Project Leadership and Society 6 (2025) 100199

Contents lists available at ScienceDirect

Project Leadership and Society

journal homepage: www.sciencedirect.com/journal/project-leadership-and-society

Editorial

The future of learning: how artificial intelligence and other new technologies revolutionize project management education and foster Project Learning Intelligence

Costanza Mariani [a], Kirsi Aaltonen [b], Helgi Þor Ingason [c], Mauro Mancini [a], Martina Huemann [d,e,f,*]

[a] Politecnico di Milano, Italy
[b] University of Oulu, Finland
[c] Reykjavik University, Iceland
[d] WU Vienna, University of Economics and Business, Austria
[e] University College London, UK
[f] University of Johannesburg, South Africa

1. Introduction

Over the past decade, project management education has undergone a profound transformation, accelerated by the diffusion of digital technologies and the growing need for flexible, learner-centred pedagogies (Hodgson and Paton, 2016; Cicmil and Gaggiotti, 2018). This editorial introduces a nascent yet rapidly evolving area of inquiry — the use of artificial intelligence in project management education — which calls for renewed conceptualisation and critical reflection. Previous studies, including those featured in the Project Leadership and Society special issue "*Digital Learning and Education in a Project Society*", have shown that digitalization is reshaping traditional teaching models. Rather than simply disrupting them, it also creates space for more experiential, collaborative, and emotionally engaging forms of learning (Konstantinou et al., 2023). Scholars have highlighted the importance of shifting from the mere transmission of knowledge to learning experiences that mirror the uncertainty and complexity of real projects. Such environments can strengthen students' sense of autonomy, motivation, and engagement (Van Der Hoorn and Killen, 2021; Afzal and Crawford, 2022).

However digitalization is now complemented by new technologies; AI represents the next frontier of pedagogical innovation (Winkler and Soellner, 2018; Ng et al., 2023). While digital learning primarily improved connectivity and content delivery, AI introduces a new logic of *intelligent adaptation* (Strielkowski et al., 2025). According to recent studies, technologies such as chatbots, virtual tutors, generative AI systems, and learning analytics do not just mediate instruction—they *co-create* learning experiences by offering tailored feedback, simulating dialogue, and dynamically adjusting challenges (Carvalho et al., 2022; Kim et al., 2022). In project management education, the implementation of these tools has the potential for allowing personalised, data-driven, and context-sensitive learning pathways that cultivate both methodological expertise and also soft capabilities such as ethical reasoning, teamwork, and adaptive judgment (Jääskä et al., 2022; Jääskä et al., 2023).

However, the integration of AI is not just a pedagogical enhancement; it invites a re-examination of what it means to learn and lead in a project society (Konstantinou et al., 2023). Teachers are expected to create spaces where humans and machine intelligence can work together harmoniously, given that project work depends more and more on digital and AI-based infrastructures and technologies (Whyte, 2019; Mariani and Mancini, 2025). This challenge is addressed in this special collection, "*The future of learning: how artificial intelligence and other new technologies revolutionize project management education and training.*" The papers explore how AI can act as an insightful ally in fostering the development of morally grounded, adaptable, and self-reflective project managers, thus shifting the focus from mere digitalization of learning to the development of *intelligent learning ecosystems*. The contributions invite educators, researchers, and practitioners to rethink what is the meaning of learning, teaching, and leading in an age of human–AI collaboration. Overall, these contributions suggest that the integration of AI in project education is less a technological transition than an epistemic one because it essentially transforms how knowledge, ethics, and practice are conceptually associated with the formation of project leaders.

2. From digitalization to intelligent learning ecosystems

The acceleration of digital learning during the past decade has revealed both the opportunities and the limitations of technology-mediated education (Bower, 2019; Okoye et al., 2021). While early efforts largely focused on translating traditional teaching into online formats, the recent diffusion of intelligent technologies has started to shift attention from *digitalization*—the transfer of content and processes into

This article is part of a special issue entitled: AI and Education published in Project Leadership and Society.

* Corresponding author. University College London, UK.

https://doi.org/10.1016/j.plas.2025.100199

Available online 31 October 2025
2666-7215/© 2025 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Table 1
Overview of the four papers included in the special collection.

Paper	Focus	Main Contribution	Method
Smit et al. (2025)	Ethical use of AI in project-based higher education	Highlights moral hazards and need for clear institutional AI policies	Survey to postgraduate students
Daniels et al. (2025)	AI-enhanced game-based learning for leadership	Shows how AI simulations foster ethical reasoning and adaptive expertise	Design-based mixed-methods study
Ingason et al. (2025)	AI-driven chatbot for personalised learning (*ChatLearn*)	Demonstrates how AI tutors support reflection and learner autonomy	Action Design Research
Vettori and Warm (2025)	Institutional readiness for AI-skills education	Identifies barriers and proposes co-creation, peer learning, and micro-designs	Conceptual and pedagogical analysis

digital environments—to *intelligent learning ecosystems*, where technology becomes an enabler of interaction, reflection, and adaptation—calling for new digital and pedagogical capabilities to sustain them (Benita et al., 2021; Nguyen and Tuamsuk, 2022). In this view, the educator is no longer primarily a transmitter of knowledge but a **designer of learning experiences**, who shapes the conditions under which students can engage critically with complex and uncertain project scenarios (Sarnok et al., 2019).

This transition is not merely technological; it represents a deeper pedagogical and epistemic change. In digital learning environments, knowledge was often conceived as information to be delivered efficiently, whereas in intelligent ecosystems it is viewed as something that is *constructed dynamically,* as knowledge sharing through dialogue between humans and digital agents (Passey et al., 2018; Brevik et al., 2019). Immersion simulations, data analytics, and AI-driven systems may provide new ways for learners to receive feedback and engage, but their true potential is in facilitating reflexive learning processes, which assist students in understanding, challenging, and reframing their own work (Lin et al., 2025).

At the centre of this evolution is what we call *Project Learning Intelligence (PLI)* — a shared capacity to design, experience, and reflect on learning that brings together human judgment, ethical awareness, and insights derived from technology. PLI is not about artificial intelligence as a technological enabler; it is concerned with the ongoing co-evolution between human and technological ways of knowing and teaching in project-based education. It means a move away from teaching project management as a fixed body of knowledge, towards developing project leadership as an adaptive competence that grows through constant interaction with digital tools, data, and social contexts. This conceptual framework conceptually underlies all the papers in this collection. In fact the collection shows how emerging technologies encourage educators to move beyond a focus on digital efficiency and towards what Bearman and Ajjawi (2023) define as *intelligent pedagogy* — an approach that values curiosity, ethical reflection, and contextual understanding alongside technical skill.

3. Contribution of this special collection

The four papers included in this Special Collection represent distinct yet interconnected perspectives on how Artificial Intelligence and emerging technologies are reshaping the learning and teaching of project management. Rather than offering isolated case studies, they collectively outline a trajectory of transformation—from ethical reflection to immersive experience, from personalised learning to human–AI collaboration—illustrating how the concept of *Project Learning Intelligence* can materialise in practice. Table 1 provides an overview of the paper.

3.1. Ethical and regulatory awareness

The first contribution, *"Ambiguous regulations for dealing with AI in higher education can lead to moral hazards among students"* (Smit et al., 2025) outlines the ethical tensions inherent in the integration of generative AI within academic learning environments. Drawing on moral hazard theory, the paper questions how automation and algorithmic assistance may distort accountability, fairness, and trust between educators, students, and institutions. The authors argue that responsible AI use in education demands both technical safeguards and governance frameworks that clarify roles, expectations, and ethical boundaries. The paper links project management education to wider debates on integrity, regulation, and professional responsibility. It establishes the ethical foundation upon which the other contributions build.

3.2. Immersive and experiential learning

The paper *"Advancing project leadership education through AI-enhanced game-based learning"* (Daniels et al., 2025) explores the potential of AI to enhance experiential pedagogy. The study employs a design-led approach to explore how generative systems can help create simulation environments that capture the ambiguity, pressure, and complex decision-making of real project situations. The paper draws on six pedagogical themes—relevance, agility, identity, ethics, motivation, and adaptability. The authors show how AI-supported scenarios can support the development of both adaptive expertise and moral reasoning. Rather than treating AI as a shortcut for instruction, the authors present it as a reflective partner that enables learners to practice leadership, learn from failure, and exercise judgment in ethically demanding contexts.

3.3. Personalised learning and adaptive feedback

The third paper, *"Personalised learning in project management education: insights from an artificial intelligence-driven chatbot"* (Ingason et al., 2025), examines the use of educational chatbots as enablers of scalable, learner-centred education. The paper presents the empirical results of the multi-country Erasmus + project *ChatLearn*; the study employs an Action Design Research approach to iteratively develop and test the chatbot *PMTutor*. The findings reveal how AI-driven systems can provide adaptive feedback, support motivation and self-paced learning across diverse educational settings. Also, the paper highlights practical and ethical challenges—ranging from user engagement and content coherence to the need for faculty training—showing that effective AI integration depends both on pedagogical design and institutional readiness and on technological capabilities.

3.4. Reflective practice and Human–AI collaboration

Finally, *"The race for AI skills as an obstacle course: Institutional challenges and low threshold suggestions"* (Vettori and Warm, 2025) extends the discussion toward the evolving role of educators and learners in intelligent learning ecosystems. The paper conceptualises *reflective hybrid intelligence*—a form of shared cognition in which human and artificial agents jointly contribute to learning design, interpretation, and assessment. Instead of seeing AI as a replacement for human expertise, the authors argue that the real educational challenge is to develop reflexivity—the capacity of both teachers and students to question algorithmic results, interpret data-driven insights within context, and preserve human agency in decision-making. Their workplaces AI-enhanced education within a broader view of socio-technical co-evolution, where reflection and dialogue become the bridge between technological innovation and well-designed pedagogical frameworks.

The four contributions part of this special collection provide a

Table 2
Dimensions of Project Learning Intelligence (PLI) as reflected in the contributions of the Special Collection.

Dimension	Focus	Paper
Ethical Intelligence	Establishing responsible, transparent, and human-centred principles for using AI in learning and leadership.	(Smit et al., 2025)
Experiential Intelligence	Leveraging simulation, serious games, and adaptive feedback to cultivate moral reasoning and adaptive expertise.	Daniels et al. (2025)
Personalised Intelligence	Employing AI-driven platforms and chatbots to support learner autonomy and motivation while preserving pedagogical coherence.	Ingason et al. (2025)
Reflective Intelligence	Encouraging critical dialogue and sensemaking between human and digital actors to co-create knowledge.	Vettori and Warm (2025)

layered view of how intelligent technologies blend with project education. They point to a future where learning in a project society depends on finding balance: between efficiency and ethics, automation and agency, data and reflective judgment—an equilibrium that constitute the basis of the *Project Learning Intelligence* framework.

4. Synthesis: towards a framework of project learning intelligence

Across the four contributions, a common thread emerges. The digital transformation of project management education is unfolding as a movement toward more connected, intelligent, and ethically grounded forms of learning. While each article focuses on a distinct dimension—ethics, experience, personalization, or reflection—together they delineate a coherent landscape that we term *Project Learning Intelligence (PLI)*. This notion emphasizes the evolving interplay between human judgment, technological support, and collective learning within project environments. It suggests that the effectiveness of project education no longer rests only on mastering tools or methods, but on developing the capacity to learn *with*, *through*, and *about* intelligent systems. In this sense, PLI embodies both a pedagogical vision and a developmental capability reflecting the potential of educational communities to bring together digital and human intelligence in ways that encourage reflection, inclusion, and ethical awareness.

The framework is built upon four dimensions, that are reported in Table 2.

These four dimensions are not single components but mutually reinforcing capacities. Ethical intelligence ensures that technological innovation is grounded in human values; experiential intelligence brings abstract principles to life through practice; personalised intelligence ensures accessibility and learner engagement; and reflective intelligence sustains the critical mindset necessary for continuous learning and adaptation.

This framework, represented in Fig. 1,foresees a next stage of research and practice that goes beyond developing new digital tools, emphasising instead the growth of organisational and individual capabilities needed to use them with purpose and discernment. *Project Learning Intelligence* (PLI) links technological innovation to educational intent with the underling aim to prepare project professionals who can question algorithms, and who are able to lead responsibly in contexts where human and artificial intelligence continuously evolve together.

5. Future research directions

The contributions assembled in this Special Collection highlight how Artificial Intelligence and other digital technologies are beginning to reshape the epistemic foundations of project management education. Yet, they also reveal how much remains to be understood. Future research must move beyond proof-of-concept studies (e.g Daniels et al., 2025; Ingason et al., 2025), to examine **how intelligent technologies influence learning processes, values, and professional identities** in sustained and diverse educational contexts. One promising direction, already attracting research attention (Alam, 2023) concerns the assessment of learning outcomes in AI-supported environments. Future research could integrate quantitative and qualitative methods to examine how adaptive feedback, personalised tutoring, and immersive simulations foster the development of professional competences, leadership maturity, and ethical sensitivity. Equally significant is the emerging collaboration between educators and AI systems—how teachers design, interpret, and adjust algorithmic insights within pedagogical frameworks that safeguard human agency and creativity.

A second avenue for research involves institutional readiness and governance. Universities and professional schools are more and more adopting AI-based tools thus they must also establish ethical standards, data policies, and capacity-building initiatives that promote transparency and inclusion. This theme has already gained traction within discussions on responsible AI in higher education and professional training (Cicmil and Gaggiotti, 2018; Kim et al., 2022). Comparative studies across cultural and disciplinary settings could further help in exploring how institutional systems and national policies shape both the opportunities and the risks of AI use in project education.

Finally, researchers could examine the socio-technical dynamics of learning with AI—how it influences collaboration, critical thinking, and the balance of authority within project teams. Understanding these dynamics may offer insight into the future of leadership itself, moving the analysis toward forms that are more distributed, adaptive, and co-intelligent – thus more capable of effectively integrating innovative technologies.

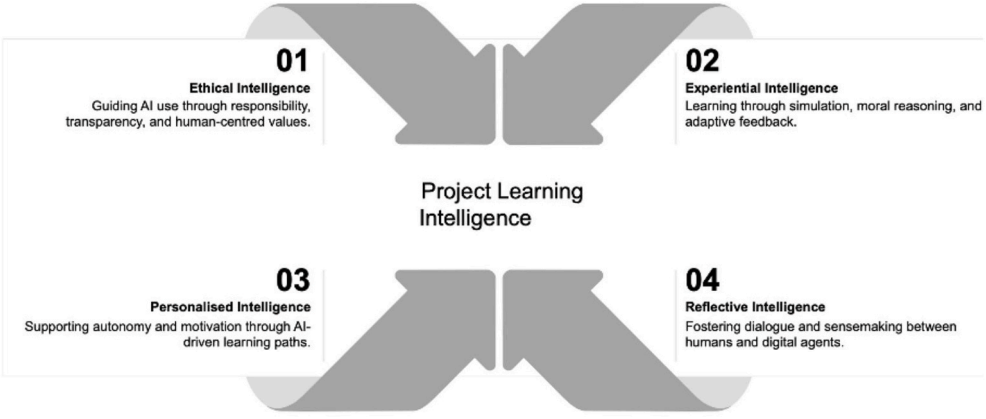

Fig. 1. Project learning intelligence.

6. Conclusion

This Special Collection represents a step forward in understanding how learning and leadership evolve in an era of intelligent transformation. The papers gathered here suggest that the challenge is no longer simply to digitalise project management education, but to ***humanise technology and technologise reflection***—to create conditions where AI enhances rather than replaces the human capacity to think, decide, and act responsibly.

Project work essentially shape how organisations and societies pursue change (Wagner et al., 2021; Wald et al., 2025) thus the education of project professionals becomes both a pedagogical and an ethical responsibility. The notion of Project Learning Intelligence proposed in this editorial provides a conceptual lens for this endeavor: it invites educators, researchers, and practitioners to view AI not as an endpoint, but as a partner in cultivating critical, ethical, and adaptive project leaders. In the end, the future of project management education will depend on our ability to design learning ecosystems that are as intelligent as they are humane.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement of funding

The subject of this article is a research project that was funded by the Erasmus+ program of the European Union.

References

Afzal, F., Crawford, L., 2022. Student's perception of engagement in online project management education and its impact on performance: the mediating role of self-motivation. Project Leadership Soc. 3, 100057. https://doi.org/10.1016/j.plas.2022.100057.

Alam, A., 2023. Harnessing the power of AI to create intelligent tutoring systems for enhanced classroom experience and improved learning outcomes. In: Rajakumar, G., Du, K.-L., Rocha, Á. (Eds.), Intelligent Communication Technologies and Virtual Mobile Networks. Springer Nature Singapore (Lecture Notes on Data Engineering and Communications Technologies), Singapore, pp. 571–591. https://doi.org/10.1007/978-981-99-1767-9_42.

Bearman, M., Ajjawi, R., 2023. Learning to work with the black box: pedagogy for a world with artificial intelligence. Br. J. Educ. Technol. 54 (5), 1160–1173. https://doi.org/10.1111/bjet.13337.

Benita, F., et al., 2021. A smart learning ecosystem design for delivering Data-driven thinking in STEM education. Smart Learn. Environ. 8 (1), 11. https://doi.org/10.1186/s40561-021-00153-y.

Bower, M., 2019. Technology-mediated learning theory. Br. J. Educ. Technol. 50 (3), 1035–1048. https://doi.org/10.1111/bjet.12771.

Brevik, L.M., et al., 2019. Transformative agency in teacher education: fostering professional digital competence. Teach. Teach. Educ. 86, 102875. https://doi.org/10.1016/j.tate.2019.07.005.

Carvalho, L., et al., 2022. How can we design for learning in an AI world? Comput. Educ. Artif. Intell. 3, 100053. https://doi.org/10.1016/j.caeai.2022.100053.

Cicmil, S., Gaggiotti, H., 2018. Responsible forms of project management education: theoretical plurality and reflective pedagogies. Int. J. Proj. Manag. 36 (1), 208–218. https://doi.org/10.1016/j.ijproman.2017.07.005.

Daniels, M., et al., 2025. Advancing project leadership education through AI-enhanced game-based learning. Project Leadership Soc. 6, 100189. https://doi.org/10.1016/j.plas.2025.100189.

Hodgson, D.E., Paton, S., 2016. Understanding the professional project manager: cosmopolitans, locals and identity work. Int. J. Proj. Manag. 34 (2), 352–364. https://doi.org/10.1016/j.ijproman.2015.03.003.

Ingason, H.T., et al., 2025. Personalised learning in project management education: insights from an artificial intelligence-driven chatbot. Project Leadership Soc. 6, 100193. https://doi.org/10.1016/j.plas.2025.100193.

Jääskä, E., et al., 2022. Game-based learning and students' motivation in project management education. Project Leadership Soc. 3, 100055. https://doi.org/10.1016/j.plas.2022.100055.

Jääskä, E., Kujala, J., Aaltonen, K., 2023. A game-based learning method to teach project management – the case of the earned value management. Cogent Educ. 10 (2), 2264035. https://doi.org/10.1080/2331186X.2023.2264035.

Kim, J., Lee, H., Cho, Y.H., 2022. Learning design to support student-AI collaboration: perspectives of leading teachers for AI in education. Educ. Inf. Technol. 27 (5), 6069–6104. https://doi.org/10.1007/s10639-021-10831-6.

Konstantinou, E., Nachbagauer, A., Wehnes, H., 2023. Editorial: Digital learning and education in a project society. Project Leadership Soc. 4, 100083. https://doi.org/10.1016/j.plas.2023.100083.

Lin, C.-J., et al., 2025. Enhancing reflective thinking in STEM education through experiential learning: the role of generative AI as a learning aid. Educ. Inf. Technol. 30 (5), 6315–6337. https://doi.org/10.1007/s10639-024-13072-5.

Mariani, C., Mancini, M., 2025. Harnessing AI for value: examining the impact of AI capabilities and the mediating role of organizational agility on project value proposition. Int. J. Manag. Proj. Bus. 18 (8), 112–143. https://doi.org/10.1108/IJMPB-03-2025-0068.

Ng, D.T.K., et al., 2023. Teachers' AI digital competencies and twenty-first century skills in the post-pandemic world. Educ. Technol. Res. Dev. 71 (1), 137–161. https://doi.org/10.1007/s11423-023-10203-6.

Nguyen, L.T., Tuamsuk, K., 2022. Digital learning ecosystem at educational institutions: a content analysis of scholarly discourse. Cogent Educ. 9 (1), 2111033. https://doi.org/10.1080/2331186X.2022.2111033.

Okoye, K., et al., 2021. Technology-mediated teaching and learning process: a conceptual study of educators' response amidst the Covid-19 pandemic. Educ. Inf. Technol. 26 (6), 7225–7257. https://doi.org/10.1007/s10639-021-10527-x.

Passey, D., et al., 2018. Digital agency: empowering equity in and through education. Technol. Knowl. Learn. 23 (3), 425–439. https://doi.org/10.1007/s10758-018-9384-x.

Sarnok, K., Wannapiroo, P., Nilsook, P., 2019. Digital learning ecosystem by using digital storytelling for teacher profession students. Int. J. Inform. Educat. Technol. 9 (1), 21–26. https://doi.org/10.18178/ijiet.2019.9.1.1167.

Smit, M., Wagner, R.F., Bond-Barnard, T.J., 2025. Ambiguous regulations for dealing with AI in higher education can lead to moral hazards among students. Project Leadership Soc. 6, 100187. https://doi.org/10.1016/j.plas.2025.100187.

Strielkowski, W., et al., 2025. AI -driven adaptive learning for sustainable educational transformation. Sustain. Dev. 33 (2), 1921–1947. https://doi.org/10.1002/sd.3221.

Van Der Hoorn, B., Killen, C.P., 2021. Stop sanitizing project management education: embracing desirable difficulties to enhance practice-relevant online learning. Project Leadership Soc. 2, 100027. https://doi.org/10.1016/j.plas.2021.100027.

Vettori, O., Warm, J., 2025. The race for AI skills as an obstacle course: institutional challenges and low threshold suggestions. Project Leadership Soc. 6, 100183. https://doi.org/10.1016/j.plas.2025.100183.

Wagner, R., Huemann, M., Radujkovic, M., 2021. The influence of project management associations on projectification of society – an institutional perspective. Project Leadership Soc. 2, 100021. https://doi.org/10.1016/j.plas.2021.100021.

Wald, A., Ingason, H.T., Fridgeirsson, T.V., 2025. Ten years after: the evolution of projectification in Germany, Norway, and Iceland. Int. J. Proj. Manag. 43 (2), 102696. https://doi.org/10.1016/j.ijproman.2025.102696.

Whyte, J., 2019. How digital information transforms project delivery models. Proj. Manag. J. 50 (2), 177–194. https://doi.org/10.1177/8756972818823304.

Winkler, R., Soellner, M., 2018. Unleashing the potential of chatbots in education: a state-of-the-art analysis. Acad. Manag. Proc. 2018 (1), 15903. https://doi.org/10.5465/AMBPP.2018.15903abstract.