A Study on The Effectiveness of Multimodal Learning, Gamification, and PBL in Academic Writing Classes

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Abstract

This study explores the integration of multimodal learning, gamification, and project-based learning (PBL) to enhance university students' creativity, engagement, and independence in academic writing. Tools such as ChatGPT and Canva support multimodal learning by helping students generate content and create visually enriched materials, including graphs, infographics, and visuals. Google Slides allows students to hyperlink research sources directly within their writing, ensuring evidence-based arguments. For gamification, platforms like Quizlet and Kahoot provide personalized experiences and real-time feedback. Grounded in theories of multimodal literacy, gamified learning, and experiential learning through PBL, this study addresses these gaps using a mixed-methods approach with 150 students from a private Indonesian university through surveys and interviews. Results showed 78% of students felt AI-enhanced multimodal elements boosted creativity, 82% found them engaging, 85% reported AI-driven gamification increased engagement, and 74% noted it fostered critical reflection. Additionally, 81% of students felt more comfortable managing projects independently, with 79% more motivated by topic choice. Interviews highlighted reduced anxiety and increased ownership. These methods create a synergistic effect, transforming writing into a more engaging, self-directed experience. It is recommended that educators leverage AI tools to foster creativity, critical thinking, and independence, aligning with technological advancements in education.

Keywords: *Gamification; Multimodal Learning; Project-Based Learning (PBL)*

A. Introduction

The ability to effectively teach academic writing is crucial in higher education, particularly as writing extends beyond academics into professional and everyday communication. However, traditional writing instruction often fails to fully engage students, leading to challenges in fostering creativity, critical thinking, and autonomy—skills essential for high-quality writing (Archer, 2006; Chen & Yang, 2019; Filippatou & Kaldi, 2010; Valeri, 2015). Conventional approaches, like lecture-based methods and isolated writing exercises, lack the dynamic qualities needed to nurture these competencies. As a result, many students experience difficulty

developing their writing skills in ways that inspire independent and innovative thought.

In recent years, innovative teaching methods have emerged, promising to enhance engagement and skill acquisition in writing education. Among these are multimodal learning, gamification, and project-based learning (PBL), all of which leverage interactive, technology-enhanced techniques to address limitations in traditional approaches. Multimodal learning, enhanced allows students to engage multiple senses and integrate diverse media—such as videos, images, and infographics—into their writing, fostering a multidimensional learning experience that enhances creativity. Gamification, using platforms introduces game-like elements, such as points, badges, and challenges, that adjust to student needs, increasing engagement through personalized, interactive feedback. Project-based learning (PBL) emphasizes real-world applications, encouraging students to take ownership of long-term projects that build independence through hands-on problem-solving

and self-directed inquiry (Sauter et al., 2022).

While existing studies have individually validated the benefits of multimodal learning, gamification, and PBL (Bai et al., 2020; Huang et al., 2022), research on their combined effect in academic writing instruction remains sparse. This study aims to explore the synergistic impact of integrating these three methods in writing classrooms, hypothesizing that their combination could address multiple skill areas—creativity, engagement, and autonomy—more effectively than isolated approaches. The integration of these strategies could transform writing pedagogy by fostering a comprehensive learning environment that not only improves writing performance but also instills a sense of ownership and innovation in students.

AI-enhanced multimodal learning, integrating various digital tools like ChatGPT and Canva, has been shown to foster greater creative engagement and critical thinking in writing instruction by allowing students to incorporate diverse media elements. Studies have found that

such tools help students express ideas more creatively and reduce anxiety, ultimately enhancing their writing process and outcomes (Kessler & Marino, 2023). This approach also improves students' engagement with authentic audiences, encouraging meaningful revision and deeper conceptual understanding.

While, AI-driven gamification, combined with multimodal learning tools like Quizlet and Kahoot, enhances student motivation and creativity in writing tasks by providing tailored, interactive learning experiences (Favour, 2024). This approach leverages real-time data analysis to adapt tasks based on individual progress, significantly boosting engagement and improving writing skills.

Project-Based Learning (PBL), particularly when combined with multimodal approaches, has been shown to enhance critical thinking and writing proficiency among students by engaging them in real-world projects (Lata & Bhatnagar, 2023). This method allows students to apply their knowledge creatively, improving their analytical skills and providing a dynamic learning experience. Additionally, AI tools integrated into PBL facilitate collaboration by enabling real-time feedback and iterative revisions, further enhancing the writing process (Almulla, 2020).

Research Objectives and Questions

This study is guided by the following research questions:

1. How does multimodal learning impact creativity in academic writing?
2. What role does gamification play in increasing engagement and critical thinking in writing tasks?
3. How does project-based learning contribute to independent writing skills?

B. Research Method

Research Design

This study employed a mixed-methods research design, incorporating both quantitative and qualitative approaches to explore the effectiveness of integrating AI-enhanced multimodal learning, gamification, and project-based learning (PBL) in teaching academic writing to university students.

Specific AI tools, including ChatGPT for idea generation, Canva for visual content creation, and Quizlet for gamified learning activities, were embedded within each teaching method. The study sought to investigate how these pedagogical strategies, augmented by AI tools, could enhance creativity, critical thinking, and independent learning in writing tasks.

Participants

The study involved 150 students from an Indonesian private university's English language programs, selected through convenience sampling for accessibility. This diverse sample included students from various academic levels, with demographic data (age, gender, field of study) and prior writing instruction experience collected via survey. Participants, aged 18-23 and primarily in their second or third year, provided informed consent after being briefed on the research objectives.

Data Collection Methods

Data collection involved surveys and semi-structured interviews to capture both quantitative breadth and qualitative depth on students' experiences with AI-enhanced multimodal, gamified, and project-based learning (PBL) approaches.

Survey: A structured survey was administered to 150 students, gathering quantitative data on the effectiveness of AI tools in promoting creativity, engagement, and autonomy in writing. Likert-scale questions provided a broad view of student engagement with these teaching methods and their impact on writing skills.

Semi-Structured Interviews: To deepen the survey insights, 20 students participated in semi-structured interviews, sharing detailed experiences of using specific AI tools, such as Canva for visual creation and ChatGPT for content generation. Questions focused on how these tools affected creativity, motivation, and writing processes. The interviews were thematically analyzed to identify patterns, including increased motivation from gamified tasks, creative boosts from multimodal projects, and independence gained through PBL.

These qualitative insights enriched the survey findings, offering a comprehensive understanding of how each method influenced students' academic writing

Procedure

The data collection was conducted over the course of one academic semester. In the first phase, the survey was administered during regular class time, ensuring maximum participation from the 150 students. Students completed the surveys anonymously to encourage honest feedback. Following the survey, interviews were scheduled with selected students, ensuring a variety of perspectives on the three pedagogical methods.Throughout the semester, the course instructors implemented AI-enhanced multimodal learning activities (using Canva to create videos, images, and infographics in writing tasks), gamification (with Quizlet for points, rewards, and competitive elements in writing exercises), and PBL (where students used Notion to organize long-term projects that required solving real-world problems or collaborating on creative outputs).

This integration of AI tools supported each pedagogical approach, providing students with accessible, technology-driven means to enhance engagement and creativity in their academic writing

Data Analysis

The data analysis in this study employed both quantitative and qualitative methods to provide a nuanced understanding of how multimodal learning, gamification, and project-based learning (PBL) influenced students' writing skills, creativity, and autonomy. This mixed-methods approach allowed for a more comprehensive analysis by integrating statistical trends with in-depth student reflections.

Quantitative Analysis

The quantitative data from the survey were analyzed using descriptive statistics to measure trends in students' motivation, creativity, and critical thinking. Using SPSS, the analysis focused on calculating frequencies, means, and standard deviations to determine how students perceived the effectiveness of each teaching method. For example, we assessed the average

levels of motivation and creativity when using gamification and multimodal projects. Additionally, correlation analysis was performed to explore relationships between variables, such as the link between gamification and student engagement, or PBL and the development of independent learning. This allowed the researchers to determine whether specific methods had a statistically significant impact on writing outcomes. These correlations helped identify which pedagogical strategies were most effective for fostering creativity and critical thinking in academic writing.

Qualitative Analysis

The qualitative data from semi-structured interviews were analyzed using thematic analysis, which involved identifying recurring themes within the students' narratives. Key themes included "increased motivation through gamified tasks," "creativity enhancement via multimodal learning," and "autonomy development through PBL." These themes were developed through coding of the interview transcripts,

where specific experiences and reflections from students were categorized to highlight how these teaching strategies impacted their writing processes. Thematic analysis provided a deeper insight into the students' personal experiences and challenges, such as how gamified activities reduced writing anxiety or how multimodal tasks allowed for more creative expression. This qualitative data added depth to the quantitative findings, helping to explain the statistical trends by revealing the underlying reasons for students' perceptions and behavior.

Table 1: The core components of both the quantitative and qualitative analyses

Category	Methodology	Techniques	Key Findings
Quantitative Analysis	Survey	Descriptive statistics (frequencies, means, standard deviations)	Assessed trends in motivation, creativity, and critical thinking among students.
		Correlation analysis	Explored relationships between teaching methods (gamification, PBL, multimodal learning) and student outcomes
Qualitative Analysis	Semi-structured interviews	Thematic analysis (coding)	Identified recurring themes like increased motivation, creativity enhancement, and autonomy development.
			Themes included reduced writing anxiety via gamified tasks, and creative expression through multimodal tasks.
Overall Approach	Mixed-methods (Quantitative & Qualitative)	Integrated quantitative statistical trends with qualitative reflections.	Provided a comprehensive understanding of the influence of different teaching methods on writing skills.

C. Results and Discussion

Results

This section presents the analysis of survey and interview data to address the study's research questions, focusing on the impact of multimodal learning, gamification, and project-based learning (PBL) on creativity, engagement, and independent writing skills.

Impact of Multimodal Learning on Creativity

Survey data revealed that 78% of students reported increased creativity when using multimodal elements like videos and images, as these tools allowed for a more dynamic approach to writing. Interview responses supported this finding, with students noting that visual aids helped them conceptualize ideas and reduce writing anxiety, aligning with multimodal learning theories that emphasize sensory engagement to foster creativity.
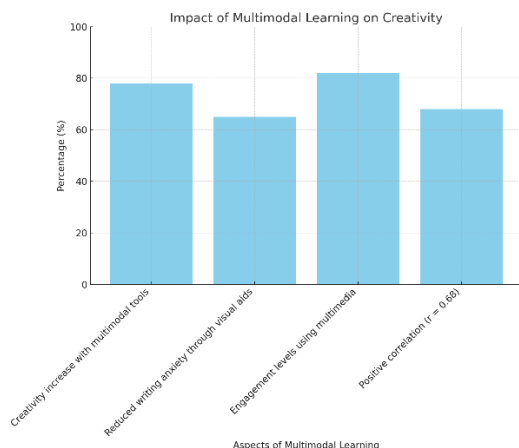
Chart 1: Impact of multimodal learning on creativity and engagement

Role of Gamification in Engagement and Critical Thinking

Gamification enhanced engagement, with 85% of participants stating that point systems, badges, and challenges made writing tasks more enjoyable. The survey also indicated that 74% of students experienced increased critical thinking through gamified feedback. Interviews highlighted that rewards and competition drove motivation and reflection, which aligns with gamification theory's focus on motivation and continuous improvement.
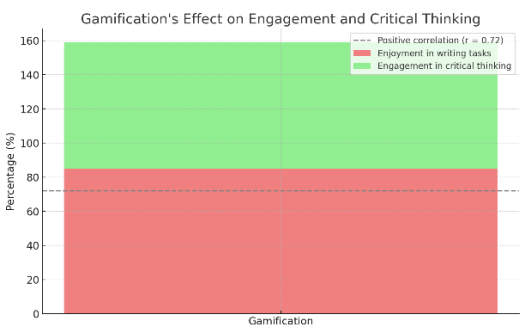

Figure 1: Gamification's role in critical thinking and engagement

Contribution of PBL to Independence in Writing

PBL was shown to foster independence, as 81% of students reported increased comfort in managing writing projects autonomously. Interviews echoed these findings, with students describing how self-directed projects motivated them to approach tasks critically and creatively.
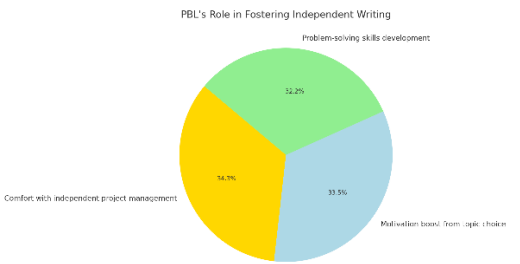

Chart 2: PBL for development of independent writing skill

Table 2: Key Findings on the Impact of Multimodal Learning, Gamification, and Project-Based Learning (PBL) on Academic Writing Skills

Research Question	Key Findings	Supporting Data
How does multimodal learning impact creativity in academic writing?	o Multimodal learning enhances creativity by allowing students to	✓ 78% of survey respondents agreed that visual/auditory media improved their creative thinking.

	visualize ideas using videos and images. o It increases engagement, making the writing process more enjoyable. o Reduces writing anxiety, encouraging students to take creative risks.	-Interviews revealed students felt more freedom to explore creative expression. ✓ 82% of students felt more engaged with writing tasks using multimedia. - Positive correlation (r = 0.68) between multimedia use and creativity scores. ✓ 65% of respondents noted that tools like concept maps helped reduce anxiety. -Interview example: "I feel like I can play around with my ideas now."
What role does gamification play in increasing engagement and critical thinking in writing tasks?	o Gamification significantly boosts student engagement and makes tasks more interactive. o Supports critical thinking through reflective practices like feedback and rewards. o Maintains sustained engagement over time, keeping students motivated throughout the semester.	✓ 85% of participants felt gamification made tasks more enjoyable. -Interviews highlighted motivation from point systems (e.g., "I felt like I was leveling up"). ✓ 74% agreed that gamified feedback encouraged reflection. -Positive correlation (r =0.72) between gamified activities and sustained engagement. ✓ Interviews emphasized the role of challenges in maintaining interest, e.g., "Challenges kept me coming back to improve my work."
How does project-based learning (PBL) contribute to independent writing skills?	o PBL promotes autonomy by allowing students to manage their own projects and topics. o Encourages problem-solving skills necessary for independent writing. o Increases motivation by allowing students to choose topics that interest them.	✓ 81% of students reported increased comfort in managing their writing independently -Example: "I felt more in control of my writing with self-directed projects." ✓ 76% of participants noted PBL helped them address writing challenges. - Interview example: "I learned to think critically about structuring my writing." ✓ 79% of students felt more motivated when choosing

		their own topics. - Example: "I was more invested in my writing because the topic mattered to me."

This result reflects the role of PBL in promoting autonomy through real-world application. The integration of multimodal learning, gamification, and PBL creates a synergistic effect that supports the growth of creative, engaged, and independent writers. Each method addresses different aspects of the writing process—creativity through multimodal learning, critical reflection through gamification, and autonomy through PBL—resulting in a well-rounded approach to writing instruction. Together, these strategies transform the traditional writing classroom into a more interactive and student-centered space, empowering learners to develop both their technical skills and their unique creative voices in writing. This study demonstrates the potential of these innovative pedagogical approaches to not only enhance writing performance but also foster a deeper and more meaningful engagement with the writing process.

Discussion

The findings of this study provide a deeper understanding of how multimodal learning, gamification, and project-based learning (PBL) contribute to enhancing students' creativity, engagement, critical thinking, and independent writing skills. By exploring these results in relation to existing theories and previous research, we can see how each approach aligns with or diverges from established knowledge in the field of writing education.

Multimodal learning has proven to be a powerful tool for fostering creativity in academic writing. The study's results align with earlier research by Lim and Polio (2020), which found that integrating visual and verbal elements into writing tasks encourages more creative expression. This study supports the idea that students, when exposed to multimedia elements such as videos and images, can think

beyond traditional text, leading to richer, more innovative written work. These findings also resonate with Lin's et al. (2021) observations that digital multimodal composing not only motivates students but also helps them articulate their thoughts more fully. Our results indicate that students feel less constrained by rigid writing structures when they can utilize multimedia, which enhances their ability to take creative risks. This aspect is particularly emphasized in our study, adding a new dimension to the existing understanding of how multimodal strategies impact creativity by highlighting their role in reducing writing anxiety and encouraging experimentation (Worsley & Blikstein, 2018).

The role of gamification in increasing engagement and fostering critical thinking is well-supported by our findings and mirrors the conclusions of Favour (2024), who noted that gamified learning enhances student motivation. Our study further highlights how elements like point systems and challenges make writing tasks more interactive and enjoyable, which, in turn, increases student participation. This increase in engagement is significant as it helps transform writing from a routine task into a more immersive experience. While previous research has focused primarily on the motivational benefits of gamification, our findings emphasize its role in promoting reflection. The feedback mechanisms embedded in gamified activities encourage students to evaluate their progress and adjust their strategies, a practice closely tied to self-regulated learning. This reflects the work of Sansone & Cesareni (2019) who emphasized the importance of continuous improvement through peer-created content. Thus, our study suggests that gamification goes beyond mere engagement by fostering a mindset oriented towards self-assessment and refinement, thereby enhancing the quality of students' writing through critical reflection.

Project-based learning (PBL) has emerged as a significant contributor to the development of independent writing skills, a finding that is consistent with the research of PBL, which highlighted the role of

PBL in fostering critical thinking and writing proficiency (Almulla, 2020; Quynh, 2022). Our study underscores the value of PBL in allowing students to manage their writing projects independently, thereby building their confidence and self-direction. This aligns with Sauter et al. (2022), who demonstrated that integrating multimodal approaches into PBL enables students to creatively apply their knowledge, resulting in deeper engagement with writing. However, our study also highlights the importance of choice within PBL, which many students found motivating. This element of choice is particularly influential in making writing more personal and meaningful, which leads to greater investment in the process. By choosing their own topics, students are more likely to invest time and effort into refining their writing, indicating that PBL not only fosters independence but also encourages deeper commitment to the writing process.

A notable contribution of this study is the identification of a synergistic effect when combining multimodal learning, gamification, and PBL, a topic that has been underexplored in prior research. While previous studies have examined the benefits of each approach individually (Favour, 2024; Lata & Bhatnagar, 2023; Lim & Polio, 2020; Riley, 2007), our findings suggest that their integration creates a holistic learning environment. Multimodal learning promotes creativity, gamification enhances engagement and reflection, and PBL supports autonomy—all of which are essential for developing effective writing skills. This integration aligns with constructivist theories of learning, which emphasize the active construction of knowledge through engaging and meaningful activities (Lin et al., 2021; Worsley & Blikstein, 2018). Our findings underscore the need for writing educators to adopt a combined approach, offering a more comprehensive framework for developing students' skills and preparing them to approach writing as both a creative and self-regulated process.

D. Conclusion

This study contribute results an understanding of how multimodal learning, gamification, and PBL can transform writing instruction. By connecting these teaching methods, we have highlighted both the strengths of each approach and the value of their combined use. The study suggests that by integrating these innovative strategies, educators can create an enriched learning environment that promotes creativity, critical thinking, engagement, and independence. This approach not only enhances writing performance but also fosters a deeper and more meaningful engagement with the writing process, offering valuable insights for future research and teaching practices.

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