audio explanations, and screen reader compatibility are essential. User interface and experience design are crucial for a good learning environment. Interactive videos provide assessment and feedback for contemplation and learning. Game elements like points, badges, and leaderboards boost motivation and achievement. Learning is fast across devices and platforms with mobile and cross-platform compatibility. Continuous improvement requires pilot testing and iterative development. These aspects allow educators to build immersive and engaging learning experiences that improve knowledge and learning. Student engagement, information acquisition, and learning outcomes depend on interactive video learning experience design and development. Content mapping and storyboarding, quizzes, simulations, personalization and adaptivity, multimodal content, accessibility, user-friendly interfaces, assessment and feedback mechanisms, gamification, and mobile cross-platform compatibility are important. The iterative development technique promises constant improvements.

Interactive video learning improves learning, promotes active engagement, and achieves educational goals. The flipped classroom model enriches classroom discussions with interactive video-based pre-class activities, formative assessment, scenario-based learning, virtual experiments, simulations, and presentations, language acquisition and speech practice, professional development and corporate training, inclusive education, gamification, student interaction at their own pace, and collaborative learning.

Interactive video learning success depends on UX and engagement. Learners' pleasure, motivation, and knowledge retention depend on UX and engagement. User-friendly interfaces, interactive components, appealing multimedia, prompt feedback on quiz answers or learning progress, gamification elements, responsive design, discussion forums or collaborative tasks, captivating storylines, and real-life situations all contribute to UX.

Interactive video learning improves learning, motivation, comprehension, and retention in many ways. Its versatility across academic disciplines and levels makes it a powerful tool for creating dynamic, learner-centered experiences.

Interactive video learning is growing and benefits students and teachers. Its integration of VR and AR technologies, AI algorithms, adaptive learning systems, learning analytics, and data mining can improve interactive video-based learning experiences.

Microlearning and bite-sized content are becoming more popular because they suit learners' short attention spans and enable just-in-time learning. Research could examine the best video length, information delivery, and knowledge retention. To improve interactive films, social learning, collaboration, and affective computing should be researched.

Optimize cognitive load management in interactive films to match content display to learners' cognitive capacity and increase information processing. Learning and intrinsic motivation can be increased via gamification and gameful design.

Interactive video learning can revolutionize education and training by incorporating multimedia, interactive elements, and personalized approaches. It encourages critical thinking, active participation, and varied learning methods.

Future studies should improve interactive movie design, engagement, and AI-driven personalization. Interactive video learning's long-term consequences on knowledge retention and real-world application must also be understood.

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Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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