

Exploring a Blended Teaching Model with AI-Generated Short Videos: Evidence from Higher Education

Liang Jingjing^{1,2}, Suraya Md Nasir^{1*}

¹Faculty of Art, Sustainability and Creative Industry Sultan Idris Education University, Tanjung Malim, Perak, Malaysia

²School of Design and Art, Shandong Huayu University of Technology, Dezhou, Shandong, China

*Corresponding Author

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ABSTRACT

The increasing integration of digital technologies into higher education has contributed to a wider use of video-based instructional resources, particularly in blended learning settings. In recent years, developments in generative artificial intelligence have made it possible to produce short-form educational videos more efficiently, offering new ways to support flexible teaching and learning. Despite growing interest in these tools, their role within structured teaching models remains insufficiently examined. This study explores how AI-generated short videos can be incorporated into a blended teaching approach in an undergraduate digital media course. A mixed-method design was adopted, combining questionnaire data with semi-structured interviews to better understand students' learning behaviors, participation patterns, and their experiences across online and face-to-face learning contexts. In addition, the study considers how video-based resources are organized within the overall course structure and how they support different stages of learning. The findings indicate that short, clearly structured videos can help students manage their learning more flexibly and maintain engagement beyond the classroom. Many students showed a preference for concise content that was closely aligned with specific learning tasks. The use of video materials also allowed instructors to shift part of the content delivery outside class time, creating more opportunities for discussion and interaction during in-person sessions. However, the results suggest that poorly designed video content may lead to fragmented understanding or increased cognitive load. Overall, the study presents a practice-oriented approach to integrating AI-generated short videos into blended teaching and highlights their potential to support student-centered learning in higher education.

Keywords: AI-generated short videos; blended learning; higher education; student engagement; instructional design

INTRODUCTION

The ongoing digital transformation of higher education has gradually reshaped instructional practices, with media-based resources playing an increasingly prominent role in course delivery. Among these resources, video has become widely used for its ability to present information in a concise and accessible format. In blended learning environments, video materials are often employed to extend learning beyond the classroom, allowing students to engage with content at their own pace while supporting more interactive forms of in-class learning.

In recent years, advances in generative artificial intelligence have further expanded the possibilities for educational video production. AI-supported tools enable automated content generation, rapid editing, and adaptive design, making it easier to produce short-form instructional videos. Emerging research indicates that AI-generated learning materials can support comparable learning experiences to traditional resources while offering increased efficiency and scalability (Kasneci et al., 2023). In addition, generative AI has been recognized as a key driver in reshaping digital learning environments by enabling more personalized and accessible educational content (Zawacki-Richter et al., 2023).

Despite these developments, existing research has largely focused on the technological potential or general effectiveness of AI in education, with less attention given to how such tools can be systematically integrated into pedagogical models. In particular, the role of AI-generated short videos within blended learning environments remains underexplored. Recent reviews have emphasized the importance of aligning emerging technologies with instructional design principles rather than treating them as standalone tools (Holmes & Tuomi, 2022).

It is also important to note that the effectiveness of video-based learning depends not only on the availability of digital tools, but on how these resources are embedded within the broader instructional structure. Within blended learning models, video materials may serve different functions, including pre-class preparation, in-class support, and post-class review. However, the ways in which AI-generated short videos influence students' learning behaviors and participation patterns across these stages have yet to be fully examined.

In response to these gaps, this study examines the integration of AI-generated short-form videos within a blended teaching model in higher education. Focusing on an undergraduate digital media course, the research adopts a mixed-method approach to explore how video-based resources are incorporated into course design and how students engage with them across both online and in-person contexts. Rather than concentrating solely on measurable learning outcomes, the study places particular emphasis on students' engagement, learning routines, and their perceptions of instructional organization.

By situating AI-generated video within a concrete teaching context, this study contributes to ongoing discussions on digital learning and instructional innovation. It provides a practice-oriented perspective on how emerging technologies can be aligned with pedagogical objectives while supporting more flexible and student-centered learning experiences.

LITERATURE REVIEW

Video-Based Learning in Blended Education

Video-supported learning is now widely embedded in blended teaching practices, particularly as institutions continue to adopt more flexible instructional models. Rather than serving as supplementary material, video resources are increasingly used to structure different stages of learning, including preparation, in-class engagement, and review activities. Recent research suggests that video resources can support self-paced learning and improve accessibility, allowing students to revisit complex concepts and engage with instructional materials beyond scheduled class time (Bond et al., 2023). Within blended learning environments, videos are often used to facilitate pre-class preparation and reinforce learning after in-class activities, contributing to more interactive and student-centered approaches.

At the same time, the effectiveness of video-based instruction depends not only on availability but also on design and structure. Studies indicate that shorter and well-organized video segments are more effective in sustaining attention and supporting comprehension in digital learning environments (Fiorella & Mayer, 2022). This highlights the importance of aligning video content with instructional objectives and cognitive processes rather than relying solely on the medium itself.

AI-Generated Content in Education

The rapid development of generative artificial intelligence has introduced new approaches to producing educational content. AI tools are increasingly used to support automated video creation, including script generation, voice synthesis, and visual editing. Recent studies have shown that AI-generated learning materials can provide comparable instructional value while significantly reducing the time and effort required for content production (Kasneci et al., 2023).

In addition, generative AI has been identified as a key driver of innovation in digital education, enabling more personalized and adaptive learning experiences. By allowing educators to rapidly modify and customize instructional content, AI-supported tools can better address diverse learner needs (Zawacki-Richter et al., 2023).

However, current research also emphasizes that the educational value of AI depends largely on how these tools are integrated into pedagogical practices rather than their technical capabilities alone (Holmes & Tuomi, 2022).

Integration of AI and Blended Teaching Models

Although video-based learning and AI-supported content creation have both received increasing scholarly attention, their combined application within blended teaching models remains relatively underexplored. Blended learning frameworks emphasize the coordination between online and face-to-face activities, requiring instructional resources to be aligned with different stages of the learning process (Bond et al., 2023). In this context, AI-generated short videos may serve as preparatory materials before class, as support tools during instruction, or as resources for post-class review.

Despite these potential applications, empirical evidence on how students engage with AI-generated video content across different learning contexts remains limited. In particular, there is a lack of research examining how such resources influence students’ learning behaviors, participation patterns, and perceptions of instructional design in real classroom settings. This suggests a need for more practice-oriented studies that connect emerging technologies with concrete teaching models.

Theoretical Framework

To provide a stronger conceptual foundation for this study, it is informed by Cognitive Load Theory and Self-Regulated Learning Theory.

Cognitive Load Theory suggests that effective learning occurs when instructional materials are designed to reduce unnecessary cognitive burden and support meaningful information processing. In the context of AI-generated short videos, concise and well-structured content can help minimize extraneous load and enhance comprehension.

Self-Regulated Learning Theory emphasizes learners’ ability to actively control their learning processes, including pacing, monitoring, and reflection. The flexible nature of short-form videos enables learners to revisit content and adjust their learning strategies, thereby supporting self-regulated learning behaviors.

Together, these theoretical perspectives provide a conceptual lens through which AI-generated short videos can be understood as instructional tools that influence both cognitive processing and learner autonomy in blended learning environments.

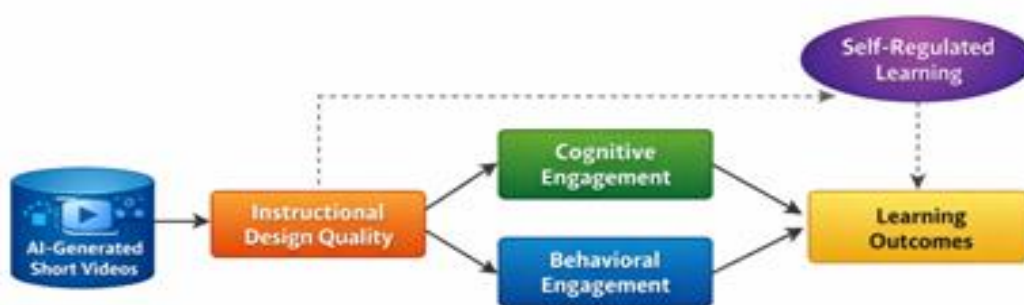


Figure 1. Conceptual Model of AI-Generated Short Videos, Instructional Design, and Learning Outcomes in Blended Learning

Research shown in Figure 1, AI-generated short videos influence learning outcomes primarily through instructional design quality and student engagement. Cognitive engagement and behavioral engagement act as mediating variables, while self-regulated learning plays a moderating role by shaping how learners interact with video-based resources.

Building on these theoretical perspectives, several research gaps can be identified. Based on the existing literature, several gaps can be identified. First, while video-based learning has been widely studied, fewer studies have examined the specific role of short-form videos within structured teaching models. Second, research on AI in education has primarily focused on technological potential and efficiency, with less emphasis on pedagogical integration. Third, there is limited empirical evidence on how students interact with AI-generated short videos in blended learning environments, particularly in relation to learning behavior and engagement.

To address these gaps, the present study investigates the integration of AI-generated short videos within a blended teaching model in higher education. By focusing on students' learning experiences and participation patterns, this research aims to provide a more grounded understanding of how AI-supported media can be effectively incorporated into instructional practice.

METHODOLOGY

Research Design

A mixed-method approach was employed to examine how AI-generated short videos were integrated into a blended teaching context, allowing both general patterns of student engagement and more detailed aspects of students' learning experiences to be captured. Quantitative data were collected through a structured questionnaire to identify trends in student engagement, while qualitative data from semi-structured interviews provided additional insights into how students experienced and interpreted video-based learning activities.

This design reflects recent methodological approaches in digital education research, where survey data are often complemented by qualitative evidence to better understand the interaction between learning technologies and student behavior.

Participants and Sampling

The study was conducted with undergraduate students enrolled in a digital media course at a higher education institution. A total of 98 students participated in the questionnaire survey. To gain a more detailed understanding of individual experiences, 12 students were selected for follow-up interviews using purposive sampling. The selection aimed to include participants with varying levels of engagement in order to capture a broader range of perspectives.

All participants had prior exposure to AI-supported video learning activities within a blended learning context, ensuring that their responses were grounded in actual learning experience rather than hypothetical perceptions.

Research Instruments

Questionnaire

A structured questionnaire was developed to explore students' experiences with AI-generated short videos. The instrument was organized around three key dimensions:

- Behavioral engagement, focusing on the frequency of video use and participation in related learning tasks
- Cognitive engagement, including attention, understanding, and perceived learning support
- Perceptions of instructional design, such as clarity, structure, and relevance of video content

All items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire design draws on recent research that conceptualizes student engagement as a multidimensional construct, encompassing behavioral and cognitive components.

Interviews

To complement the survey findings, semi-structured interviews were conducted with selected participants. The interview protocol focused on three main aspects: students' experiences using AI-generated videos, their

preferences regarding video format and organization, and their views on how video-based materials influenced their learning process.

This approach allowed participants to elaborate on their responses and provided a more contextualized understanding of their learning experiences.

Data Collection Procedure

Data collection was carried out over a six-week teaching period. During this time, AI-generated short videos were integrated into the course as part of the blended learning design, serving primarily as pre-class preparation materials and post-class review resources.

The questionnaire was administered at the end of the teaching period to capture students' overall perceptions. Interviews were conducted subsequently to further explore patterns observed in the survey data. Participation was voluntary, and all respondents were informed of the purpose of the study.

Data Analysis

Quantitative data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, including mean values and standard deviations, were first used to summarize general trends in student engagement and perceptions.

In addition, inferential statistical analyses were conducted to examine relationships among key variables. Pearson correlation analysis was used to explore associations between behavioral engagement, cognitive engagement, and perceptions of instructional design. Multiple regression analysis was further applied to assess the predictive effects of these variables on perceived learning outcomes.

Qualitative data from the interviews were analyzed using thematic analysis. The process involved coding responses, identifying recurring patterns, and organizing them into broader themes. This approach enabled a deeper interpretation of students' learning experiences and complemented the quantitative findings.

RESULTS

Descriptive Results of Questionnaire Data

A total of 98 valid responses were collected and included in the analysis. Overall, the results indicate a generally positive evaluation of AI-generated short videos within the blended learning context.

In terms of behavioral engagement, students reported frequent use of video materials as part of their learning process ($M = 3.94$, $SD = 0.68$). Most respondents indicated that they regularly accessed short videos for pre-class preparation and post-class review, suggesting that video-based resources were effectively integrated into their learning routines.

Regarding cognitive engagement, the mean score was relatively high ($M = 3.88$, $SD = 0.72$), indicating that students perceived the videos as helpful in supporting understanding and maintaining attention. A majority of participants agreed that concise video content made it easier to grasp key concepts, particularly when videos were directly aligned with specific learning tasks.

For perceptions of instructional design, students expressed moderately positive views ($M = 3.76$, $SD = 0.75$). Many respondents noted that clearly structured videos improved learning efficiency and reduced confusion. However, some variability was observed, with a portion of students reporting that inconsistencies in video organization occasionally affected their comprehension. Minor variations were observed across individual responses, suggesting that students' engagement levels may be influenced by differences in learning preferences and prior experience with video-based materials.

Patterns of Video Use in Blended Learning

Further analysis suggests that students tended to use AI-generated short videos in a task-oriented manner. Rather than watching videos continuously, they often selected specific segments based on immediate learning needs. This pattern was particularly evident in pre-class preparation, where students focused on key concepts before attending in-person sessions.

In addition, the use of video materials appeared to support more active participation during classroom activities. Students reported that prior exposure to video content allowed them to engage more confidently in discussions and practical tasks. This indicates that the integration of short videos may contribute to a shift from passive content reception to more interactive learning processes.

Qualitative Findings from Interviews

The interview data provide further insight into how students experienced AI-generated short videos within the blended teaching model. Three main themes were identified through thematic analysis.

1. Preference for Concise and Structured Content

Most interview participants emphasized the importance of brevity and clarity in video design. Short videos with a clear structure were perceived as more effective, particularly when they focused on a single concept or task. Students noted that overly dense or fragmented videos made it more difficult to maintain attention.

2. Flexible Learning and Self-Paced Study

Participants highlighted the flexibility offered by video-based learning. The ability to pause, replay, and selectively access content was frequently mentioned as beneficial, especially when reviewing complex material. This flexibility allowed students to adapt their learning pace according to individual needs.

3. Limitations Related to Content Organization

Despite the generally positive feedback, some students pointed out limitations related to inconsistent video quality and organization. In cases where videos lacked clear sequencing or logical progression, students reported difficulty in connecting different parts of the content. This suggests that the effectiveness of AI-generated videos depends not only on their availability but also on careful instructional design.

Inferential Statistical Analysis

Pearson correlation analysis revealed significant positive relationships among key variables. Instructional design was strongly correlated with cognitive engagement ($r = 0.62$, $p < 0.01$), while cognitive engagement showed the highest correlation with perceived learning outcomes ($r = 0.68$, $p < 0.01$). Behavioral engagement was moderately associated with learning outcomes ($r = 0.54$, $p < 0.01$).

Multiple regression analysis further demonstrated that cognitive engagement ($\beta = 0.45$, $p < 0.01$) and instructional design ($\beta = 0.37$, $p < 0.01$) significantly predicted learning outcomes, with the model explaining 52% of the variance ($R^2 = 0.52$). Behavioral engagement had a smaller yet significant effect ($\beta = 0.21$, $p < 0.05$).

These findings indicate that well-designed AI-generated short videos enhance learning outcomes primarily through their impact on cognitive engagement.

Summary of Findings

Taken together, the results indicate that AI-generated short videos can support student engagement and flexible learning within a blended teaching model. Students demonstrated active use of video resources and expressed a clear preference for concise, well-structured content. At the same time, the findings highlight the importance of aligning video design with instructional goals, as inconsistencies in content organization may reduce their effectiveness.

DISCUSSION

The results provide a clearer understanding of how AI-generated short videos are taken up within blended learning settings. Rather than functioning as isolated resources, these videos appear to be incorporated into students' regular learning routines, influencing how they prepare for and participate in course activities.

The findings can be further interpreted through theoretical perspectives. The strong association between instructional design and cognitive engagement suggests that well-structured video content reduces extraneous cognitive load, thereby facilitating deeper processing. This aligns with principles of Cognitive Load Theory, emphasizing the importance of clarity and segmentation in instructional materials.

Compared with prior studies that emphasize the efficiency and scalability of AI-generated content (Kasneci et al., 2023), the present study highlights that pedagogical design plays a more critical role than technology itself. AI serves primarily as an enabling tool rather than a determining factor in learning effectiveness.

At the same time, the study reveals potential limitations that contrast with more optimistic findings in existing literature. Inconsistent video structure and fragmented content may increase cognitive load and hinder comprehension. This suggests that without careful instructional design, AI-generated materials may not automatically lead to improved learning outcomes.

These findings underscore the importance of aligning AI-generated resources with pedagogical principles to ensure meaningful learning experiences. The results also point to the importance of situating AI-generated content within a coherent instructional framework. While recent studies have emphasized the potential of generative AI in educational settings (Kasneci et al., 2023; Zawacki-Richter et al., 2023), the present findings suggest that technological affordances alone are insufficient. The benefits of AI-generated videos become more apparent when they are aligned with specific teaching objectives and integrated into the broader course structure. This supports the view that the educational value of AI depends largely on pedagogical context rather than on technological sophistication alone (Holmes & Tuomi, 2022).

At the same time, the study identifies certain challenges that should not be overlooked. In particular, inconsistencies in video structure or sequencing were found to affect students' understanding. When content lacked a clear progression, some students experienced difficulty in connecting different parts of the material. This highlights a potential limitation of relying on automated or semi-automated content generation, where ease of production may come at the expense of coherence. It also underscores the continued importance of instructional planning, even when advanced tools are available.

Overall, these findings contribute to a more nuanced understanding of AI-supported learning in higher education. Rather than emphasizing efficiency or technological novelty, the study draws attention to how AI-generated short videos can support student-centered learning when they are thoughtfully integrated into teaching practice. The results suggest that the effectiveness of such tools lies not in their technical features alone, but in how they are used to structure meaningful learning experiences.

CONCLUSION

This study explored how AI-generated short videos can be incorporated into a blended teaching approach in higher education, with a focus on students' learning practices and experiences. The findings indicate that short-form video resources can be integrated into course design in ways that support more flexible learning arrangements and sustained engagement across both online and in-person settings. Students generally favored concise and clearly organized video content, particularly when it was directly connected to specific learning tasks.

The results also point to the central role of instructional design in determining how effective these resources are in practice. While AI tools make it easier to produce video content, their educational value is shaped by how they are structured and positioned within the broader learning process. When video materials are embedded in a coherent teaching framework, they can help redistribute instructional time and create more opportunities for interaction during face-to-face sessions.

From a practical standpoint, several considerations emerge. First, short videos should be designed with a clear focus, avoiding unnecessary complexity that may interrupt comprehension. Second, their use should be aligned with different stages of learning, such as preparation before class and review afterward, so that they function as part of a continuous learning process. Third, even when AI tools are used to generate content, instructors remain responsible for organizing and refining materials to ensure clarity and coherence.

This study has several limitations. First, the findings rely primarily on self-reported data, which may introduce response bias and may not fully reflect actual learning behaviors. Second, the research was conducted within a single course context, limiting the generalizability of the results. Third, variations in the quality of AI-generated videos were not systematically controlled, which may have influenced students' experiences. In addition, potential subjectivity in qualitative analysis cannot be entirely excluded.

Future research should incorporate objective performance data, experimental designs, and longitudinal approaches to provide more robust evidence.

Overall, the findings point to the importance of aligning emerging technologies with pedagogical intentions. AI-generated short videos may offer practical advantages in terms of flexibility and efficiency, but their value ultimately depends on how they are embedded within meaningful learning structures. When thoughtfully implemented, they can contribute to more adaptive and student-centered forms of teaching in higher education.

Despite these limitations, this study makes several important contributions. First, it extends research on AI in education by focusing on pedagogical integration rather than technological capability. Second, it provides empirical evidence on the role of AI-generated short videos in shaping student engagement within blended learning environments. Third, by integrating Cognitive Load Theory and Self-Regulated Learning Theory, the study offers a theoretically grounded explanation of how instructional design influences learning outcomes. Finally, the proposed conceptual perspective advances understanding of AI-supported video learning in higher education.

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