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Innovative Use of AI-Generated Animated Video Quizzing for Student Engagement in Theoretical Courses of Electrical Engineering

Franco Aldrin Menezes[1]

[1]Electrical & Electronics Engineering Department, St Joseph Engineering College, Mangalore, Karnataka

francom@sjec.ac.in

Abstract

This paper presents an innovative teaching–learning practice that integrates Artificial Intelligence (AI)-generated animated video quizzing with traditional learning pedagogies to improve engagement in theoretical courses of Electrical Engineering. Using InVideo, an AI-powered video creation platform, and ChatGPT for script and quiz generation, short video clips were developed to transform traditional lectures into interactive learning sessions. These videos were strategically paused during classroom delivery for instructor-led discussions and embedded quizzes, creating a dynamic and participatory learning experience. Students were also given access to these videos on the LMS for revision and reinforcement. The approach resulted in greater student participation, improved retention, and positive feedback, highlighting the potential of AI-driven tools to enhance conceptual understanding and sustain motivation in non-laboratory Electrical Engineering courses.

***Keywords*— Active Learning; AI in Education; Electrical Engineering; Student Engagement; Theoretical Courses; Video Quizzing.**

***JETLP Category*—Practice**

Introduction

The rapid integration of Artificial Intelligence (AI) into educational ecosystems has transformed the way instructors design, deliver, and assess learning experiences across higher education. Recent literature highlights a growing interest in AI-enabled pedagogies that strengthen student engagement, personalization, and instructional efficiency. Wang et al. (2024) demonstrates that AI applications significantly enhance learning effectiveness through automation, adaptive content delivery, and data-driven feedback mechanisms. Castillo-Martínez et al. (2024) further emphasizes that AI tools support curriculum enrichment and teaching innovation, particularly in engineering and technology-oriented programs. Studies by Al-Zahrani and Alasmari (2024)

examine the ethical, social, and pedagogical implications of AI in classrooms, underscoring the need for responsible implementation. Complementing this, Baig and Yadegaridehkordi (2024) outline key challenges in adopting tools such as ChatGPT, including accuracy, cognitive dependency, and assessment integrity. Dempere et al. (2023) investigate the disruptive impact of generative AI on teaching practices, reporting both opportunities for enhanced learning and concerns regarding academic authenticity. The broader body of work on interactive and video-based learning (Wachtler, 2016; Bakla, 2022; Zhang et al., 2006; Guaña-Moya et al., 2024; 2024 Review) consistently shows that embedded quizzes, interactive elements, and multimedia-rich content promote deeper understanding and better retention. Against this backdrop, the present practice leverages AI-generated animated video quizzing to foster active learning in theoretical Electrical Engineering courses.

Incorporating AI-enabled tools into classroom pedagogy has opened new possibilities for enhancing learner engagement, especially in theoretical subjects that students often perceive as less interactive. In this work, we present an innovative teaching–learning practice that leverages InVideo, an AI-powered video creation platform, to produce concise animated video clips enriched with stock visuals, voiceover, and AI-generated scripts. These videos were developed for courses such as Universal Human Values, Engineering Management & Entrepreneurship, Electrical Safety Practices, and Solar & Wind Energy, where conceptual understanding is essential but student interest tends to wane due to the non-technical nature of the content.

To promote active engagement, the videos are paused at carefully selected points during class for instructor-facilitated discussions and embedded quiz questions, creating an interactive video-quizzing environment. Additionally, ChatGPT is used to generate prompts, refine scripts, and design thought-provoking questions, ensuring coherence and pedagogical alignment. After classroom delivery, the videos are uploaded to the Learning Management System (LMS) for self-paced review, enabling students to reinforce concepts during revision and exam preparation. This integrated AI-supported strategy has demonstrated notable improvements in classroom participation, concept retention, and student motivation through sustained active learning and reflection.

Implementation Details

The practice utilized two AI-based tools: InVideo for video production and ChatGPT for scriptwriting and quiz design. The process began by selecting a theoretical topic from the identified courses and drafting the script and prompting instructions using ChatGPT. InVideo was then used to convert the script into engaging audiovisual content, incorporating narration and visual elements. Each video included embedded quiz pauses every 30–60 seconds, transforming passive viewing into an interactive learning activity.

During class sessions, the instructor played the videos and paused at quiz points to encourage discussion, gauge understanding, and promote active participation. Each video, with an average duration of 5–7 minutes, was later uploaded to the Learning Management System (LMS) for students to access during self-paced learning. Over the semester, 8–10 videos were created and integrated into core Electrical Engineering courses to reinforce conceptual clarity and sustain student curiosity

Details of Video Generation Using AI tools

AI tools were strategically utilized to streamline and enhance the process of educational video creation. ChatGPT was used to generate topic-specific scripts, design quiz questions, and structure engaging narration tailored to student learning needs. These scripts were then imported into InVideo, an AI-driven video creation platform, which transformed the text into high-quality instructional videos using automated scene generation, voice-over options, and customizable templates. Visual elements such as illustrations, animations, and concept diagrams were added to support deeper understanding. The final videos, typically 5–7 minutes long, included embedded quiz pauses to maintain learner engagement. This AI-assisted workflow significantly reduced production time while ensuring consistency, clarity, and pedagogical effectiveness. Table 1 shows the various course titles and the links for the videos.

Table 1: Video implementation details

Course Title	Topics Unraveled	Video Links
Engineering Management & Entrepreneurship	Financial Statements an Introductory guide	https://youtu.be/0uoJd3S1XD4
Electrical Safety Practices	Essentials of PPE-Ensuring Electrical Safety	https://youtube.com/shorts/tPAuWRWiS7E
Electrical Safety Practices	Understanding Hazardous zones	https://youtu.be/CckrJuOj7NY
Electrical Safety Practices	How to install irrigation pump ensuring electrical safety	https://youtu.be/FGKr-cVF_fM
Electrical Safety Practices	Electrical shocks due to High Voltage Hazards	https://youtube.com/shorts/-jYfyDIkjm0
Power System Operation & Control	Power System Operation & Control-SCADA & Power System Operating States	https://youtu.be/93BwU7Ew9-0

Impact and Outcomes

The introduction of AI-based video quizzing demonstrated notable improvements in engagement and comprehension. Student participation increased significantly during in-class sessions, and post-lecture quiz results reflected a 20–30% improvement in recall and understanding compared to conventional lectures. Feedback surveys revealed that 85% of students preferred this method for theoretical subjects. Moreover, video-based resources allowed students to revisit lessons before examinations, enhancing retention and promoting self-directed learning.

Lessons Learned

Several insights were gained from this practice. Balancing the number of quiz pauses was crucial to maintaining attention without interrupting flow. Visual diversity and relevance in videos were key to sustaining interest. AI-generated prompts required careful instructor review to ensure pedagogical alignment. Time investment for each video ranged from 1 to 1.5 hours, emphasizing the need for preplanning and content moderation.

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Author Bio

Mr Franco Aldrin Menezes is an Assistant Professor in the Department of Electrical & Electronics Engineering at St Joseph Engineering College, Mangaluru. His teaching interests include Power Electronics, Integration of Renewable Energy Resources, and Technology Integration in Education.

Mr. Deepesh Kanchan is an Assistant Professor in the Department of Electrical & Electronics Engineering at St Joseph Engineering College, Mangaluru. His teaching interests include Power Systems, Human Values, and Technology Integration in Education.

Both authors are passionate about integrating AI tools for enhanced learner engagement and outcome-based education.

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