Vol. 10, Issue 2, pp. 187-195 | DECEMBER 2025
DOI: https://doi.org/10.53840/myjict10-2-198

A FEASIBILITY STUDY ON INTEGRATING ARTIFICIAL INTELLIGENCE INTO ANIMATE CC ONLINE TO ENHANCE DESIGNER'S CREATIVITY

[i*]Khodijah Abdul Rahman, & [i]Nor Hidayah Hussain

[i]Faculty of Creative Multimedia and Computing, Universiti Islam Selangor, Malaysia

*(Corresponding author) e-mail: diejah@uis.edu.my

Article history:
Submission date: 2 January 2025
Received in revised form: 30 October 2025
Acceptance date: 31 December 2025
Available online: 31 December 2025

Keywords:
AI in animation, AI integration, designer's creativity, Adobe Animate CC Online

Funding:
This study was funded by Universiti Islam Selangor.

Competing interest:
The author(s) have declared that no competing interests exist.

Cite as:
Abdul Rahman, K., & Hussain, N. H. (2025). A Feasibility Study on Integrating Artificial Intelligence into Animate CC Online to Enhance Designer's Creativity. *Malaysian Journal of Information and Communication Technology (MyJICT)*, *10*(2), 187-195. https://doi.org/10.53840/myjict10-2-198

ABSTRACT

Adobe Animate CC is renowned for its robust feature set and versatility, facilitating the creation of high-quality animations through powerful drawing, tweening, and scripting tools. However, challenges in real-time rendering, resource-intensive processes, and limited interactivity hinder its effectiveness in online applications. Despite these hurdles, Adobe Animate CC remains relevant due to its ability to produce versatile, high-quality animations compatible across various platforms and its seamless integration with other Adobe Creative Cloud applications. The objective of this study is to investigate how AI technologies can augment Adobe Animate CC Online to overcome these challenges and enhance designer creativity. The method involves conducting a structured review of existing literature and relevant case studies on AI integration in animation tools to gain insights into potential benefits, challenges, and best practices. The results indicate that integrating AI into Adobe Animate CC Online holds promise for significantly improving animation quality, streamlining workflow processes, and unlocking new creative possibilities. Despite identified challenges such as real-time rendering limitations and scalability issues, the benefits of AI integration outweigh these obstacles. Overall, this study suggests that integrating AI into Adobe Animate CC Online has the potential to revolutionize the animation industry, fostering increased productivity, innovation, and competitiveness among animators and animation studios.

Introduction

Adobe Animate CC is a leading tool in the animation and multimedia industry, valued for its versatility, robust features, and cross-platform compatibility. It simplifies the creation of high-quality animations through powerful drawing, tweening, and scripting tools (Adobe, 2024). Its ability to export content in multiple formats and integrate with other Adobe Creative Cloud applications, such as Photoshop and Illustrator, enhances workflow efficiency and supports diverse animation projects.

Artificial Intelligence (AI) is increasingly transforming creative industries by performing tasks that traditionally require human intelligence, including learning, reasoning, and decision-making. AI uses techniques such as machine learning and neural networks to analyze large datasets, detect patterns, and support problem-solving, improving productivity and innovation across fields (Russell & Norvig, 2011).

Animation production involves multiple stages, from pre-production tasks like scriptwriting and storyboarding to production techniques such as hand-drawn animation and computer-generated imagery, and post-production activities including editing, compositing, and sound design (Williams, 2001). Integrating AI into Adobe Animate CC Online has the potential to enhance creativity and efficiency at each stage. AI can automate repetitive tasks, refine movements, generate realistic effects, and suggest innovative design alternatives, enabling designers to focus on artistic decisions and explore new creative possibilities (Zhang et al., 2022).

However, AI integration also presents challenges. Real-time rendering limitations, scalability issues, and the need for effective prompt engineering strategies can affect performance in web-based environments. Ethical concerns around AI-to-human communication highlight the importance of designing AI as a collaborative partner rather than a replacement for human creativity (Rezwana & Maher, 2022; Hutson & Lang, 2023). Understanding these challenges is essential to ensure that AI supports human creativity effectively and responsibly.

This study investigates how AI can be integrated into Adobe Animate CC Online to enhance designer creativity, streamline workflows, and support innovative animation production. It explores the benefits and limitations of AI integration and considers practical implications for designers, educators, and developers. The following sections review related works, outline the methodology for designing AI-enhanced Animate CC Online, present the study's results and findings, discuss the outcomes, and conclude with the overall contributions and implications of the research.

Related Literature

Evolution of Animation Software

The field of animation software has undergone a remarkable transformation, evolving from traditional frame-by-frame techniques to advanced digital platforms capable of supporting interactive and web-based content. Since its founding in 1982, Adobe has played a key role in this evolution by developing industry-standard creative tools. The company initially gained recognition through PostScript and later expanded its influence with applications such as Photoshop and Illustrator. Following its acquisition of Macromedia in 2005, Adobe further extended its portfolio to include multimedia and animation technologies.

A significant milestone in this evolution is Adobe Animate CC. Originally launched as Adobe Flash Professional, the software was widely adopted for creating vector-based animations and interactive web content. As industry requirements shifted toward more secure, open, and web-compatible technologies, Adobe rebranded the platform as Animate CC in 2016, transitioning from reliance on Flash Player to a modern, HTML5-based framework (Lee, 2015).

This shift reflects broader trends in the animation industry toward web-compatible, cross-platform solutions that facilitate content delivery across browsers, mobile devices, and learning environments. Today, Adobe Animate CC enables creators to produce 2D animations, interactive educational resources, and multimedia applications using standards such as HTML5 Canvas, JavaScript, SVG, and WebGL. Its versatility ensures that it remains a relevant tool for both technological and pedagogical applications in contemporary digital animation.

For fully online alternatives, cloud-based platforms such as Animaker and Powtoon provide accessible options for creating animated videos and presentations. Additionally, the open-source Wick Editor offers a browser-based 2D animation environment. These options raise an important question for this study: to what extent is Adobe Animate CC suitable for online use? This research aims to explore this question in detail.

AI in Creative Industries

Artificial intelligence (AI) is starting to play a big role in creative fields like animation, video, and multimedia. Instead of just doing simple repetitive tasks, AI can now help artists come up with ideas, create content faster, and explore new styles. For example, new AI tools—like those that generate images or text—can suggest background designs, character poses, or story dialogue, saving creators a lot of time.

When combined with tools like Adobe Animate CC, AI doesn't replace the animator but acts like a smart assistant. The animator can focus on creative decisions, while AI handles routine or time-consuming parts, like filling in frames, suggesting motion, or generating effects. This allows multimedia creators to experiment more, try different animation styles, and produce content for web, mobile, or educational platforms much faster.

In short, AI is making multimedia creation more efficient, flexible, and playful, helping people bring their ideas to life without getting stuck on the tedious details.

Human-AI Collaboration in Design

In recent years, researchers have started to think of artificial intelligence (AI) not just as a tool, but as a collaborative partner that can work alongside humans in creative processes. Instead of completely taking over tasks, AI is seen as something that augments human creativity, helping artists, designers, and multimedia creators do more in less time. Studies show that for this collaboration to work well, AI systems need to be transparent (so users understand how suggestions are made), provide meaningful control (so users can accept, modify, or reject AI outputs), and support two-way interaction (so the AI can respond to user input and vice versa) (Rezwana & Maher, 2023).

In the context of multimedia and animation, this means that AI can suggest ideas, generate draft animations, or help with repetitive tasks like in-betweening frames, but the human creator still makes the final creative decisions. For example, when using tools like Adobe Animate CC or even online animation platforms, AI could propose character movements, background designs, or dialogue options. The animator can then choose what to use, tweak it, or reject it entirely.

This collaborative approach changes the way we think about creativity in research: it's not about replacing human imagination, but about enhancing it. AI becomes a smart assistant that helps explore more ideas, try new visual styles, and speed up production, all while keeping the human creator in control. This concept is especially important in multimedia research, where understanding how humans and AI work together can guide the development of more effective animation and interactive content tools.

Technical Challenges in Web-Based Creative Applications

Web-based creative applications offer the advantage of accessibility, allowing users to create content directly from a browser without installing complex software. However, they also face unique technical constraints that are less of a concern for desktop applications. Differences in browser capabilities, device performance, screen sizes, and internet speed can limit how advanced features are implemented. For example, real-time rendering of animations, smooth timeline control, or collaborative editing can be more difficult to achieve online compared to a desktop environment.

These limitations become even more significant when considering AI integration. Many AI-powered tools, such as generative models for animations, image suggestions, or automated in-betweening of frames, require high computational power that may not be fully supported in a browser. As a result, AI features in web-based platforms often rely on cloud processing, which introduces network dependency and latency, potentially affecting responsiveness and user experience (Amershi et al., 2019).

In the context of multimedia creation, this means that while web-based platforms like Animaker or Powtoon make animation more accessible and convenient, they may struggle to match the performance, flexibility, and advanced AI capabilities offered by desktop software like Adobe Animate CC. Understanding these constraints is crucial for researchers and developers, as it informs the design of hybrid workflows where AI can enhance creativity without being limited by browser or device restrictions.

Methodology

This section describes the methodology using a structured literature review approach to investigate how AI technologies can augment Adobe Animate CC Online to overcome existing challenges and enhance designer creativity. There are four phases involved in this approach namely literature search, selection criteria, literature analysis and synthesis and conceptual framework development.

Literature Search

The first phase involved a literature search conducted through major academic databases, including ACM Digital Library, Researchgate, and Google Scholar. The search focused on articles published between 2020 and 2025 to capture recent studies related to AI integration and animation technologies. This timeframe allowed the review to concentrate on current developments in AI and creative technology within the selected research domain.

A comprehensive set of keywords was employed to identify pertinent literature, including: "Adobe Animate CC functionality," "Limitations of Animate CC Online," "Artificial Intelligence (AI) augmentation," "Enhancement of designer creativity," and "Challenges in AI integration." These keywords were strategically selected to address all dimensions of the research question, from technical platform capabilities to creative enhancement outcomes.

Selection Criteria

Specific inclusion and exclusion criteria were established to ensure that the selected studies aligned with the research objectives and scope of the review.

Inclusion criteria comprised:

- Peer-reviewed journal articles, and conference proceedings published between 2020 and 2025
- Studies focusing on AI integration in animation tools and creative software
- Research addressing workflow enhancement, designer creativity, and AI augmentation in digital content creation
- Articles discussing Adobe Animate CC or similar animation platforms
- Publications examining cross-platform compatibility and online application challenges in creative software environments

Exclusion criteria included:

- Studies published before 2020
- Non-English and Non-Malay language publications
- Articles lacking empirical evidence or theoretical foundation
- Research unrelated to animation, design, or AI integration

Literature Analysis and Synthesis

The third phase involved a structured manual analysis and synthesis of the selected literature by comparing findings across studies based on the main concepts of this research. The analysis was guided by predefined conceptual categories derived from the research objectives and initial literature review.

The literature was organized around several components: Adobe Animate CC functionality, limitations of Animate CC Online, Artificial Intelligence (AI) augmentation, enhancement of designer creativity, and challenges in AI integration. Each article was reviewed and compared manually to identify similarities, differences, and relationships across these components.

Key aspects such as research focus, technological approaches, and reported outcomes were extracted and contrasted to identify patterns, gaps, and opportunities for AI integration in Adobe Animate CC Online. The insights derived from this comparative synthesis informed the development of the proposed conceptual framework.

Conceptual Framework Development

The final phase involved the development of a conceptual framework based on the outcomes of the literature analysis and synthesis. This framework was formulated to organize and represent the key

concepts identified across the reviewed studies related to AI integration in online animation environments. The development process focused on structuring the relationships between AI integration, designer creativity, and the associated benefits and challenges discussed in the literature.

The resulting conceptual framework presents a high-level representation of how AI integration may contribute to enhancing designer creativity, while also acknowledging commonly reported constraints such as technical limitations and usability challenges in online platforms. This framework serves as a guiding structure for discussing the feasibility of AI integration in Adobe Animate CC Online and provides a foundation for future empirical research and system development.

Results and Findings

The results of this feasibility study indicate that integrating Artificial Intelligence (AI) into Adobe Animate CC Online has significant potential to enhance animation design, improve workflow efficiency, and support creative exploration. The findings highlight two main outcomes of AI integration: benefits and challenges. By reviewing existing literature and case studies on AI in animation tools, the study identified how AI can improve both the creative process and practical outputs for users such as designers, educators, and developers. AI integration in Animate CC Online can automate repetitive tasks, provide intelligent suggestions, and enhance real-time feedback, allowing users to focus on creative decision-making, experiment with new ideas, and produce higher-quality animations more efficiently.

Figure 1 illustrates the conceptual framework of AI integration in enhancing designer creativity, highlighting both the benefits and challenges associated with its implementation. The framework shows that AI integration contributes to improved animation quality, streamlined workflow, and enhanced creative possibilities. However, it also presents challenges such as real-time rendering limitations, scalability issues, and the initial learning curve faced by designers.

Benefits

Improved Animation Quality

One of the primary benefits of AI integration is the improvement in the quality of animations. AI algorithms can refine character movements, generate realistic lighting and shading, and produce dynamic environmental effects that would be time-consuming to create manually. This allows designers to deliver polished, professional-quality content that meets current industry standards. For example, a teacher creating an animated educational video can use AI to automatically smooth character gestures and add subtle facial expressions, making the content more engaging for students without requiring extensive manual work.

Streamlined Workflow

AI also streamlines the animation workflow by automating repetitive and mundane tasks. Keyframe adjustments, in-betweening, and asset management can be handled by AI, allowing creators to spend more time on the conceptual and artistic aspects of animation. This automation not only speeds up production but also reduces overall costs, enabling designers to take on additional projects or complete tasks more efficiently. For instance, a freelance animator working on an explainer video can rely on AI to generate intermediate frames for a walking sequence, saving hours of manual effort while maintaining creative control.

Enhanced Creative Possibilities

Another significant advantage of AI integration is the expansion of creative possibilities. AI tools can suggest alternative design solutions, generate novel animation ideas, and support experimentation with different styles and techniques. This encourages users to explore innovative approaches that might be too complex or time-consuming to attempt manually. For example, a developer designing interactive educational apps can use AI to test multiple animation styles for a character in real-time, quickly identifying which version best engages learners and enhances the user experience.

Challenges

Real-Time Rendering Limitations

Despite the benefits, AI integration poses challenges, particularly related to real-time rendering. AI algorithms require substantial computational power, which can lead to delays and reduced responsiveness in a web-based environment like Animate CC Online. This lag can disrupt workflow and slow down the creative process. For example, while generating AI-assisted background effects for a web animation, designers using less powerful devices or slower internet connections may experience delays that interrupt their creative flow.

Scalability Issues

Ensuring consistent performance of AI tools across different devices and network speeds is another challenge. Users may work on high-performance desktops, laptops, or tablets, each with varying capabilities, and internet connectivity can further affect AI responsiveness. These variations can lead to inconsistent experiences and outcomes, particularly when multiple team members are collaborating remotely. For instance, an AI feature that works smoothly on a high-end desktop may perform poorly on a tablet with slower connectivity, impacting collaborative workflows.

Initial Learning Curve

Effectively using AI tools also requires users to learn new workflows and interactions with intelligent systems. Designers, teachers, and developers must understand how to interpret AI suggestions, adjust outputs, and integrate AI-generated content into their creative process. Without proper training, users may underutilize these tools or produce suboptimal results. For example, a teacher creating an animated lesson may need training to effectively use predictive drawing or AI-assisted lip-sync features, ensuring that the animations meet both educational and visual quality standards.

Implications for Practice

Overall, the study suggests that AI integration in Adobe Animate CC Online can empower designers, educators, and developers to produce high-quality, versatile animations more efficiently. By automating routine tasks, improving visual quality, and expanding creative possibilities, AI supports innovative experimentation while maintaining human creative control. Addressing challenges related to real-time performance, scalability, and user training is essential for maximizing the benefits of AI in online animation workflows. This approach aligns with current industry trends, where AI is increasingly used to augment creativity rather than replace it, helping professionals explore new ideas and stay competitive in a rapidly evolving digital media landscape.

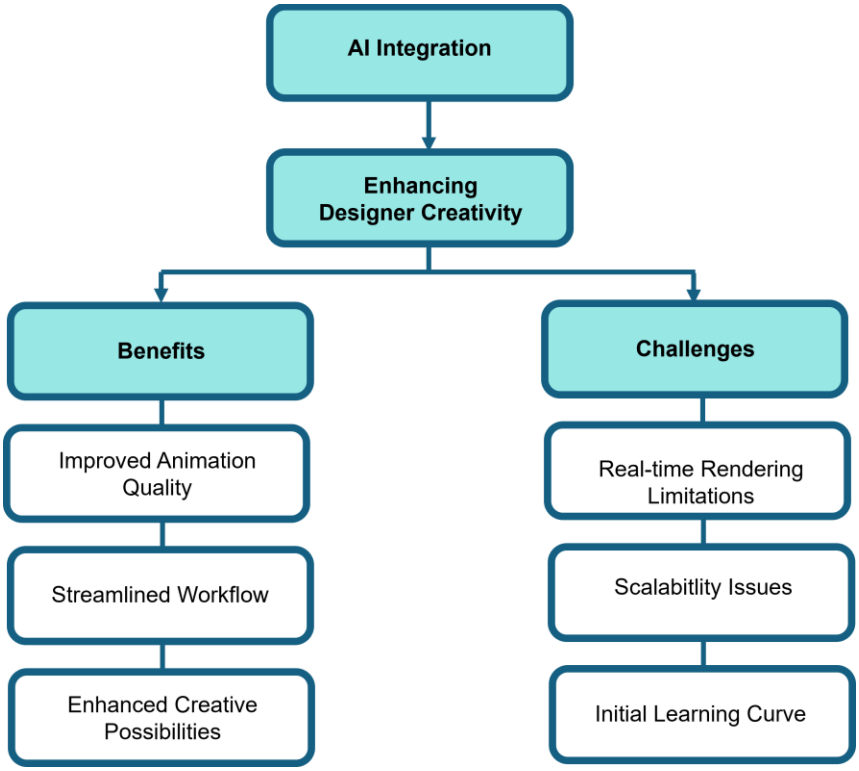

Fig 1: Conceptual framework of AI integration for enhancing designer creativity

Discussion

Integrating Artificial Intelligence (AI) into Adobe Animate CC Online can greatly improve creativity, workflow, and animation quality. Studies show that AI can act as a collaborative partner, providing design suggestions, generating new ideas, and supporting the creative process. For example, AI can create images based on similar concepts, helping designers explore ideas they might not have considered (Kim & Maher, 2023). When combined with Virtual Reality, AI can turn design sessions into immersive experiences, allowing more interactive and engaging ideation (Grech et al., 2023).

The results of this study show that AI in Animate CC Online can improve animation quality by refining character movements, creating realistic effects, and enhancing visuals. Designers can produce professional animations faster and focus on artistic choices. Teachers can use AI to make more engaging educational animations, and developers can experiment with interactive applications without being limited by technical challenges. Automating repetitive tasks such as in-betweening, lip-syncing, and keyframe adjustments also saves time and allows more space for creativity (Elfa & Dawood, 2023).

AI also expands creative possibilities by suggesting alternatives, analyzing designs, and encouraging experimentation. Integrated AI tools can combine multiple AI models to improve performance and support collaboration between human and machine (Zhang et al., 2022). AI can help generate a wider variety of ideas and push designers to try new animation styles (Kim & Maher, 2023). Importantly, AI does not replace human creativity but enhances it, allowing designers to explore possibilities beyond their own limitations.

However, integrating AI into Animate CC Online has challenges. Real-time rendering can be slow because AI requires high computational power, especially in web-based environments (Grech et al., 2023). Different devices and internet speeds can affect performance, making AI less consistent. Users also need time and training to learn new workflows, which can be difficult for designers or teachers unfamiliar with AI tools.

Ethical considerations are also important. AI should be used responsibly, respecting human authorship and avoiding harmful outputs (Vinchon et al., 2023). Effective prompt engineering and iterative workflows help maximize benefits and reduce risks, especially in education and professional projects

(Cotroneo & Hutson, 2023). Human oversight is still necessary to ensure AI outputs align with creative intentions and professional standards (Hutson & Lang, 2023).

Overall, AI in Adobe Animate CC Online can help designers, teachers, and developers produce higher-quality animations more efficiently. By automating routine tasks, providing suggestions, and supporting co-creation, AI encourages exploration of new ideas. Addressing challenges such as performance, scalability, and training is important for maximizing AI's potential. This approach aligns with industry trends where AI supports rather than replaces human creativity, helping creators develop skills, try new techniques, and produce innovative multimedia content.

Conclusion and Implementation

This feasibility study highlights the significant potential of integrating Artificial Intelligence (AI) into Adobe Animate CC Online to enhance creativity and efficiency in animation production. The study shows that AI can improve animation quality by refining movements, generating realistic effects, and supporting innovative design ideas. It can also streamline workflows by automating repetitive tasks such as in-betweening, keyframe adjustments, and asset management, freeing designers, educators, and developers to focus on creative decisions. Furthermore, AI expands creative possibilities by suggesting alternative approaches, analysing designs, and encouraging experimentation, enabling users to explore styles and concepts beyond traditional limitations.

Despite challenges related to real-time rendering, device variability, and the learning curve for new AI workflows, the benefits clearly outweigh these obstacles. Addressing these challenges through optimized algorithms, scalable solutions, and proper user training can ensure that AI tools are accessible, effective, and reliable in web-based animation environments. Ethical considerations and responsible use of AI are also essential to maintain human creative control and align outputs with professional and educational standards.

Overall, integrating AI into Adobe Animate CC Online has the potential to transform animation practice. It can empower individual animators, educators, and studios to produce high-quality, versatile content more efficiently, foster innovation, and enhance competitiveness in the animation industry. By supporting both productivity and creativity, AI integration represents a significant step forward in the evolution of digital animation tools, bridging the gap between human imagination and computational intelligence.

Acknowledgement

This study was funded by Universiti Islam Selangor.

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