

## The Effectiveness of Artificial Intelligence Platforms in Creating Digital Educational Content

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### Abstract

This study investigates the effectiveness of Artificial Intelligence (AI) tools in enhancing digital content creation within project-based learning (PBL). Conducted at the Department of English Language and Literature, specifically the English Education Study Program, Faculty of Languages and Arts, Universitas Negeri Medan, the research focuses on students enrolled in the Digital Education Content Creator subject. The objective of the study is to evaluate the effectiveness of Artificial Intelligence (AI) in enhancing the quality of educational video content compared to conventional methods within a project-based learning framework. The research used a randomized sampling method, involving 80 students divided into two groups: an experimental group of 40 students using AI tools and a control group of 40 students relying on traditional approaches. Both groups created videos assessed based on six key criteria: content quality and relevance, clarity and structure, engagement, technical quality, duration and tempo, and accessibility and usability. The results show that the experimental group achieved significantly higher post-test scores, with an average of 3.8 compared to 2.64 in the control group. Hypothesis testing also supports these findings, with a t-test result exceeding the critical value. The findings confirm that AI tools significantly improve content quality, enabling students to produce more relevant, accessible, and technically refined digital content within a PBL framework. Future research should address AI's long-term effectiveness in different subject areas, accessibility challenges, and ethical concerns in education.

**Keywords:** artificial intelligence, digital content creation, project-based learning

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## Introduction

The Fourth Industrial Revolution (Industry 4.0) and Society 5.0 represent significant shifts characterized by the integration of Artificial Intelligence (AI) and the Internet of Things (IoT), reshaping various sectors, including education. Using digital tools like interactive videos, online quizzes, virtual simulations, and AI-driven systems enhances the learning process by offering dynamic, multimedia environments that meet diverse learning styles and needs (Dron & Anderson, 2011; Laurillard, 2012). Digital technology makes personalized learning possible by helping teachers adapt educational content to suit the needs and preferences of each student. It also promotes interactive and collaborative learning through tools like learning management systems and educational apps (Hattie, 2009; Mayer & Fiorella, 2022). However, educational community is encountering both the opportunities and challenges presented by the ongoing advancement of artificial intelligence (AI) technologies, which have the potential to significantly transform the structure, functioning, and management of educational institutions (Popenici & Kerr, 2017). This change requires teachers to continuously update their skills and adjust to fast-changing technologies in order to be able to design more interactive and tailored learning experiences, enabling real-time feedback and opportunities for collaboration, which can be challenging (Baranwal, 2022; Selwyn, 2016; Laurillard, 2012). As the educational landscape evolves, developing digital literacy has become essential for students to navigate and succeed in this dynamic environment. According to (Law et al., 2018), digital literacy involves the ability to access, evaluate, create, and communicate information using information and

communication technologies (ICT), which is essential for preparing students to meet the demands of modern education.

Integrating digital literacy into higher education curricula in Indonesia is crucial for aligning with global educational standards. The Digital Education Content Creator course at Universitas Negeri Medan is an exemplary initiative integrating project-based learning (PjBL) to develop practical skills in digital content creation. As (Spante et al., 2018) states, digital literacy extends beyond technical skills to encompass critical thinking, creativity, and the ability to innovate in response to technological advancements. However, the digital rapid development can also a major challenge, as unequal access to technology can impact students' learning opportunities (Warschauer, 2011). In order to use digital resources effectively teachers should build technological skills and adopt a thoughtful strategy to align these tools with learning goals (Kirkwood & Price, 2013). Recent research emphasizes the need to equip future educators with the skills required to effectively utilize digital tools in their teaching (Bates & Vancouver, 2019; Koehler, 2006). By doing so, universities can ensure that teacher candidates are prepared to develop engaging, high-quality educational materials that cater to the diverse needs of students in the digital era. Educators must also address challenges such as ensuring equal access to technology and promoting digital literacy among students to fully harness the benefits of digital content (Greenhow, 2011).

However, in its application to the Digital Education Content Creator subject in the previous semester, it was found a lack of quality in the educational content produced by students. A needs analysis identified several challenges faced by students in creating learning content. These challenges included limited access to tools (such as cameras, video recorders, and editing equipment), issues related to locations or studios for recording, and difficulties with scheduling. Students also faced problems related to inadequate technical skills which often impede students' ability to create high-quality digital content. To overcome these obstacles, AI platforms offer innovative solutions that streamline the content creation process while enriching students' learning experiences.

Artificial intelligence can be defined as the ability of a computer system to carry out tasks typically requiring human intelligence, such as thinking (Whitby, 2009; Wang, 2019; Sadiku et al., 2021). AI platforms have emerged as powerful educational tools, offering unique capabilities to transform teaching and learning. These platforms leverage deep learning and computer vision technologies to create dynamic and interactive educational content, addressing traditional challenges such as limited recording equipment, complex editing processes, and time constraints. (Tuomi, 2018;) note, AI technologies in education can provide personalized learning, instant feedback, and the development of critical skills, allowing for adaptive learning experiences. By automating specific aspects of digital content production, AI platforms enable students to focus on creativity and instructional design. This approach aligns with Indonesia's competency-based education framework, which emphasizes measurable student outcomes, as outlined in the Indonesian National Qualifications Framework (KKN) and Outcome-Based Education (OBE).

Integrating AI platforms into project-based assignments enhances students' readiness for the digital era by providing practical, hands-on experiences in content creation. PjBL emphasizes real-world problem-solving and active engagement and offers an ideal framework for preparing students to meet 21st-century challenges. AI tools in PjBL support the development of interdisciplinary competencies such as problem-solving, innovation, and adaptability—critical skills for future educators in a technology-driven world. As (Thomas, 2000) asserts, PjBL fosters critical thinking and conceptual understanding by encouraging students to apply their knowledge to solve real-world problems. However, the effective integration of AI in these projects requires careful alignment of AI capabilities with curriculum objectives, students' understanding of AI, and the contextual relevance of the projects. Addressing these factors is crucial to maximizing the benefits of AI-enhanced learning environments.

The Digital Education Content Creator course at Universitas Negeri Medan provides students with practical training in digital content production, focusing on digital materials' design, sustainability, and pedagogical relevance. This course teaches students to plan, produce, and deliver digital educational content tailored to specific learning objectives and target audiences. Students gain hands-on experience creating high-quality content using various digital tools and media formats by incorporating AI platforms into the learning process. As (Ruiz Hidalgo, 2022) highlights, PjBL provides an ideal structure for encouraging active learning, where students solve real-world problems by engaging deeply with their projects. The course not only equips students with essential digital skills but also fosters creativity and innovation in education, preparing them to contribute positively to the growing digital education content creation field.

Despite these technological advancements, previous research highlights challenges in effectively integrating digital tools into education. For instance, while digital platforms offer the potential for transformative learning, many educators and students face barriers such as a lack of access to advanced tools, limited technical proficiency, and insufficient training in technology integration (Kirkwood & Price, 2013; Greenhow, 2011). Although studies have demonstrated the importance of preparing future educators with digital competencies (Bates & Vancouver, 2019; Koehler, 2006), there is limited research specifically addressing how AI platforms can bridge these gaps and enhance the quality of digital content creation in higher education.

This study aims to address this gap by exploring the potential of AI tools to overcome traditional challenges in content production and improve learning outcomes for students by investigating the effectiveness of AI platforms in enhancing digital content creation within the framework of the Digital Education Content Creator course at Universitas Negeri Medan. By examining how AI integration supports PjBL, the research aims to evaluate its impact on students' digital literacy development and overall learning outcomes. The findings are expected to provide valuable insights into the role of AI in fostering innovation and addressing challenges in digital content creation, offering practical recommendations for educators and institutions looking to leverage AI in modern teaching practices. Unlike previous studies, which often focus broadly on digital literacy, this research emphasizes the direct application of AI tools in overcoming specific barriers to content production. It is expected that this research will contribute to the broader discourse on integrating AI into education and its potential to revolutionize how digital content is created and used in the classroom.

## Method

Experimental research is a systematic method for investigating cause-and-effect relationships by manipulating independent variables and observing their effects on dependent variables (Ary et al., 2006) In this study a quasi-experimental design was employed to evaluate the impact of AI integration on digital content creation. Participants were undergraduate students enrolled in the Digital Education Content Creator course at Universitas Negeri Medan. The study involved 80 participants, divided equally into control and experimental groups, ensuring diversity regarding prior experience with digital tools and content creation. The experimental group utilized advanced AI platforms designed for digital content creation, offering features such as automated scripting, customizable templates, and seamless video editing capabilities. These tools were selected for their ability to simplify complex production tasks and enable the creation of professional-quality educational content. In contrast, the control group relied on manual methods for creating content, using essential software such as PowerPoint and standalone video editing applications, which required more manual input and technical effort. PowerPoint and these softwares were categorized as manual methods due to requirement for extensive manual input in content production.

Data collection methods included rubrics for evaluating digital content, surveys to capture students' perceptions and experiences, and statistical analyses conducted using SPSS 22. A pre-test and post-test evaluation framework were employed to measure improvements in six core criteria: relevance, clarity, engagement, technical quality, pacing, and usability. These criteria were chosen to assess the technical and pedagogical effectiveness of the content. The analysis focused on comparing the performance of the two groups to determine the extent to which AI integration enhanced the quality of digital content and improved students' overall digital literacy. Insights gained from the study aim to provide practical recommendations for integrating AI into project-based learning approaches, particularly in courses designed to prepare students for technology-driven educational practices. The stages of the research are described in the following diagram:

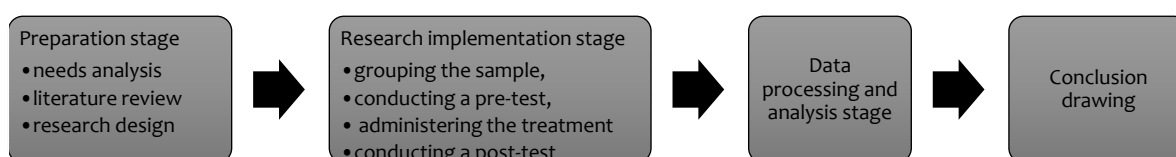


Figure 1. Stages in Experimental Research

## Results and Discussion

This study compared the outcomes of educational video creation between the control group, which used conventional methods, and the experimental group, which utilized AI-based platforms. The average scores of each group were evaluated based on six criteria: Content Quality & Relevance, Clarity & Structure, Engagement, Technical Quality, Duration & Pacing, and Accessibility & Usability. The table below summarizes the pre-test and post-test results for both groups, followed by a diagram visualizing the score comparison.

**Table 1.**  
Pre-Test and Post-Test Scores of Control and Experimental Groups

Criteria	Control Group (Pre-Test)	Experimental Group (Pre-Test)	Control Group (Post-Test)	Experimental Group (Post-Test)
Content Quality and Relevance	2.6	2.7	2.75	3.8
Clarity & Structure	2.5	2.6	2.50	3.7
Engagement	2.7	2.6	2.80	3.6
Technical Quality	2.4	2.5	2.60	3.9
Duration & Pacing	2.6	2.5	2.70	3.8
Accessibility & Usability	2.5	2.4	2.50	4.0

Before the intervention, both the control and experimental groups showed similar performance in the pre-test phase, with an average score of 2.55. This indicates that the videos created by both groups had an average quality in terms of content, structure, and technical aspects. In particular, Content Quality & Relevance was rated at 2.6 for the control group and 2.7 for the experimental group, showing that both groups produced videos with moderately relevant content, though the experimental group slightly outperformed the control group. Similarly, Clarity & Structure was slightly higher for the experimental group (2.6 compared to 2.5 for the control group), suggesting that the videos were structured with a similar level of clarity,

but the experimental group showed a minor edge in organization. Both groups were rated similarly (2.7 for the control group and 2.6 for the experimental group), indicating that neither group's videos were particularly interactive or engaging in the pre-test phase. Technical Quality, Duration & Pacing, and Accessibility & Usability all showed moderate ratings in the 2.4-2.6 range, highlighting that neither group produced videos with advanced technical features or user-friendly attributes before the intervention.

After the intervention, where the experimental group used AI tools for video production, the results showed a significant improvement in the experimental group across all criteria. The Content Quality & Relevance in the experimental group increased to 3.8, compared to 2.75 in the control group. This major improvement suggests that AI tools helped the experimental group create more relevant and high-quality content, enhancing the overall effectiveness of their videos. Similarly, Clarity & Structure showed a substantial increase in the experimental group (3.7), indicating that AI-assisted tools helped improve the organization and clarity of the videos, compared to the control group's 2.5.

The experimental group outperformed the control group with a score of 3.6, compared to 2.8 for the control group. This suggests that the videos made by the experimental group were more engaging and interactive, likely due to the enhanced features provided by AI, such as automated scripts and customized visuals. Technical Quality showed the most significant improvement for the experimental group (3.9), compared to the control group's 2.6. The use of AI likely enhanced video resolution, sound quality, and overall production values, making the videos technically superior. Additionally, Duration & Pacing improved in both groups, but the experimental group showed better control over video length and pacing (3.8), as compared to 2.7 in the control group. The greatest improvement was seen in Accessibility & Usability, with the experimental group achieving a perfect score of 4.0, while the control group scored only 2.5. This highlights that AI tools made the videos more accessible, user-friendly, and easier for the target audience to engage with. A t-test revealed a significant difference between the groups, with a calculated t-value of 9.13, far exceeding the critical t-value of 1.761. This result supports the hypothesis that integrating AI significantly impacts students' ability to produce high-quality educational content.

The average total scores reflect a clear contrast in performance. The control group showed a slight increase in their average score, rising from 2.55 in the pre-test to 2.64 in the post-test. This minor improvement indicates that the traditional methods used by the control group had limited impact on improving the overall quality of their videos. On the other hand, the experimental group experienced a significant improvement, with their average score rising from 2.55 in the pre-test to 3.8 in the post-test. This substantial improvement underscores the effectiveness of AI tools in enhancing the quality of educational videos. The experimental group not only improved in content relevance, structure, and technical quality but also created more engaging and accessible videos compared to the control group.

The findings of this study provide strong evidence that integrating AI tools into video content creation significantly enhances the quality of educational videos. This aligns with the introductory discussion on the transformative potential of AI and digital literacy in the context of Industry 4.0 and Society 5.0. AI has emerged as a crucial tool for reshaping educational practices, particularly content creation. The study results highlight that AI-assisted platforms provide distinct advantages over traditional methods, particularly in technical quality, content relevance, clarity, and accessibility. These improvements reflect the theoretical foundation that AI tools, as part of the broader digital literacy framework, can enhance students' ability to produce high-quality digital content, aligning with (Law et al., 2018) definition of digital literacy and (Spante et al., 2018) focus on critical thinking, creativity, and technological adaptability.

The experimental group used AI tools in their video production process and demonstrated significant improvements across six evaluation criteria. These findings confirm that AI tools help students produce polished, relevant, and engaging content, addressing traditional challenges in

video production. For example, the experimental group outperformed the control group in content quality, clarity, structure, and technical quality. AI tools such as automated video editing, enhanced visuals, and synthetic avatars facilitated the production of professional-level videos, bypassing the need for advanced technical skills, a limitation for the control group, which relied on essential video editing software. As (Ruiz Hidalgo, 2022) suggest, AI technologies in education provide personalized, adaptive learning experiences. In this case, AI platforms supported students in creating more engaging content by improving the technical aspects of video production and content delivery.

The study's results further highlight the substantial improvements in accessibility and usability for the experimental group, which scored higher in these areas than the control group. AI tools, such as automatic subtitle generation, adaptive layouts, and simplified interfaces, significantly enhanced the usability of videos, making them more accessible to diverse audiences. This improvement directly supports the growing emphasis on inclusive education, as discussed in the introduction, where digital literacy involves not just technical skills but also the ability to create accessible content to a wide range of learners. AI platforms, therefore, represent a crucial innovation in supporting the accessibility goals of digital content creation, as noted by (Spante et al., 2018)

The significant increase in content quality and relevance for the experimental group also echoes the discussion on the role of AI in streamlining content creation. The AI-assisted approach allowed students to produce well-structured, engaging, and relevant videos aligned with educational objectives, reflecting the theoretical understanding that AI can help students innovate and create high-quality content more efficiently. In contrast, the control group, which relied on conventional methods, produced less refined content. This aligns with the study's assertion that traditional video-making tools like PowerPoint and basic video editors lack the advanced capabilities necessary to create high-quality, engaging educational videos.

The statistical analysis, which confirmed the significant difference between the control and experimental groups, further strengthens these findings. With a t-value of 9.13, exceeding the critical t-value of 1.761, the hypothesis testing provides robust evidence that AI platforms significantly improve content creation outcomes. This result emphasizes the practicality and effectiveness of AI tools in enhancing digital content creation, particularly in educational contexts where engagement, clarity, and accessibility are critical.

In line with the introduction's discussion on AI's role in digital literacy, the study's findings support that integrating AI into digital literacy and content creation courses enhances students' ability to produce high-quality work. As educational institutions continue to integrate digital tools into curricula, AI platforms can become essential resources for creating accessible, engaging, and professional-level educational content. These platforms not only streamline the production process but also enable students to focus on the creative aspects of content creation, fostering the development of critical skills such as innovation and problem-solving.

Furthermore, the findings align with previous research on the impact of AI tools on digital content creation. The introduction highlights that AI tools facilitate personalized learning, skill development, and creative expression. The rapid development of AI technologies suggests that integrating these tools into educational practices offers students significant learning outcomes and digital competency advantages. This study provides practical recommendations for educators and institutions leveraging AI in modern teaching practices, particularly project-based learning (PjBL). By incorporating AI platforms into PjBL, students gain valuable experience in content creation, enhancing their readiness for the digital era and preparing them for future challenges in the technology-driven educational landscape.

## Conclusion

This study highlights the significant role of Artificial Intelligence (AI) tools in enhancing the quality of educational video content produced by students. The experimental group, which used AI tools, demonstrated substantial improvements in post-test scores across all assessment criteria, with an average score of 3.8 compared to 2.64 for the control group, which relied on conventional methods. These results confirm that AI tools help students create content that is more relevant, technically refined, engaging, and accessible. The statistical analysis supports this conclusion, as the t-test result ( $t = 9.13$ ) significantly exceeds the critical value, indicating a meaningful effect of AI on student performance.

The findings have important implications for education, particularly in integrating technology into teaching and learning. AI tools not only enhance technical capabilities but also enable students to approach tasks with greater creativity and efficiency. This makes AI a valuable resource for modern pedagogy, especially in project-based learning (PBL). By incorporating AI into PBL assignments, students can develop both technical and problem-solving skills, as the tools provide support in organizing ideas, refining outputs, and ensuring quality across various project stages.

Future research could explore the long-term impact of AI tools in PBL settings and their effectiveness in different subject areas. Investigating how AI can support collaboration, creativity, and critical thinking in group projects would provide deeper insights into its potential. Additionally, addressing challenges such as access to AI tools, ethical concerns, and the risk of over-reliance on technology could guide the development of balanced and inclusive strategies for integrating AI in education. Overall, these findings suggest that AI-driven tools have the potential to revolutionize learning by fostering higher-quality outcomes and preparing students for the demands of the digital age.

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