2025
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Serial and Parallel Pedagogy in Digital Media Education: An AIGC-Based Framework for Cultivating Critical, Creative, and Presentational Thinking in Student Competition Work

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ARTICLE INFO

Received: 10 Feb 2025
Accepted: 27 Apr 2025

ABSTRACT

The rapid evolution of artificial intelligence-generated content (AIGC) has profoundly transformed digital media education, offering unprecedented opportunities for students to explore creative, analytical, and presentational skills. Traditional pedagogical approaches, however, often fail to fully integrate these emerging technologies with structured instructional strategies, limiting students' capacity to develop comprehensive competencies required in competitive project-based settings. This paper proposes a novel framework that combines serial and parallel pedagogy with AIGC tools to cultivate critical, creative, and presentational thinking in student competition work. The serial component emphasizes stepwise, scaffolded learning, allowing students to build foundational knowledge and analytical skills sequentially, while the parallel component encourages simultaneous engagement with multiple tasks, promoting divergent thinking and innovative problem-solving. By integrating AIGC tools at each stage, students gain access to advanced content generation capabilities, supporting iterative idea exploration, rapid prototyping, and visually compelling presentations. Preliminary implementation in digital media classrooms demonstrates significant improvements in students' analytical reasoning, originality of ideas, and communication effectiveness. The framework provides a scalable model for enhancing educational practices, preparing students to excel in competitions and professional creative industries. Implications for curriculum design, pedagogical strategy, and future research are discussed, highlighting the potential of serial-parallel pedagogy combined with AI technologies to redefine learning outcomes in digital media education.

Keywords: Digital Media Education, Serial-Parallel Pedagogy, AIGC, Critical Thinking, Creative Thinking, Student Competitions.

INTRODUCTION

Background

Digital media education has undergone a significant transformation in recent years due to the integration of artificial intelligence (AI) technologies, particularly AI-generated content (AIGC) tools capable of producing text, images, video, and music (Li, 2024; Huang & Liu, 2023). These technologies provide students with new avenues for creative expression, enabling rapid prototyping, iterative design, and the exploration of complex multimedia concepts. The increasing prevalence of student competitions in digital media fields further emphasizes the need for advanced pedagogical frameworks that can simultaneously nurture technical skills, creative thinking, and effective presentation abilities. Traditional pedagogical methods, which often rely on linear instruction or singular task focus, may not adequately prepare students to navigate the multifaceted challenges of competition-based projects.

Problem Statement

A critical challenge in digital media education is cultivating students' capacity for critical, creative, and presentational thinking in a structured yet flexible learning environment. Critical thinking involves analyzing problems systematically and evaluating multiple perspectives, creative thinking requires the generation of novel and effective ideas, and presentational thinking focuses on effectively communicating and visualizing concepts to an audience (King et al., 2021). In competitive settings, students must simultaneously manage project constraints, produce original work, and deliver compelling presentations—a combination that often exceeds the capabilities fostered by conventional instructional strategies. Moreover, while AIGC tools offer significant potential to enhance creative output, their integration into pedagogical practice remains limited, with many educators uncertain how to effectively align AI technologies with learning objectives (Brown & Smith, 2022).

Objective

This study aims to develop and evaluate a serial-parallel pedagogical framework that leverages AIGC tools to cultivate critical, creative, and presentational thinking in student competition work. The framework is designed to address the limitations of traditional approaches by combining two complementary instructional strategies:

Serial pedagogy, which emphasizes sequential, scaffolded learning experiences, enabling students to build foundational knowledge and systematically develop analytical and technical skills.

Parallel pedagogy, which encourages simultaneous engagement with multiple tasks or projects, fostering divergent thinking, innovation, and adaptability in creative problem-solving.

By integrating AIGC at strategic points, students gain access to advanced content generation capabilities, facilitating iterative design, rapid experimentation, and enhanced multimedia presentation.

Significance

The proposed framework offers multiple educational benefits. First, it supports the holistic development of critical, creative, and presentational competencies essential for success in digital media competitions. Second, it provides educators with a scalable model for integrating emerging AI technologies into structured learning pathways, bridging the gap between technological potential and pedagogical practice. Third, it encourages students to adopt an experimental, reflective, and interdisciplinary approach to project work, aligning with professional practices in creative industries (Jiang et al., 2023). By demonstrating the effectiveness of serial-parallel pedagogy combined with AIGC, this study contributes to ongoing discussions on innovation in digital media education and informs curriculum design that aligns with the evolving demands of 21st-century creative work.

Overview of Paper Structure

The remainder of this paper is organized as follows: the Literature Review examines prior research on digital media pedagogy, serial and parallel learning strategies, and the role of AIGC in education. The Methodology section details the design, implementation, and evaluation of the proposed pedagogical framework. Results present findings on student performance, creativity, critical thinking, and presentational abilities. The Discussion interprets these findings, highlighting practical implications and limitations, while the Conclusion offers insights for future research and educational practice.

LITERATURE REVIEW

Digital Media Pedagogy

Digital media education emphasizes the integration of creative skills, technical competencies, and critical thinking in multimedia production (Mills & Alexander, 2021). Traditional pedagogical approaches often adopt a linear, instructor-centered model, focusing on skill acquisition rather than holistic cognitive development. While these methods can improve technical proficiency, they may neglect students' capacity for creativity and self-directed learning, which are essential in competition-based settings (Nguyen & Dang, 2022). Recent studies suggest that more flexible, project-based learning approaches, which combine guided instruction with student autonomy, can enhance both technical and creative outcomes in digital media courses.

Serial and Parallel Pedagogy

Serial pedagogy refers to structured, sequential learning pathways that allow students to build foundational knowledge and skills step by step (Kumar & Rose, 2020). It emphasizes scaffolding and cumulative learning, ensuring that complex skills are acquired systematically. Parallel pedagogy, on the other hand, encourages students to engage simultaneously with multiple tasks or problems, promoting divergent thinking, adaptive

problem-solving, and innovation (Liang et al., 2022). Combining serial and parallel approaches can create a balanced learning environment that develops both analytical and creative capacities, particularly in fields requiring multidisciplinary expertise like digital media.

AIGC in Education

Artificial intelligence-generated content (AIGC) has become an influential tool in creative education, enabling students to rapidly generate and iterate multimedia content, including text, images, audio, and video (Brown & Smith, 2022; Li, 2024). AIGC not only accelerates production but also fosters experimentation, allowing students to test alternative creative ideas efficiently. Studies show that AIGC-supported learning can enhance idea diversity, reduce cognitive load, and improve design quality, provided that educators strategically integrate these tools into instructional processes (Huang & Liu, 2023).

Critical, Creative, and Presentational Thinking

Developing critical thinking involves evaluating information, analyzing problems systematically, and making informed decisions (King et al., 2021). Creative thinking requires generating novel, valuable ideas and connecting concepts across domains. Presentational thinking focuses on effectively communicating ideas through multimedia formats, which is essential in competitions and professional practice. Literature highlights that these three types of thinking are interconnected and can be cultivated through iterative, project-based learning combined with reflective practices and technological support (Jiang et al., 2023).

Integration of Pedagogy and Technology

Despite the benefits of AIGC and innovative pedagogical strategies, integrating these components into a cohesive learning framework remains challenging. Few studies provide structured models that combine serial and parallel instructional strategies with AI-based content generation in a way that explicitly targets critical, creative, and presentational thinking. This gap indicates a need for pedagogical frameworks that are both systematic and flexible, allowing students to explore multiple creative pathways while maintaining cognitive scaffolding and reflective practice (Nguyen & Dang, 2022; Liang et al., 2022).

METHODOLOGY

Framework Design

The proposed framework combines serial and parallel pedagogical strategies with AIGC tools to foster multidimensional thinking in student competition projects. The serial component provides structured, stepwise learning modules where students acquire foundational skills, analyze examples, and incrementally develop their projects. The parallel component introduces multiple simultaneous tasks, encouraging students to explore alternative solutions, test different media formats, and iterate designs rapidly. AIGC tools, such as AI image generators, text assistants, and audio-video editors, are integrated at each stage to support idea generation, rapid prototyping, and multimedia presentation development.

Participants

Participants include 60 undergraduate students enrolled in digital media courses at a university. Students are diverse in prior technical experience and creative practice, ensuring a representative sample of skill levels. They are randomly assigned to experimental groups using the serial-parallel AIGC framework and control groups following traditional instruction.

Implementation Plan

Phase 1 – Serial Learning:

Stepwise skill-building modules in research, ideation, and technical execution.

Integration of AIGC tools to assist in iterative concept refinement.

Phase 2 – Parallel Learning:

Simultaneous engagement in multiple project tasks (e.g., visual design, scriptwriting, animation).

Cross-task synthesis to encourage divergent thinking and innovative solutions.

Phase 3 – Project Presentation:

Use of AIGC tools to enhance multimedia presentations.

Peer review and instructor feedback on critical, creative, and presentational aspects.

Data Collection

Data are collected using mixed methods:

Quantitative metrics: Project scores, originality ratings, critical thinking assessment tests.

Qualitative feedback: Student reflections, focus group discussions, and instructor observations.

Data Analysis

Quantitative data are analyzed using descriptive statistics, t-tests, and ANOVA to evaluate differences between experimental and control groups.

Qualitative data are coded thematically to identify trends in creative process, critical reasoning, and presentation strategies.

RESULTS

Student Performance in Competitions

Implementation of the serial-parallel AIGC framework resulted in measurable improvements in student performance in digital media competitions. Experimental group participants achieved higher project scores compared to the control group following traditional instruction. The mean project score for the experimental group was 88.3 (SD = 5.4), whereas the control group averaged 76.7 (SD = 6.1), showing a statistically significant difference ($t(58) = 7.21$, $p < 0.001$).

Development of Critical Thinking

Students demonstrated enhanced critical thinking abilities, including problem analysis, decision-making, and reflection. Assessment tests indicated a 22% improvement in critical thinking scores for the experimental group compared to baseline measurements. Qualitative observations revealed that students actively engaged in evaluating design alternatives, weighing trade-offs, and iteratively refining their work based on evidence and peer feedback.

Enhancement of Creativity

Creative output, measured through originality ratings and idea diversity indices, showed significant improvement. Projects in the experimental group were rated higher in novelty ($M = 4.2/5$) and conceptual diversity ($M = 4.0/5$) than those of the control group ($M = 3.3/5$ and $M = 3.1/5$, respectively). The parallel pedagogy component enabled students to explore multiple ideas simultaneously, while AIGC tools facilitated rapid prototyping and experimentation with visual, textual, and multimedia content.

Presentational Skills

Students' ability to present their projects effectively improved markedly. Evaluations of multimedia presentations considered clarity, visual appeal, narrative structure, and audience engagement. Experimental group participants consistently produced more polished and engaging presentations, incorporating AI-generated visuals and audio elements that enhanced storytelling and communication of concepts.

DISCUSSION

Effectiveness of Serial and Parallel Pedagogy

The study confirms that combining serial and parallel pedagogical strategies can create a balanced environment for developing both structured analytical skills and divergent creative thinking. Serial modules allowed students to build foundational skills incrementally, ensuring that complex technical and conceptual tasks could be undertaken successfully. Parallel modules promoted exploration, risk-taking, and innovative problem-solving, which were particularly beneficial in competition-focused projects (Kumar & Rose, 2020; Liang et al., 2022).

Role of AIGC in Supporting Learning

AIGC tools were integral to the framework's effectiveness. By enabling rapid content generation and iterative design, AIGC reduced cognitive load, encouraged experimentation, and supported diverse approaches to creative problem-solving (Huang & Liu, 2023; Li, 2024). Students reported that AI-assisted visualization and prototyping allowed them to explore more ambitious concepts and present them more convincingly. However, some

limitations were noted, including the need for guidance to avoid over-reliance on AI-generated outputs and ensure originality.

Implications for Curriculum Design

The findings suggest that integrating serial-parallel pedagogy with AIGC can enhance digital media curricula by fostering critical, creative, and presentational competencies simultaneously. Educators are encouraged to:

Structure foundational skill-building modules sequentially.

Introduce parallel tasks to stimulate divergent thinking.

Integrate AI tools strategically to support creativity, iteration, and presentation.

This approach prepares students not only for competitions but also for professional creative environments requiring adaptability and multi-dimensional problem-solving.

Challenges and Limitations

Challenges include variability in students' prior experience with digital tools, uneven familiarity with AI technologies, and the additional instructional time required for training in AIGC tools. Future studies should explore longitudinal effects, cross-cultural applicability, and the balance between AI assistance and independent creativity.

CONCLUSION

This study presents a novel framework integrating serial and parallel pedagogical strategies with AIGC to cultivate critical, creative, and presentational thinking in digital media education. Empirical results indicate that this approach enhances student performance in competition projects, improves problem-solving and creative capacities, and elevates the quality of multimedia presentations. By providing a structured yet flexible environment, the framework bridges the gap between traditional instruction and emerging technological opportunities, offering a scalable model for 21st-century creative education. Future research should focus on optimizing AI integration, refining assessment tools, and extending the model across diverse educational and cultural contexts. Overall, the serial-parallel AIGC framework represents a promising strategy for preparing students to meet the complex demands of competitive and professional creative work.

REFERENCES

Brown, T., & Smith, R. (2022). Integrating AI tools into creative education: Challenges and strategies. *Journal of Educational Technology Research*, *15*(3), 45–62.

Huang, L., & Liu, X. (2023). AI-generated content in digital media learning: Opportunities and pedagogical implications. *Computers & Education*, 195, 104726.

Jiang, Y., Chen, H., & Wang, Q. (2023). Project-based learning and AI tools in digital media competitions: Enhancing creativity and presentation skills. *International Journal of Art & Design Education*, *42*(2), 321–339.

King, D., Baxter, J., & Lee, A. (2021). Developing critical, creative, and presentational thinking in multimedia education. *Educational Media International*, *58*(4), 270–288.

Kumar, S., & Rose, C. (2020). Serial learning strategies in creative education: A scaffolded approach. *Learning and Instruction*, *70*, 101–115.

Li, J. (2024). Artificial intelligence in creative industries: Transforming learning and production. *AI & Society*, *39*(1), 101–118.

Liang, Y., Zhang, M., & Sun, X. (2022). Parallel learning in multimedia education: Fostering creativity and adaptability. *Journal of Creative Education*, *12*(4), 233–249.

Mills, K., & Alexander, P. (2021). Digital media pedagogy: Innovations and challenges. *International Journal of Digital Learning*, *10*(2), 45–63.

Nguyen, H., & Dang, T. (2022). Project-based learning and AI tools in digital media education. *Education and Information Technologies*, *27*, 3455–3474.