ASCILITE 2026

The Future is Connection:

Collaboration, Creativity and Compassion in a Digital Society

Teacher–GenAI partnership in design and technology education: From utility to allyship

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Generative artificial intelligence (GenAI) is reshaping Design and Technology (D&T) education by transforming how design ideas are generated, evaluated, and refined. Although existing research has largely focused on capabilities and limitations of AI, less is known about the emerging teacher–GenAI relationships during authentic design practice. Through semi-structured and recall interviews, classroom observations, reflective journals, design folios and artefacts, this qualitative case study investigated these relationships. Guided by sociomaterial perspectives and using reflexive thematic analysis, the study examined how creativity, agency, knowledge construction, pedagogy, and ethical decision-making emerged through human–GenAI interaction. Findings revealed that pre-service teacher–GenAI partnerships evolved through a developmental trajectory from utility, to dialogue, to teacher orchestration, and ultimately allyship. Rather than functioning as a solution-generating tool, GenAI became a provocateur and generative partner whose educational value emerged through iterative cycles of prompting, critique, reflection, and redesign. The study proposes Orchestrated Co-Agency and the Teacher–GenAI Relationship Continuum as complementary conceptual lenses for understanding these interactions. These lenses could offer new theoretical insights into human–AI co-creation and inform curriculum, pedagogy, and the responsible integration of GenAI in Design and Technology education.

Keywords: Teacher orchestration, human–AI co-creation, agency, design and technology education, interpretive qualitative case study

1. Introduction

Generative artificial intelligence (GenAI) is rapidly reshaping Design and Technology (D&T) education by transforming how design ideas are generated, explored, evaluated, and refined. Large language models and text-to-image generators, including Midjourney, Stable Diffusion, DALL-E, ChatGPT and Fusion 360 Generative Design, are increasingly being used to support ideation, modelling, optimisation, and iterative reflection, expanding opportunities for creative problem-solving. The significance of these developments is that GenAI is becoming embedded in contemporary design practice, extending beyond information retrieval to support creative exploration, decision-making, and iterative design (Ghimire et al., 2024; Liu, 2025). Secondly, creativity and knowledge are increasingly understood as relational achievements emerging through interactions among people, technologies, materials, and contexts (Giannakos et al., 2025). Rather than positioning AI as a substitute for human expertise, contemporary scholarship now emphasises human-centred approaches in which educational value emerges through pedagogically informed human–AI interaction, extending creative thinking through iterative dialogue and shared problem-solving (Chandrasekera et al, 2024; Kayiran et al., 2026). Thirdly, these developments are reshaping teachers' roles as they orchestrate interactions among learners, intelligent technologies, disciplinary knowledge, and authentic design challenges intensifying debate about preserving human creativity, professional judgement, and ethical responsibility (Song & Rabu, 2025; UNESCO, 2023).

Although research on GenAI in education has expanded rapidly, much of it has focused on technological capability, adoption, productivity, learning outcomes, and academic integrity (Mollick, 2024; Selwyn, 2022). However, less attention has been given to how teachers construct and negotiate pedagogically meaningful partnerships with GenAI during authentic classroom practice. Consequently, limited understanding remains of how creativity, agency, knowledge construction, pedagogical decision-making, and ethical responsibility emerge through sustained teacher–GenAI interaction. This gap is particularly important in D&T, where learning is inherently iterative, dialogic, and reflective. Design develops through cycles of exploration, critique, evaluation, and refinement in which teachers, learners, technologies, and material constraints continually

shape one another. From this perspective, GenAI is neither simply a tool nor an autonomous collaborator; its educational significance depends on how teachers interpret, mediate, challenge, and integrate its contributions within authentic design practice. Accordingly, this study investigates how pre-service D&T teachers develop their capacity to engage with ChatGPT and Fusion 360 Generative Design during authentic design activities and how these experiences may shape their future practice in AI-supported design education. It asks: How do pre-service D&T teachers experience and negotiate teacher–GenAI partnerships during authentic design processes?

Drawing on patterns identified in the study, the study makes two related contributions. Firstly, it advances Orchestrated Co-Agency as a relational framework for examining how teachers, pre-service teachers, and GenAI collectively shape creativity, agency, knowledge construction, pedagogical decision-making, and ethical practice. Orchestration foregrounds the teacher's role in intentionally mediating and regulating AI-supported interactions while maintaining disciplinary rigour, human judgement, and ethical accountability. Second, it proposes a Teacher–GenAI Relationship Continuum to conceptualise how partnerships may shift from utility through dialogic engagement and orchestration towards allyship. Together, these contributions extend understandings of human–AI co-creation by foregrounding the pedagogical and relational processes through which AI-supported design practices acquire educational meaning, with implications for D&T pedagogy, curriculum design, and responsible GenAI integration.

2. Literature review: Towards teacher–GenAI partnership

Reimagining design learning in the age of GenAI

GenAI is increasingly embedded in contemporary design practice, expanding how designers generate, visualise, test, and refine ideas. Studies demonstrate its capacity to broaden solution spaces and accelerate creative processes. Yin et al. (2023), for example, found that integrating Midjourney into design systems enhanced product development efficiency and rapidly translated concepts into visual representations. Similarly, Liu and Hu (2023) demonstrated Stable Diffusion's capacity to support intent mapping and structural deduction in industrial design, while Tan and Luhrs (2024) showed its potential to support architectural ideation and refinement. The capacity of GenAI to generate explanations, propose alternatives, and respond iteratively to prompts positions these systems as potential collaborators rather than merely instructional tools (Sadeghi et al., 2026; Tan et al., 2026). This development aligns with contemporary understandings of design as a relational and socio-technical process in which creativity emerges through interactions among people, technologies, materials, and contexts.

However, the educational use of GenAI also introduces challenges concerning reliability, pedagogy, and responsible integration (Song & Rabu, 2025). Concerns regarding bias, hallucination, delusional spiralling, and uncritical acceptance of AI-generated outputs highlight the limitations of relying on AI without human oversight (Chandra et al., 2026; Huet & Metz, 2025). These concerns reinforce the importance of human judgement, critical evaluation, and pedagogical mediation, particularly when GenAI becomes involved in processes of creative inquiry and decision-making.

Beyond technology-centred perspectives

Within D&T, research has demonstrated GenAI's potential to expand creative exploration, generate alternative concepts, and support iterative design reasoning (Liu, 2025; Tan et al., 2026). Nevertheless, much of the literature continues to frame GenAI primarily in terms of technological capability, affordances, adoption, productivity, academic integrity, and learning outcomes (Oliveira, 2026; Tan, 2026). Less attention has been given to the pedagogical processes through which teachers and learners interpret, question, contextualise, and transform AI-generated contributions. This is significant because design learning extends beyond generating solutions to comparing alternatives, responding to constraints, justifying decisions, critiquing outcomes, and iteratively refining ideas (Sadeghi, et al., 2026). The pedagogical challenge is therefore how teachers structure AI-supported activity so that it strengthens creativity, agency, disciplinary knowledge, and critical judgement rather than simply accelerating production.

Emerging research on human–AI co-creation begins to address this relational dimension, recognising that creative outcomes can develop through iterative dialogue and shared problem-solving (Liu, 2025; Tan, 2024). Related scholarship emphasises human-centred AI and the continuing importance of professional judgement in determining how AI contributions are interpreted and used (Giannakos et al., 2025; Tan et al., 2026). International guidance similarly positions teachers as central to responsible AI integration, particularly in maintaining human agency, critical thinking, and ethical accountability (UNESCO, 2023). However, limited research has examined how teacher–GenAI relationships are constructed and negotiated during authentic educational practice, particularly how teachers orchestrate AI-supported interactions and how perceptions of GenAI's role evolve through iterative design. Addressing this gap requires moving beyond viewing GenAI as a tool, assistant, or technical capability towards examining the pedagogical and relational processes through which teacher–GenAI partnerships develop. This perspective provides the foundation for the study's conceptualisation of Orchestrated Co-Agency and the Teacher–GenAI Relationship Continuum.

3. Conceptual framing

The study draws primarily on sociomaterial perspectives, complemented by Actor–Network Theory (ANT), posthumanism, and co-evolutionary design. Each provides a distinct lens for interpreting teacher–GenAI interaction. Sociomaterial perspectives conceptualise learning and design as emerging through entanglements among social, material, and technological elements (Barad, 2007; Fenwick et al., 2012). ANT extends this relational view by positioning agency as distributed across human and non-human actors, including teachers, learners, technologies, artefacts, and material constraints (Latour, 2005). Posthumanism challenges exclusively human-centred understandings of intelligence, creativity, and knowledge, enabling GenAI to be considered a participant in their production (Braidotti, 2013). Co-evolutionary design highlights the iterative relationships among designers, problems, representations, and emerging solutions as each continually reshapes the others.

Together, these perspectives position D&T design as a relational and emergent process in which human and non-human actors collectively influence activity. Importantly, distributed agency does not imply distributed pedagogical responsibility. While GenAI and other elements of the design assemblage may shape decisions and possibilities, teachers retain responsibility for interpreting, evaluating, contextualising, and ethically mediating AI contributions. Teacher orchestration is therefore understood as the pedagogical mechanism through which distributed contributions are organised and given educational direction. This framing shifts attention from what GenAI can produce to how its contributions become meaningful through interaction. It provides the foundation for Orchestrated Co-Agency, which explains teacher mediation of distributed human–AI contributions, and the Teacher–GenAI Relationship Continuum, which conceptualises how these relationships may shift from utility through dialogic engagement and orchestration towards allyship.

4. Methods

This qualitative exploratory case study investigated how pre-service D&T teachers constructed and negotiated partnerships with GenAI during authentic design activities. It examined how creativity, agency, knowledge construction, and pedagogical decision-making emerged through interactions among participants, GenAI, and the design context. The case was bounded within three university-based D&T courses in which participants engaged in authentic design activities supported by ChatGPT and Fusion 360 Generative Design. This approach enabled in-depth examination of contemporary human–GenAI interaction within its natural educational setting (Yin, 2018).

Participants comprised two university lecturers and 40 pre-service D&T teachers from Adelaide University, purposively recruited from the three participating courses: Advanced Manufacturing, Technologies Curriculum 2, and Design and Technology Workshop Knowledge. All participants provided written informed consent. Data were generated through six classroom observations (18 hours), one semi-structured and one stimulated recall interview (approximately 30 minutes each), 40 participant design folios, design artefacts, AI interaction logs, and reflective journals. Together, these sources provided complementary perspectives on participants' experiences and captured the interactions, decisions, and evolving design practices through which teacher–GenAI partnerships developed.

Data analysis and reflexivity

Data were analysed using Reflexive Thematic Analysis (RTA) following Braun and Clarke (2021) and drawing on disciplinary and contextual knowledge of D&T education. This positioning was treated as an integral part of the interpretive process. Analysis involved familiarisation, inductive coding, development and review of candidate themes, and refinement of the final thematic structure. The analysis examined interactions with GenAI alongside participants' design decisions and emerging understandings of agency, creativity, knowledge construction, and pedagogy. Data were continually compared across courses, participants, and sources, with attention to convergence, divergence, and contradiction. The final themes therefore represented patterns of meaning explaining the evolving teacher–GenAI partnership rather than simply recurring topics. Reflexive memos documented assumptions, analytical decisions, uncertainties, and alternative interpretations throughout the study. This reflexive approach supported a thematic structure capturing the iterative and relational nature of human–GenAI collaboration.

Lincoln and Guba's (1985) principles informed the study's approach to trustworthiness. Credibility was supported through sustained engagement and triangulation across multiple data sources; transferability through thick description of the research context and processes; and dependability through peer critique involving the two university lecturers and a research assistant. The research assistant contributed to data organisation and discussions of emerging interpretations, providing opportunities to question assumptions and alternative explanations rather than seeking inter-rater reliability.

5. Learning context: The design challenge

To investigate how pre-service teacher–GenAI partnerships developed during authentic design practice, participants undertook a challenge to design, evaluate, and refine a lightweight drone frame. Fusion 360 Generative Design produced initial design solutions based on specified constraints, including strength, weight, material efficiency, manufacturability, and structural performance. Each participant then uploaded a Fusion 360 generated drone arm to ChatGPT, using prompts to explore, compare, justify, and refine alternative design possibilities. The challenge reflected the open-ended and iterative nature of contemporary D&T education, in which solutions develop through exploration, critique, testing, and refinement. GenAI was positioned as a participant within the design process rather than an autonomous problem solver.

Throughout the activity, participants critically evaluated AI-generated suggestions using disciplinary and engineering knowledge, moving iteratively between prompting, dialogue, evaluation, redesign, and reflection. This process was not to assess the technical performance of GenAI but to create opportunities to examine how teacher–GenAI partnerships were negotiated through decision-making and collaborative inquiry. The activity therefore provided the foundation for the Orchestrated Co-Agency framework and the Teacher–GenAI Relationship Continuum presented in the findings.

6. Findings: The development of teacher–GenAI partnership

RTA identified the Teacher–GenAI Relationship Continuum (Figure 2) through which relationships may evolve through practice. Four developmental stages: utility, dialogic engagement, teacher orchestration and allyship derive from patterns identified in this study.

Stage 1: Utility – partnership begins as instrumental

Our observations revealed that the earliest stage of teacher–GenAI partnership was characterised by an instrumental orientation in which participants positioned GenAI primarily as a functional resource for information retrieval, idea generation, and problem-solving. Initial interactions were largely transactional, with ChatGPT used to clarify technical concepts, generate design ideas, and explore alternative solutions. One pre-service teacher interaction log showed one-way commands to get a quick solution: *"generate a different drone arm design to the one shown"* and *"given the drone arm design, generate a new arm to meet specifications given."* At this stage, participants viewed GenAI as an efficient means of supporting design work rather than as a collaborative partner in the creative process. As one pre-service teacher explained in an interview: *"Initially, I*

used ChatGPT like a search engine for getting ideas quickly and checking things I wasn't sure about" (Pre-service Teacher 4). Pre-service teacher 7 commented during an interview: *"I still saw it as another digital tool rather than a collaborator in idea generation. I did not know how to prompt it deeper for a better solution."* These accounts indicate that early engagement with GenAI was predominantly instrumental, task-focused, and directed by the pre-service teachers. Figure 1 shows our observations about a utility-oriented type of interaction where GenAI functioned primarily as an external cognitive resource rather than a co-creative partner. This finding aligns with research suggesting that initial engagement with GenAI tends to be technology-centred before evolving towards more sophisticated forms of pedagogical interaction, as shown in Figure 2 (Liu, 2025).

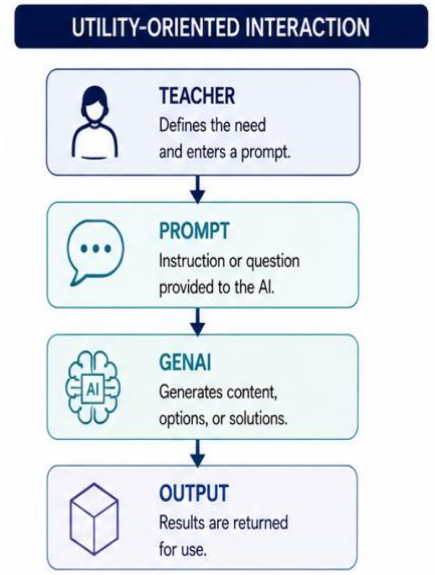


Figure 1. Utility oriented interaction

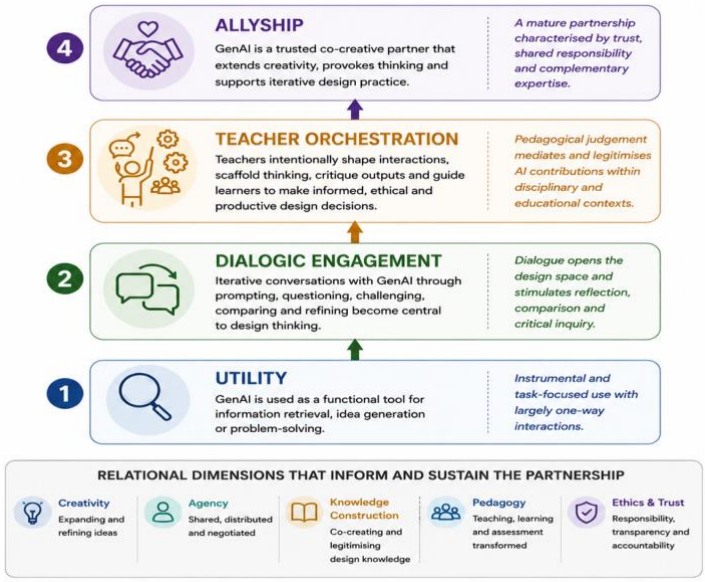


Figure 2. Teacher–GenAI Relationship Continuum

Stage 2: Dialogic engagement – developing a conversational partnership

Lesson observations revealed that before students became more familiar with GenAI, prompting had to be taught by the lecturer for conversations with AI to evolve into pedagogical processes of inquiry. The relationship evolved from instrumental information retrieval towards sustained dialogic engagement. Rather than seeking isolated answers, participants increasingly used iterative conversations to question assumptions, compare alternatives, and refine design ideas. Conversation became central to design thinking, with GenAI functioning as a catalyst for inquiry rather than a source of solutions. Pre-service teacher 22 noted in a reflection log that *"the most important thing was for us to be taught how to ask the right questions and sustain the dialogue*." One lecturer commented that *"I had to teach prompting to get the students asking better questions."* When pre-service teachers got better at prompting, one reflected in a stimulated recall interview that *"the first answer was rarely the one I used. Every response gave me something else to question, so I kept asking different questions until the design started making sense" (*Pre-service teacher 9).

Together, these accounts demonstrate participants no longer evaluated GenAI by the accuracy of individual responses as in stage 1 but by its capacity to sustain dialogue that encouraged questioning, critique, comparison, and iterative refinement. As pre-service teacher 10 explained: *"The GenAI designs weren't the answer; they were something to push against. Each prompt pushed me to think differently, compare options, and justify why one idea worked better than another."* These findings reinforce growing evidence that the educational value of GenAI lies less in producing answers and more in supporting meaningful human–AI dialogue (Giannakos et al., 2025).

Stage 3: Teacher intentionally orchestrating the learning process

Rather than relinquishing pedagogical authority to algorithmic systems, teachers enacted what we referred to as orchestrated co-agency: the deliberate coordination of relationships between students, GenAI systems, disciplinary knowledge, and real-world design constraints. Observation of learning revealed that lecturers' roles extended beyond facilitating AI use to designing opportunities for inquiry, guiding critical reflection, and ensuring that AI-generated ideas were interpreted through disciplinary knowledge and authentic design criteria. Figure 3 synthesises these finding and arrows indicate observed circulation of agency across these elements, emphasising that creativity and decision-making emerged through iterative negotiation rather than residing with any single actor. Table 1 explains Orchestrated Co-Agency during observed design practice.

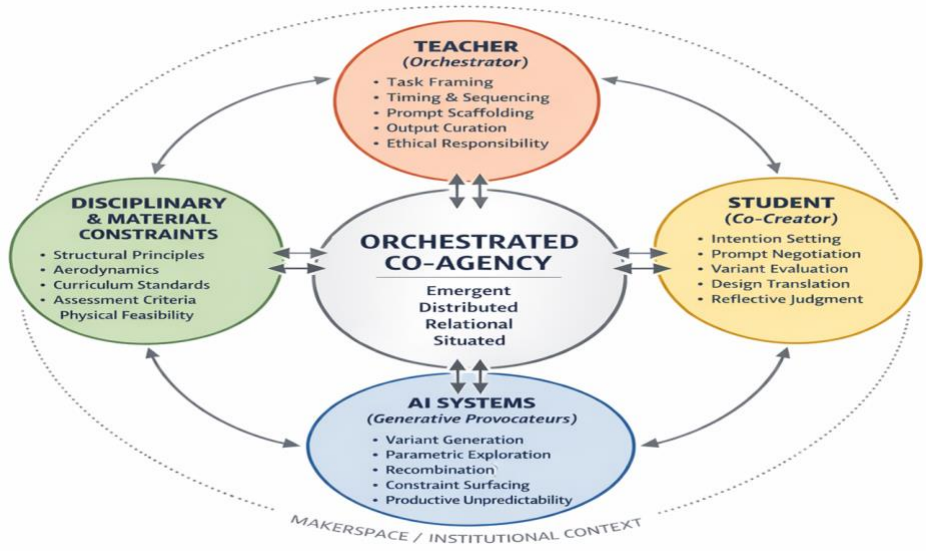


Figure 3. Orchestrated Co-Agency in design education (Visual representation co-created with ChatGPT)

Table 1
Orchestrated Co-Agency during design practice explained

Component	Role in design process	Observed practices during the lesson
Orchestrated Co-Agency (central dynamic)	Emergent relational agency produced through iterative interaction among teachers, students, AI systems, and design constraints.	Agency is circulated across actors. Creativity, authorship, and pedagogical responsibility are negotiated through cycles of prompting, interpretation, critique, redesign, and material testing within the design process.
Teacher as orchestrator	Frames and regulates the design process by structuring tasks, scaffolding AI use, and aligning outputs with curricular goals.	Teachers positioning GenAI in task framing, prompting guidance, timing AI engagement, curating or rejecting AI outputs, modelling evaluative judgement, and linking AI suggestions to disciplinary knowledge.
Student as co-creator	Students articulate design intentions, negotiate prompts, evaluate AI-generated possibilities, and translate outputs into sketches and CAD models.	Students engaging GenAI through prompt creation and refinement, interpretation of AI suggestions, sketching and modelling adaptations, evaluation of variant designs, reflection on authorship and creativity.
AI systems as generative provocateurs	Generator of variant design possibilities that stimulate ideation and reshape design trajectories.	AI outputs influencing design exploration, provoking reflection, and altering the trajectory of design development.
Disciplinary norms and material as constraints	Stabilise and filter design possibilities through disciplinary knowledge, assessment criteria, and physical feasibility.	Disciplinary knowledge, curriculum expectations and material realities being used to shape acceptance, modification, or rejection of AI-generated ideas.

Teacher orchestration emerged as the pedagogical mechanism through which dialogue was transformed into meaningful learning. One university lecturer explained:

> *My job is to shape how agency is enacted within the teacher–GenAI partnerships. The important part isn't getting students to use ChatGPT or Fusion 360. It is helping them question what it suggested, justify their choices, and explain why one solution was better than another. That's where learning happens.* (University lecturer 2)

Similarly, pre-service teacher (11) reflected: *"I realised that my role wasn't to find the best prompt, but to keep the conversation going. Every response became another opportunity to challenge thinking, refine ideas, and help students make informed design decisions*."

Lecturer 1 used the metaphor of the teacher as editor or curator arguing that instead of functioning primarily as transmitters of knowledge, teachers became interpreters, moderators, and contextualisers of generative possibilities. Their authority was therefore not diminished by GenAI but reconfigured through them being disciplinary gatekeepers mediating between computational possibility, material reality and curriculum constraints. Teachers retained responsibility for interpreting ideas, maintaining disciplinary standards, and supporting informed decision-making. He pointed out that: *"Sometimes I let my students run with a bad idea for a while then intervene. I do this for my students to figure out why the idea isn't working. This is more valuable than me shutting it down."* Lecturer 2 reflected in an interview that: *"If students choose an AI-generated design, they must explain why. If they reject it, they also must explain why. Either way, the decision must be justified."*

Together, these accounts demonstrate that teachers intentionally orchestrated dialogue to transform AI-generated ideas into opportunities for critical inquiry, collaborative problem-solving, and disciplinary reasoning. These findings extend contemporary scholarship by demonstrating that meaningful human–AI partnerships are shaped through teacher orchestration rather than technological capability alone (Giannakos et al., 2025; UNESCO, 2023).

Stage 4: Allyship – maturing into co-creative partnerships

As teacher–GenAI partnerships matured, there was an observed shift toward co-design and knowledge generation. Participants increasingly described GenAI as a thinking partner that extended creative inquiry. The partnership was characterised by reciprocal engagement in which AI prompted new perspectives, challenged assumptions, and supported iterative refinement without displacing teacher expertise or professional judgement. Allyship therefore emerged not as a property of the technology itself, but as the outcome of sustained pedagogical interaction in which teachers intentionally cultivated dialogue and critical reflection. One practising teacher reflected: *"I stopped thinking about ChatGPT as something that gave me answers. It became more like another perspective in the room—something that kept pushing my thinking in directions I hadn't considered"* (pre-service teacher 8). Similarly, pre-service teacher 6 explained: *"It felt less like using software and more like working alongside something that kept challenging my ideas. I still made the decisions, but the conversation helped me arrive at better ones*."

Together, these accounts indicate that participants increasingly valued GenAI for its capacity to provoke reflection rather than provide solutions. Meaningful collaboration developed through repeated interaction and allyship therefore reflected a pedagogically mediated relationship that complemented, rather than replaced, human creativity and professional judgement. These findings extend emerging scholarship on human–AI co-creation by demonstrating that the educational significance of GenAI resides in its capacity to sustain collaborative inquiry rather than automate design thinking (Giannakos et al., 2025).

Ethical ambivalence – negotiating responsibility within teacher–GenAI partnerships

Engagement with GenAI not only created new possibilities but was accompanied by persistent ethical tension and reflexive questioning, particularly around authorship, bias, transparency, and professional responsibility. Questions of how ideas originated, who is accountable for decisions and outcomes, whose perspectives, experiences and cultural values are embedded in the output, and how we can maintain independent thinking and avoid over-reliance were issues discussed. Lecturer 1 asked: *"who is accountable for decisions and*

outcomes with GenAI?" Pre-service teacher 10 observed: *"The more I trusted ChatGPT to help my thinking, the more careful I became about checking its suggestions and asking whose ideas they really were*." Similarly, pre-service teacher 18 reflected: *"If the form came from the AI, the parameters from the teacher, and the final choice from the student—who's the designer?"*

These accounts illustrate that ethical concerns evolved alongside, rather than in opposition to, partnership development. Ethical reflection emerged not as a barrier to partnership, but as a natural consequence of increasingly sophisticated engagement with GenAI. These findings reinforce growing international calls for human-centred and ethically responsible approaches to AI integration (Kayiran et al., 2026; UNESCO, 2023).

7. Discussion of findings

This study examined how pre-service teachers experienced and negotiated relationships with GenAI during authentic D&T activities. The findings suggest that meaningful teacher–GenAI partnerships develop through iterative, pedagogically mediated interaction. Participants moved between instrumental use, dialogic engagement, teacher orchestration, and emerging perceptions of GenAI as an ally, while ethical considerations remained present throughout the process. These findings extend existing human–AI research by suggesting that the educational significance of GenAI lies not simply in what the technology can do, but in how teachers and learners question, evaluate, justify, and transform its contributions within disciplinary practice.

Theoretical contribution

The study proposes Orchestrated Co-Agency as a relational perspective for understanding human–GenAI interaction in education. The findings suggest that teacher orchestration is central to transforming AI-generated contributions into meaningful learning through dialogue, critical inquiry, disciplinary reasoning, and ethical judgement. Mutlu Cucurova's chapter 7 in the OECD Digital Education Outlook 2026, on teacher–AI teaming, complementarity, AI affordances, task delegation and synergy paradigms provides an important account of how teachers and AI can work together to augment educational activity (OECD, 2026). Complementing Cucurova, the present study extends this work by shifting analytical attention from the level of teaming to the development and negotiation of the relationship itself. Whereas the OECD framework is primarily concerned with the forms and conditions of teacher–AI teaming, Orchestrated Co-Agency extends existing teaming perspectives by positioning GenAI as a participant in design activity while recognising that human–AI relationships are negotiated and sustained through situated pedagogical practice (Sadeghi et al., 2026). This distinction is particularly relevant to D&T education, where design activity involves iterative cycles of exploration, critique, comparison, justification, and refinement.

Secondly, the findings provide a basis for conceptualising a Teacher–GenAI Relationship Continuum, through which relationships may shift from viewing GenAI primarily as a tool or assistant towards more dialogic and complementary forms of partnership. The continuum should not be interpreted as a fixed sequence or developmental hierarchy. Rather, the dimensions are iterative and overlapping, with teachers potentially moving between different forms of engagement depending on the task, context, AI contribution, and pedagogical purpose. The concept of allyship is therefore used as an interpretive construct describing a perceived form of complementary partnership, rather than suggesting that GenAI possesses human intentions, agency, or consciousness.

Pedagogical and practical implications

The findings have three implications for D&T education and teacher professional learning. Firstly, teacher education should develop orchestration capabilities alongside technical competence. Preparing teachers for AI-rich classrooms involves more than prompt engineering or software operation; it requires the capacity to facilitate productive dialogue, critically evaluate AI-generated ideas, and integrate GenAI into authentic disciplinary learning while maintaining professional judgement and learner agency. This aligns with international guidance emphasising teacher agency, human oversight, and ethical responsibility in AI-supported education (OECD, 2026; UNESCO, 2023).

Secondly, authentic design challenges provide productive contexts for developing meaningful human–GenAI interaction. Open-ended problems require participants to compare alternatives, question AI-generated solutions, justify decisions, and iteratively refine designs. Such activities position GenAI as a resource for inquiry and creative exploration rather than simply an answer-generating system (Giannakos et al., 2025; Mollick, 2024). Thirdly, ethical reflection should be embedded throughout AI-supported design practice. As participants developed greater confidence in GenAI, they also confronted questions of trust, responsibility, transparency, and the boundaries of AI contribution. Consequently, AI literacy in D&T education should encompass not only technological capability but also critical and ethical judgement.

Limitations and future research

This qualitative case study provides rich, context-dependent insights but does not support statistical generalisation. The proposed Teacher–GenAI Relationship Continuum and Orchestrated Co-Agency perspective are derived from patterns identified in this study and should therefore be regarded as theoretically informed propositions rather than empirically validated frameworks. Participants' experiences were also shaped by the particular technologies, design activities, pedagogical arrangements, and institutional contexts examined. Furthermore, concepts such as partnership and allyship are interpretive constructs reflecting participants' experiences rather than claims about AI possessing human-like agency or intention. Given the rapid evolution of GenAI, these relationships may also change as technologies and educational practices develop. Future longitudinal and comparative research across disciplines, educational settings, participant groups, and AI systems is therefore needed to examine the applicability, boundaries, and explanatory value of the proposed concepts.

8. Conclusion

This study demonstrates that teacher–GenAI relationships in authentic D&T practice are dynamic, relational, and pedagogically mediated rather than determined by technological capability alone. The findings indicate that meaningful collaboration develops through cycles of prompting, dialogue, evaluation, justification, refinement, and ethical reflection, with teachers retaining a central role in shaping how GenAI contributes to learning and design.

The study proposes Orchestrated Co-Agency and the Teacher–GenAI Relationship Continuum as complementary conceptual lenses for understanding these interactions. Together, they shift attention from GenAI as merely a tool or assistant towards the relationships and pedagogical processes through which its contributions acquire educational value. Rather than presenting these concepts as definitive or validated frameworks, the study offers them as theoretically informed propositions emerging from the empirical analysis and as a basis for further investigation. As GenAI becomes increasingly embedded in D&T education, the central challenge is therefore not simply whether AI should be used, but how teachers can mediate human–AI interaction in ways that strengthen creativity, agency, disciplinary knowledge, professional judgement, and ethical responsibility. Further research is needed to determine whether the relational patterns identified here extend across different educational contexts and technologies. Nevertheless, the study provides a foundation for rethinking teacher–GenAI interaction as an evolving pedagogical relationship rather than simply a matter of technological assistance.

References

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press. https://doi.org/10.1215/9780822388128

Braidotti, R. (2013). *The posthuman*. Polity Press.

Braun, V., & Clarke, V. (2021). One size fit all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology, 18(3),* 328-352. https://doi.org/10.1080/14780887.2020.1769238

Chandra, K., Kleiman-Weiner, M., Ragan-Kelley, J., & Tenenbaum, J. (2026). Sycophantic chatbots cause delusional spiralling, even in ideal Bayesians. *arXiv*. https://arxiv.org/abs/2602.19141

Chandrasekera, T., Hosseini, Z., & Perera, U. (2024). Can artificial intelligence support creativity in early design processes? *International Journal of Architectural Computing,* 23(1), 122-136. https://doi.org/10.1177/14780771 241254637

Fenwick, T., Edwards, R., & Sawchuk, P. (2012). *Emerging approaches to educational research: Tracing the socio-material.* Routledge. https://doi.org/10.4324/9780203817582

Giannakos, M., Horn, M., & Cukurova, M. (2025). Learning, design and technology in the age of AI. *Behaviour & Information Technology*, *44(5),* 883–887. https://doi.org/10.1080/0144929X.2025.2469394

Ghimire, A., Prather, J., & Edwards, J. (2024). Generative AI in education: A study of educators' awareness, sentiments, and influencing factors. In *2024 IEEE Frontiers in Education Conference (FIE)*. IEEE. https://doi.org/10.1109/FIE61694.2024.10892891

Huet, E., & Metz, R. (2025). *OpenAI confronts signs of delusions among ChatGPT users*. *Bloomberg Businessweek*. https://www.bloomberg.com/features/2025-openai-chatgpt-chatbot-delusions/

Kayıran, D., Sönmez, M., Avcı, A., & Haji Mohamud, R. Y. (2026). Teachers' perceptions of artificial intelligence in curriculum integration: Opportunities, concerns, and professional development needs. *Frontiers in Artificial Intelligence*. Advance online publication. https://doi.org/10.3389/frai.2026.1806165

Latour, B. (2005). *Reassembling the social: An introduction to actor–network-theory*. Oxford University Press. https://doi.org/10.1093/oso/9780199256044.001.0001

Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic inquiry. *International Journal of Intercultural Relations*, 9, 438 439. https://doi.org/10.1016/0147-1767(85)90062-8

Liu, M., & Hu, Y. (2023). Application potential of stable diffusion in different stages of industrial design. In H. Degen & S. Ntoa (Eds). Artificial intelligence in HCI. HCII 2023. Lecture notes in computer science, 14050, 590-609. Springer Nature. https://doi.org/10.1007/978-3-031-35891-3_37

Liu, Z. (2025). Human-AI co-creation: A framework for collaborative design in intelligent systems. *arXiv*, 1-15. https://arxiv.org/abs/2507.17774

Mollick, E. (2024). *Co-intelligence: Living and working with AI*. Penguin Group.

OECD (2026), *OECD Digital Education Outlook 2026: Exploring effective uses of Generative AI in education*, OECD Publishing. https://doi.org/10.1787/062a7394-en.

Oliveira, A. P., Coelho, M., Póvoa, O., Morgado, B., & Guerra, C. (2026). Higher education teachers' perspectives on the ethical challenges of using artificial intelligence—A case study in the Alto Alentejo region, Portugal. *Frontiers in Education, 11*, Article 1780142, 1–14. https://doi.org/10.3389/feduc.2026.1780142

Sadeghi, N., Dehghani, M. & Kabadayi, N. (2026). The AI-driven Decision-Making (AIDM) Framework: Integrating AHP and ChatGPT for supplier selection. *Ann Oper Res* 359, 2593–2615. https://doi.org/10.1007/s10479-026-07136-7

Selwyn, N. (2022). The future of AI and education: Some cautionary notes. *European Journal of Education, 57*(2), 620–631. https://doi.org/10.1111/ejed.12532

Song, F., & Rabu, S. N. A. (2025). Trends, Advantages, and challenges: A systematic literature review of artificial intelligence in design education. *Journal of Educational and Social Research*, 15(4), https://doi.org/10.36941/jesr-2025-0147

Tan, L., & Luhrs, M. (2024). Using Generative AI Midjourney to enhance divergent and convergent thinking in an architect's creative design process. *The Design Journal*, 27(4), 677-699. https://doi.org/10.1080/14606925.2024.2353479

Tan, S. C., Tan, Y. Y., Teo, C. L., & Yuan, G. (2026). Teachers' professional agency in learning with AI: A case study of a generative AI-based knowledge building learning companion for teachers. *British Journal of Educational Technology*, 57, 943–964. https://doi.org/10.1111/bjet.70013

UNESCO (2023). *Guidance for generative AI in education and research*. https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage.

Yin, H., Zhang, Z., & Liu, Y. (2023). The exploration of integrating the Midjourney artificial intelligence generated content tool into design systems to direct designers towards future-oriented innovation. *Systems*, 11(12), 566. https://doi.org/10.3390/systems11120566

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The Future is Connection:

Collaboration, Creativity and Compassion in a Digital Society

Chimwayange, C. (2026). Teacher–GenAI partnership in design and technology education: From utility to allyship. In Cochrane, T., Narayan, V., Poole, T., Lai, P., Lake, P., Moore, O., & Li, L. (Eds.), *The Future is Connection: Collaboration, Creativity and Compassion in a Digital Society*. Proceedings ASCILITE 2026. Brisbane (pp. 905-915). https://doi.org/10.65106/apubs.2026.3417

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