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A Collaborative AI-Driven Platform to Foster Social Creativity in Graphic Design Education

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Abstract

This study presents the development and evaluation of CoDesign, a web-based collaborative platform embedded with an AI-chatbot, designed to support the creative process among Education students enrolled in a graphic design course. Grounded in the Cognitive and Social Apprenticeship (COCIAL) model, CoDesign addresses the limitations of generic tools like Facebook and Padlet by offering features such as real-time communication, creative feedback, task coordination, and design archiving. A mixed-methods approach was employed to assess the platform's effectiveness. Over the course of one academic semester, students submitted three iterations of their design work, receiving AI-only feedback initially, followed by a combination of AI and lecturer input. Quantitative findings from 30 students revealed a significant increase in satisfaction scores when transitioning from AI-only support to AI combined with lecturer facilitation. Qualitative thematic analysis further indicated that students perceived the chatbot as useful in fostering idea generation, emotional engagement, and iterative refinement; elements closely aligned with creativity-supportive learning. These findings highlight the potential of CoDesign to scaffold creative thinking and collaborative interaction, with scalability for broader implementation in teacher education and design-based pedagogy.

Keywords: Graphic Design Education, Social Creativity, AI Chatbot, Cognitive and Social Apprenticeship Model

Introduction

Creativity in design is increasingly understood as a socially co-constructed process, where novel ideas and solutions emerge not merely from individual cognition but from dynamic collaboration and interaction. As design disciplines become more interdisciplinary and team-oriented, fostering social creativity—defined as the collaborative process where creative outcomes emerge from group interaction rather than individual effort alone, where both individual and collective contributions intersect, has become vital in professional and educational settings (Dmitriyevna, 2024).

Despite this, traditional design education continues to prioritize individual expression, often emphasizing technical and aesthetic mastery while overlooking the collaborative and dialogic dimensions that underpin real-world design practices (Meyer & Norman, 2020). This misalignment risks underpreparing students for team-based innovation and critique-driven environments. To address this, the COCIAL model (Abdullah & Mohamad Said, 2015) illustrated in Figure 1 was developed to scaffold both individual and social creativity through structured collaboration among students, lecturers, and industry designers. Grounded in cognitive and social apprenticeship, earlier applications of the model using platforms like Facebook and Padlet highlighted the potential for enhanced peer interaction and creativity. However, these platforms lacked critical features to support creative iteration, prototyping, and long-term documentation. These are elements essential for deep learning and creative development (Manca, 2020).

Recent advances in AI-powered educational tools, particularly conversational agents, offer new opportunities for supporting creative processes through contextual feedback, metacognitive prompts, and real-time dialogic scaffolding (Petrova & Kuhnen, 2025; Venter et al., 2025). Yet, few platforms are explicitly designed to support the iterative and reflective nature of the design critique cycle, and empirical studies in design education remain limited (Kovari, 2025). This study therefore introduces CoDesign, a web-based platform that embeds an AI chatbot within a collaborative design environment. Grounded in the COCIAL framework, CoDesign fosters distributed creativity through features that support iterative feedback, critique archiving, and progressive refinement. By enabling students to co-create, reflect, and evolve their work across time, CoDesign aims to bridge the gap between individual expression and collaborative creativity in design education.

To guide this inquiry, the study seeks to answer the following research question: How does the integration of AI and human feedback within CoDesign influence student satisfaction, feedback quality, and creative development in a graphic design learning context?

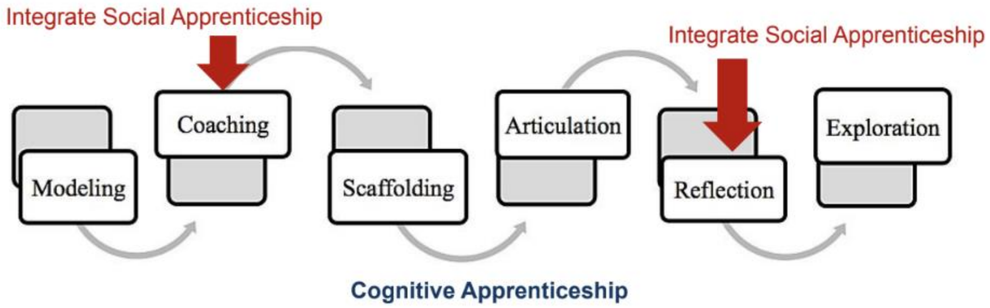

Figure 1. COCIAL model (Abdullah & Mohamad Said, 2015)

Research Gap

Although the COCIAL model has shown promise in enhancing creativity, platforms such as Facebook and Padlet do not sufficiently support the depth of interaction necessary for iterative design processes. Prior classroom trials using these tools showed benefits like improved access and peer engagement; however, critical limitations remained. These included fragmented documentation, limited support for version control, and difficulties in linking feedback directly to design revisions, ultimately restricting opportunities for sustained reflection and refinement (Abdullah & Mohamad Said*, 2015*; Manca, 2020; Zhang & Mao, 2025).

At the same time, the growing presence of AI in education introduces new possibilities for supporting creative learning. AI chatbots, particularly those fine-tuned on domain-specific datasets can offer dynamic, context-aware feedback and emulate expert critique. Nevertheless, current research on how AI-powered collaborative tools can facilitate deep, iterative creative work within university-industry design education remains limited (Kovari, 2025; Wang et al., 2025). To our knowledge, no prior studies have systematically examined how an AI-augmented critique platform can emulate expert-level feedback across multiple design iterations in a higher education context. This study addresses this gap by exploring how a purpose-built digital platform like CoDesign can integrate AI feedback with structured design tools to meaningfully support student creativity, collaborative learning, and expert-like critique in a more sustained and iterative manner.

Proposed Solution
To overcome the limitations of mainstream collaboration tools and the underutilization of AI in creative learning, CoDesign integrates an AI model trained on a curated dataset of authentic feedback from lecturers and professional designers dating back to 2015. This allows the AI to emulate the style and depth of expert critiques, providing students with more meaningful and context-aware guidance. Unlike general platforms, CoDesign supports:
- Version control and visual history tracking of design progress,
- Structured critique with tagging linked to specific design elements,
- Continuous AI-generated feedback, verified and enriched by human experts.

By embedding these pedagogically informed features into CoDesign, it promotes iterative design thinking, enables long-term documentation for academic assessment, and encourages industry-aligned critique practices (see Figure 2 and 3). This solution not only supports learner autonomy and reflection but also addresses the challenge of limited mentor availability by ensuring timely, scalable feedback at key stages of the creative process.

Figure 2. https://codesign.utm.my/

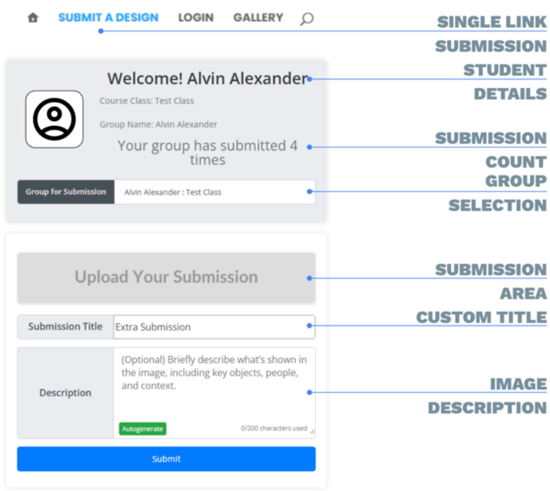

Figure 3. Codesign user's view

Methodology

This study employed a Concurrent Triangulation Design within a Mixed-Methods research paradigm (Creswell & Plano Clark, 2018) (see Figure 4). This design enabled the simultaneous collection and integration of both quantitative and qualitative data, allowing for a robust examination of the CoDesign platform's usability, effectiveness, and its impact on students' creative development. Integrating multiple data sources provided a richer and more holistic understanding of measurable learning outcomes as well as nuanced user experiences.

Participants and Intervention

The study involved 30 undergraduate students majoring in graphical design courses at a Malaysian university. A convenience sampling method was used, as the entire cohort was accessible and relevant to the research context. The students engaged with the CoDesign platform over one academic semester (14 weeks), during which they submitted and iteratively refined their design projects. Each student submitted three versions of their work across the term.

AI-generated feedback was provided for each submission. However, human expert feedback from lecturers was introduced only after the first round specifically during the second and third submissions. This feedback sequencing allowed the study to evaluate both the standalone effect of AI feedback and the combined effect of AI and expert input.

Quantitative Data Collection

The quantitative data were collected through structured questionnaires administered at each phase of the design cycle. These surveys measured a combination of variables to provide a holistic view of the student experience. To assess creative engagement and tool usability, we incorporated six key variables from the Creativity Support Index (CSI) (Cherry & Latulipe, 2014):

- Exploration
- Collaboration
- Engagement
- Effort/Reward Tradeoff

- Tool Transparency
- Expressiveness

These quantitative data provided insight into students' perceived creative engagement and tool usability over time. In addition, the questionnaires captured variables specific to the AI-assisted workflow, including satisfaction with feedback, perceived usefulness of AI, confidence in design improvement, and prompt engineering competence (Yu et al., 2024). Together, these quantitative data provided insight into students' creative engagement, tool usability, and evolving perceptions of the AI system over time.

Qualitative Data Collection and Thematic Analysis
The qualitative data from semi-structured interviews were analysed using the rigorous six-phase thematic analysis approach developed by Braun and Clarke (2006). The process began with (1) familiarisation with the data, which involved the researcher repeatedly reading the interview transcripts to become deeply immersed in the content. This was followed by (2) the generation of initial codes, where interesting features and patterns across the entire dataset were systematically identified and labelled. In the third phase, (3) searching for themes, these individual codes were collated and organised into potential overarching themes. These candidate themes were then refined during (4) reviewing themes, a critical phase where themes were checked against the coded extracts and the full dataset to ensure they were coherent and distinct. Once the thematic map was finalised, (5) defining and naming themes involved articulating the precise scope and essence of each theme. The final phase, (6) producing the report, involved weaving the analysed themes into a coherent analytic narrative supported by compelling data extracts.

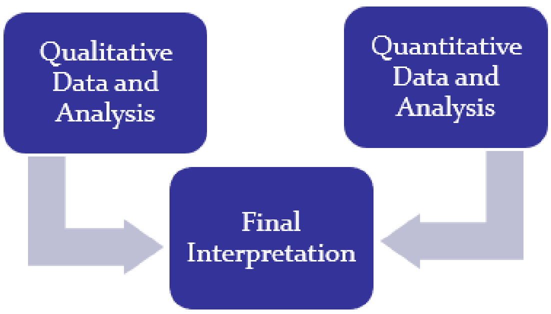

Figure 4. Concurrent Triangulation Design. Reproduced from Amboko (2025).

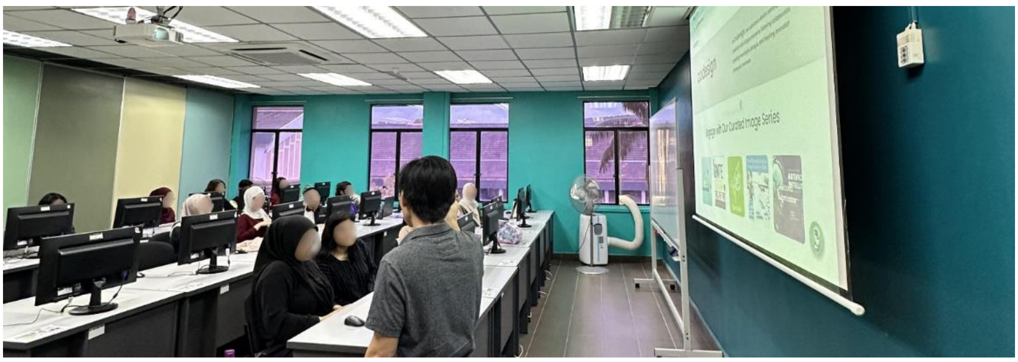

Figure 5. Data collection

Findings

Preliminary findings indicate several areas for improvement particularly related to collaboration, Effort/Reward Tradeoff, and Expressiveness, yet students generally perceived the CoDesign platform as beneficial. While some students noted its similarity to generic AI tools like ChatGPT for image enhancement, a crucial distinction lies in its design education-specific features. As shown in Table 1, students reported significantly higher satisfaction when lecturer feedback complemented AI suggestions, with effect sizes remaining stable across iterations.

Table 1
Student Satisfaction Across Design Postings

Posting Stage	Mean (M)	Standard Deviation (SD)
1st Posting (AI-only)	3.2	0.7
2nd Posting (AI + lecturer)	4.4	0.5
3rd Posting (AI + lecturer)	4.4	0.5

Note. M = mean; SD = standard deviation. Paired-sample t-tests compare Posting 1 vs. Posting 2 ($t(29) = 5.42$, $p < .001$), Posting 1 vs. Posting 3 ($t(29) = 7.82$, $p < .001$), and Posting 2 vs. Posting 3 ($t(29) = 0.01$, $p = .99$).

The significant increase in student satisfaction from the AI-only phase (M = 3.2, SD = 0.7) to the AI + lecturer phases (M = 4.4, SD = 0.5) corresponds most directly with the *Collaboration* dimension of the Creativity Support Index (CSI). This suggests that the integration of human feedback alongside AI enhanced the collaborative creative process. Additionally, the improvement may reflect a more favorable Effort/Reward Tradeoff, as students perceived greater value in their creative output when supported by both AI and lecturer guidance.

Prompt Engineering Requirement

During the initial phase of using the CoDesign platform, students interacted solely with the AI chatbot, without any supplementary feedback from their lecturer. At this stage, typically during their first design submission, students expressed frustration with the inconsistency of AI-generated feedback, which they perceived as either too vague or misaligned with their design intentions. These issues were often attributed to their unfamiliarity with how to communicate effectively with the AI system.

As Student 23 shared during an interview reflecting on the first few weeks of the semester: "I believe the quality of the prompt I provided affected the usefulness of the feedback I received. Sometimes the AI gave me something useful, but other times it was off or too generic." This quote illustrates the trial-and-error learning curve students experienced when attempting to use the AI as a design critique partner without formal instruction in prompt formulation. Similarly, Student 11 noted: "It felt like guessing…if I asked in the right way, I got something helpful. If not, it didn't make sense or didn't relate to my design at all." Such reflections reveal how lack of prompt clarity or structure often led to unproductive interactions with the AI, especially for students unfamiliar with how to phrase questions or requests in a way the AI could interpret meaningfully.

However, as the course progressed and explicit prompt engineering guidance was introduced alongside the integration of lecturer feedback during the second and third submissions, students began to report a shift in their experience. Quantitative data confirmed this shift: satisfaction with AI feedback significantly increased from the first to the second posting ($M_1 = 3.2$, $SD = 0.7$; $M_2 = 4.4$, $SD = 0.5$); $t(29) = 5.42$, $p < .001$. Student 18 reflected on this improvement after receiving training on how to formulate prompts: “Once I understood how to ask better questions, the AI became more like a creative partner. It gave more relevant suggestions, and I could actually use them to improve my poster design.”

These findings highlight the importance of scaffolding students’ interaction with AI systems, particularly through prompt engineering strategies. Without such guidance, students often struggle to access the full educational potential of AI, especially when working with visual design content. Poorly constructed prompts led to feedback that was too broad, irrelevant, or repetitive, as supported by prior work (Wang et al., 2025).

Thematic analysis of interview data (Braun & Clarke, 2006) further supports this, revealing a common perception that AI feedback became more meaningful and actionable once students understood how to engage with the system effectively. Teaching students how to communicate clearly and intentionally with AI aligns with emerging research that identifies prompt engineering as a critical digital literacy skill in AI-mediated learning environments (Lee & Palmer, 2025). In the context of design education, this skill empowers students not only to seek more targeted feedback but also to engage in a more creative and productive dialogue with AI tools.

Need for Expert Verification and coaching**:** Both quantitative and qualitative findings indicate that AI feedback alone was insufficient for most students to make meaningful progress in their design work. During the initial phase of the course, student ratings of AI-generated feedback averaged $M = 3.2$ on a 5-point scale, suggesting a moderate level of perceived usefulness. However, following the integration of lecturer feedback during the second and third design postings, satisfaction levels rose significantly to an average of $M = 4.4$. Paired-sample t-tests confirmed these changes: $t(29) = 5.42$, $p < .001$ (Posting 1 vs. 2) and $t(29) = 7.82$, $p < .001$ (Posting 1 vs. 3). No significant difference was found between Posting 2 and Posting 3 ($t(29) = 0.01$, $p = .99$), suggesting that satisfaction plateaued after the introduction of lecturer feedback.

This shift reflects key components of the Creativity Support Index (CSI). Specifically, the “Collaboration” dimension of CSI emphasizes the importance of interpersonal support in the creative process. Students in this study relied on lecturers not just for content verification, but also for interpretive guidance that helped them make sense of AI-generated suggestions. For example, Student 8 explained: “I didn’t really know what to fix until my lecturer explained what the AI meant. It was hard to tell whether it was talking about the layout or the content.” This quote reveals that the perceived usefulness of AI feedback was limited by students' ability to interpret it. When lecturer input clarified abstract or ambiguous feedback, students felt more confident and empowered to act; this links to the “Results Worth Effort” dimension of CSI. The collaboration with human experts increased students’ belief that their design effort would lead to worthwhile creative outcomes. One student reflected on their experience during the final stages of the study, Student 15 noted: “The AI gave suggestions, but sometimes they didn’t seem connected to what I was trying to do. My lecturer helped me figure out which parts to take seriously.” This reflects the “Exploration” aspect of CSI. Students were more willing to explore alternative creative solutions when they received human-mediated guidance, which helped them evaluate and filter AI suggestions in context. The presence of a lecturer provided a critical scaffolding function that AI could not fulfill particularly in creative disciplines where subjective judgment is essential. Student 20 shared: "The AI mentioned something about the 'black point' in my lighting, but I didn't know what that meant until my lecturer explained how it affected contrast and mood." This illustrates how "Expressiveness", another CSI dimension, was supported not directly by the AI but through human interpretation of its feedback. Without expert input, students struggled to translate technical suggestions into expressive design decisions.

These findings echo previous studies (Vieriu & Petrea, 2025; Venter et al., 2025), which argue that human expertise remains essential in guiding AI-supported learning, particularly in creative domains. Although AI tools can augment learning by offering timely formative suggestions, they lack the nuanced discernment, pedagogical context, and dialogic adaptability that human educators provide. As the CSI framework highlights, effective creativity support must not only enable generation of ideas but also foster interpretation, refinement, and meaning-making roles that are currently best fulfilled through human coaching and collaboration.

Effectiveness of the COCIAL Approach**:** Students responded positively to the COCIAL approach, especially valuing the opportunity to iteratively upload and improve their design work. Quantitative data collected across three design postings showed a clear upward trend in perceived learning outcomes and feedback usefulness. During the first posting, when only AI-generated feedback was available, students reported moderate levels of satisfaction with feedback ($M = 3.2$, $SD = 0.7$). However, following the second and third postings, after lecturer feedback was introduced alongside AI feedback, satisfaction scores significantly increased ($M = 4.4$, $SD = 0.5$); $t(29) = 6.15$, $p < .001$. This change highlights the impact of the iterative feedback loop in promoting continuous improvement and skill development.

Students emphasized that seeing the evolution of their design work helped them reflect more deeply and apply both AI and human critiques more effectively. As student 15 noted during the final stage of the study: "I could see my design getting better each time, especially after getting real comments from my lecturer, not just the AI". This quote illustrates the perceived value of Results Worth Effort, a CSI component reflecting the satisfaction students gain from seeing their efforts lead to tangible improvements.

In addition, Student 21 shared: "The AI gave me quick suggestions, but the lecturer pointed out what I didn't even realise was weak. Both together made me think more critically". This reflects the Collaboration and Exploration dimensions of CSI highlighting how the dual input from AI and human feedback enabled deeper engagement with design problems and fostered critical self-reflection.

The qualitative data also revealed themes such as "growing confidence through feedback", "need for human judgment", and "learning by seeing progress". These align with the Expressiveness component of CSI, where students feel increasingly empowered to experiment and refine their creative ideas through iterative interactions with feedback sources. Student 9 mentioned the role of guided risk-taking supported by trusted feedback:

"By the third task, I felt more free to try something bold because I knew someone would help me fix it if I went too far".

These results are consistent with prior research showing that interactive and formative feedback is essential in creative tasks, as it fosters reflection, iterative development, and creative confidence (McLachlan & Tippett, 2024). Notably, the Coaching element of the COCIAL model remains critical, where lecturer presence validates and contextualizes the learning derived from both the platform and AI-generated responses. The interplay between human and AI support strongly aligns with CSI's aim of balancing usability with deep support for the creative process.

Conclusion

In summary, the CoDesign platform shows strong potential in enhancing collaborative design education through its AI-driven feedback mechanisms and support for iterative design processes. However, successful implementation requires intentional pedagogical strategies that train students to interact meaningfully with AI while reinforcing the complementary role of expert human feedback.

To further enhance collaborative engagement and the Collaboration index of CSI, the platform could incorporate an open forum, enabling participation beyond closed student groups to include public contributors and design enthusiasts. This would foster a broader community of practice, supporting peer-to-peer learning, knowledge exchange, and lifelong learning which are the key goals in creativity-enhancing learning environments.

The findings from this study underscore the effectiveness of a dual-feedback model that combines AI-generated and expert human critique to support social creativity, reflection, and iterative refinement in graphic design education. Students demonstrated increased satisfaction and confidence in their design progress when provided with structured support across multiple submissions. The AI chatbot was particularly effective when students were trained in prompt engineering and could contextualize feedback with lecturer guidance.

These results provide strong empirical support for the adoption of AI-augmented learning platforms such as CoDesign in design education. Future research may explore its application across other creative disciplines, scalability in larger cohorts, and integration with cross-institutional collaborative tasks. The pedagogical implications point to the necessity of balancing technological innovation with human mentorship to cultivate a holistic creative learning environment.

Acknowledgements Declaration of Interest Statement

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References

Abdullah, Z. (2015). Implementation of cognitive and social apprenticeship frameworks to nurture creativity in a social networking site. *Advanced Science Letters, 21*(7), 2271–2275. https://doi.org/10.1166/asl.2015.6293

Amboko, B., Nzinga, J., Tsofa, B., Mugo, P., Musiega, A., Maritim, B., Wong, E., Mazzilli, C., Ng'ang'a, W., Hagedorn, B., Turner, G., Musuva, A., Murira, F., Ravishankar, N., Hussein, S., & Barasa, E. (2025). Evaluating the impact, implementation experience and political economy of primary care networks in Kenya: Protocol for a mixed methods study. *Health Research Policy and Systems, 23*(1). https://doi.org/10.1186/s12961-024-01273-w

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Cherry, E., & Latulipe, C. (2014). Quantifying the creativity support of digital tools through the creativity support index. *ACM Transactions on Computer-Human Interaction, 21*(4), 1–25. https://doi.org/10.1145/2617588

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Dmitriyevna, B. D. (2024). Formation of social creativity as a pedagogical problem in world experience. *International Journal of Pedagogics, 4*(03), 73–78. https://doi.org/10.37547/ijp/Volume04Issue03-13

Kovari, A. (2025). A systematic review of AI-powered collaborative learning in higher education: Trends and outcomes from the last decade. *Social Sciences & Humanities Open, 11,* 101335. https://doi.org/10.1016/j.ssaho.2025.101335

Lee, D., & Palmer, E. (2025). Prompt engineering in higher education: A systematic review to help inform curricula. *International Journal of Educational Technology in Higher Education, 22*(1), 7. https://doi.org/10.1186/s41239-025-00503-7

Manca, S. (2020). Snapping, pinning, liking or texting: Investigating social media in higher education beyond Facebook. *The Internet and Higher Education, 44,* 100707. https://doi.org/10.1016/j.iheduc.2019.100707

McLachlan, K., & Tippett, N. (2023). Kickstarting creative collaboration: Placing authentic feedback at the heart of online digital media education. *Assessment & Evaluation in Higher Education, 49*(2), 246–261. https://doi.org/10.1080/02602938.2023.2209295

Meyer, M. W., & Norman, D. (2020). Changing design education for the 21st century. *She Ji: The Journal of Design, Economics, and Innovation, 6*(1), 13–49. https://doi.org/10.1016/j.sheji.2019.12.002

Petrova, M., & Kuhnen, C. (2025). Artificial intelligence as a tool for individual and collaborative creativity in design education. *Design and Technology Education: An International Journal, 30*(1), 86–101. https://doi.org/10.24377/DTEIJ.article3044

Venter, J., Coetzee, S. A., & Schmulian, A. (2025). Exploring the use of artificial intelligence (AI) in the delivery of effective feedback. *Assessment & Evaluation in Higher Education, 50*(4), 516–536. https://doi.org/10.1080/02602938.2024.2415649

Vieriu, A. M., & Petrea, G. (2025). The impact of artificial intelligence (AI) on students' academic development. *Education Sciences, 15*(3), 343. https://doi.org/10.3390/educsci15030343

Wang, F., Zhou, X., Li, K., Cheung, A. C. K., & Tian, M. (2025). The effects of artificial intelligence-based interactive scaffolding on secondary students' speaking performance, goal setting, self-evaluation, and motivation in informal digital learning of

English. *Interactive Learning Environments,* 1–20. https://doi.org/10.1080/10494820.2025.2470319

Yu, C., Yan, J., & Cai, N. (2024). ChatGPT in higher education: Factors influencing ChatGPT user satisfaction and continued use intention. *Frontiers in Education, 9,* Article 1354929. https://doi.org/10.3389/feduc.2024.1354929

Zhang, G., & Mao, S. (2025). A double-edged sword: Social media use and creativity. *Information Technology & People, 38*(2), 660–685. https://doi.org/10.1108/ITP-09-2022-0682