The Integration of ChatGPT in Construction Project Management Education: Student Perspectives and Implications

Panayota Chassiakou, Panagiotis Tsikas, Athanasios Chassiakos

Department of Civil Engineering, University of Patras, Patras, Greece
a.chassiakos@upatras.gr

Abstract

Artificial Intelligence (AI) and large language models such as ChatGPT are increasingly shaping higher education, offering new opportunities for personalized learning, knowledge management, and interactive problem-solving. In construction project management (CPM) education, where complexity arises from scheduling, cost control, risk analysis, and stakeholder coordination, these tools can enhance both theoretical understanding and practical training. While international studies have examined AI in higher education, evidence on how civil engineering and CPM students perceive ChatGPT in their learning remains limited. This study investigates engineering students' perspectives on the use of ChatGPT in construction project management (CPM) courses. Data were collected through a structured questionnaire distributed to engineering students, yielding 91 responses. The survey explored, among other aspects, the frequency and purposes of ChatGPT use, the perceived benefits and challenges, and key issues related to its effective integration in education. Results show that students mainly use ChatGPT for information search, text drafting, and problem solving, valuing time efficiency, improved comprehension, and creative support. Reported challenges concern the reliability of responses, verification of sources, and risk of over-dependence. Students generally support integrating ChatGPT into teaching but emphasize that it should complement, not replace, instructor-led learning. The study concludes with recommendations for balanced integration strategies and the promotion of critical thinking skills to ensure the responsible and productive use of AI in construction education. Nevertheless, it provides only an indicative snapshot of students' emerging perceptions rather than definitive evidence, acknowledging that the findings may reflect partial understanding and limited knowledge, and exclude broader stakeholder perspectives.

Keywords
Artificial intelligence, ChatGPT, construction project management, higher education, student perceptions.

1. Introduction

Artificial Intelligence (AI) has become a transformative force in higher education, enabling personalized learning, adaptive assessment, and broader access to knowledge (Chen et al., 2020; Zawacki-Richter et al., 2019). Within this context, generative AI tools, such as ChatGPT, have gained global attention for their ability to support natural language interaction, content generation, and instant feedback (Baig & Yadegaridehkordi, 2024; Munaye et al., 2025). Their rapid adoption in universities has sparked debate over pedagogical opportunities, ethical considerations, and the evolving role of educators (Strzelecki, 2024; Wang & Fan, 2025).

Recent studies demonstrate that ChatGPT can enhance learning performance, engagement, and higher-order thinking when embedded in well-structured teaching practices. Benefits include improved access to academic resources, personalized writing assistance, and greater efficiency in learning tasks (Ravšelj et al., 2025). However, concerns remain regarding factual reliability, potential bias, and over-dependence on automated feedback (Ahmad, Ben Mimoun, & El-Gohary, 2025).

In STEM and engineering education, ChatGPT has shown potential in project ideation, technical communication, and conceptual understanding (Bravo & Cruz-Bohorquez, 2024; Khodadad, 2025), though limitations persist in analytical rigor and mathematical precision (Nikolic et al., 2023). Researchers emphasize the need for guided and critical integration strategies that promote creativity, ethical awareness, and independent reasoning rather than passive reliance on AI outputs (Wang & Fan, 2025).

Despite the expanding literature on AI-enhanced learning, its application in project management education, and particularly construction project management (CPM), remains underexplored. Given that CPM involves complex coordination, decision-making under uncertainty, and interdisciplinary communication, understanding students' perspectives on ChatGPT in this context can provide valuable insights for curriculum development and responsible AI integration. The present study addresses this gap by examining civil engineering students' experiences with ChatGPT in CPM learning. The objectives are to:

(i) identify perceived educational benefits,

(ii) explore concerns related to reliability, dependence, and ethics, and

(iii) assess implications for curriculum design and future AI-supported teaching practices.

2. Methodology

2.1 Survey Design

To investigate student perspectives on the integration of ChatGPT into construction project management (CPM) education, a structured questionnaire was developed. The instrument was designed to capture student perspectives on ChatGPT in CPM education, in particular:

- General Information: year of study and frequency of ChatGPT use.
- Applications of ChatGPT: domains within CPM (e.g., project scheduling, cost management, risk analysis, site organization, safety, legislation, optimization methods, and emerging technologies, such as BIM, Digital Twins, and AI).
- Functions of ChatGPT: main tasks supported (e.g., information search, text drafting, problem solving, enrichment of study material, and project ideation).
- Perceived Benefits and Challenges: including time efficiency, comprehension, creativity, reliability issues, and risks of over-dependence.
- Educational Dimension: students' views on whether ChatGPT should be integrated into teaching and with what prerequisites, as well as to what extent it could substitute conventional instruction.

The questionnaire was developed by the authors, drawing upon existing instruments used in recent studies on AI and ChatGPT in higher education and adapted to the context of Construction Project Management education. The questionnaire comprised both multiple-choice and Likert-scale questions (1–5), enabling quantitative analysis of perceptions alongside descriptive insights. The design ensured anonymity and emphasized objectivity, encouraging participants to provide candid responses.

2.2 Data Collection

The survey was distributed to undergraduate and postgraduate students, as well as recent graduates, from civil engineering and construction management programs at two Greek universities. Specifically, the participants were enrolled in the Department of Civil Engineering of the University of Patras, which offers both undergraduate and graduate programs, and in the Graduate Program in Engineering Project Management of the Hellenic Open University. Responses were collected during September and October 2025. Participation was voluntary and anonymous, with no incentives provided.

In total, N = 91 valid responses were obtained. The sample included participants from all levels of study, with a predominance of senior undergraduate students—who are typically exposed to project management courses—along with recent graduates and postgraduate students (Figure 1). Approximately 46% of respondents were undergraduate students, while 54% were postgraduate students or alumni. Overall, participants reported a relatively uniform distribution regarding the frequency of ChatGPT use in their daily activities (Figure 2).

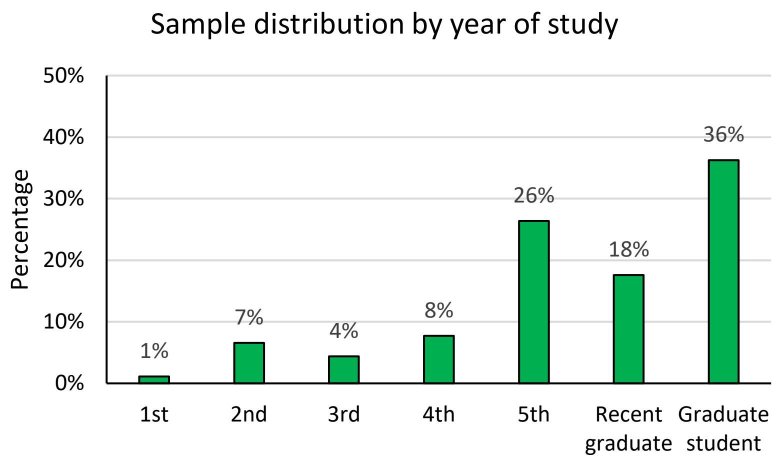

Fig. 1. Distribution of responses by year of study

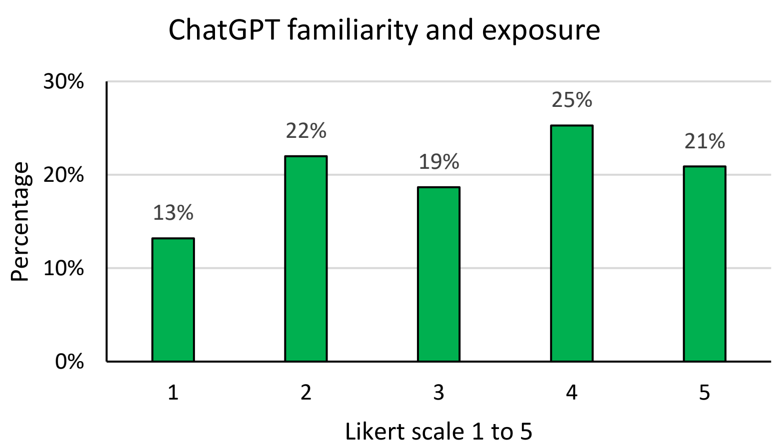

Fig. 2. Distribution of responses by ChatGPT familiarity and exposure

3. Data analysis and results

Collected data were organized in spreadsheets and analyzed using basic descriptive statistics, including frequencies, percentages, and mean values on the Likert scale items. The analysis focused on identifying general patterns, recurring tendencies, and indicative relationships among variables, such as frequency of use, perceived usefulness, and educational attitudes. Open-ended responses were also reviewed to extract qualitative observations, representative comments, and emerging themes regarding the perceived benefits, limitations, and ethical aspects of ChatGPT use. Given the exploratory nature of the study, the findings are intended as an initial, broad assessment rather than a conclusive statistical evaluation. The purpose is to inform reflection and guide the development of educational initiatives, rather than to formulate prescriptive or data-driven strategies.

Figure 3 illustrates the main purposes for which students use ChatGPT. The tool is primarily utilized for information and literature search, followed by text drafting, idea generation, and problem solving. These results suggest that students perceive ChatGPT as a versatile assistant that facilitates access to knowledge and supports the completion of academic tasks. Figure 4 depicts the range of Construction Project Management (CPM) topics where ChatGPT is applied. Digital technologies such as BIM, Digital Twins, and AI, along with Optimization/Operations Research and cost management/techno-economic analyses emerge as the most frequent areas. This pattern reflects students' preference to engage with ChatGPT in tasks combining analytical reasoning with technological exploration.

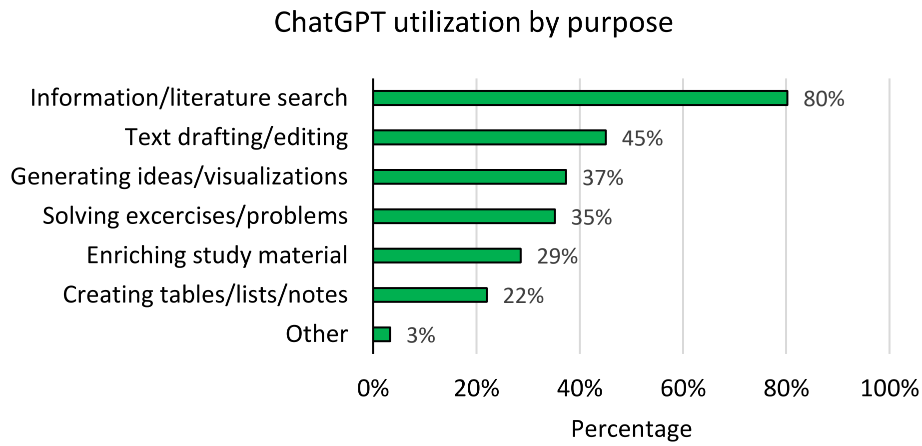

Fig. 3. Distribution of responses by purpose of ChatGPT use

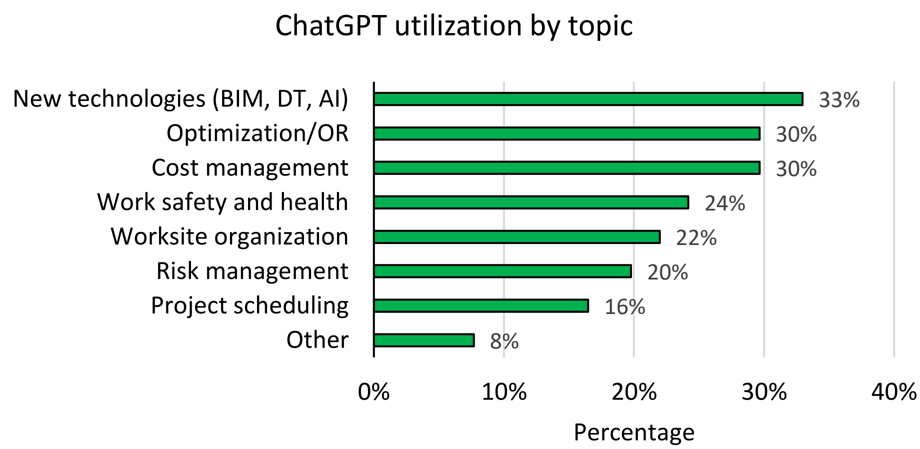

Fig. 4. Distribution of responses by topic or area of application

Figure 5 summarizes students' perceptions of the main benefits associated with ChatGPT use. Time efficiency and enhanced comprehension rank highest, followed by writing support, and creativity assistance. Overall, the results indicate that students view ChatGPT as a means of simplifying demanding academic work and deepening conceptual understanding. Figure 6 outlines the challenges and concerns identified by respondents when using ChatGPT. Reliability issues, verification of information, and over-dependence are cited most frequently. These findings underline students' awareness or, to some extent, apprehension of the limitations of AI-generated content and their recognition of the need for critical thinking and responsible use.

Figure 7 shows students' attitudes toward integrating ChatGPT into the learning process. Responses are predominantly positive, suggesting broad acceptance of ChatGPT as a supportive and complementary educational tool that can enhance learning engagement and efficiency when used under proper guidance. Figure 8 demonstrates students' opinions on ChatGPT as a possible substitute for traditional teaching. The consistently low ratings indicate a strong consensus that AI cannot replace instructor-led education. Students clearly value the human dimension of guidance, mentorship, and contextual understanding that remains central to engineering education. Figure 9 presents the ChatGPT utilization perspective, illustrating how students conceptualize the tool's overall role in their studies. The results indicate that ChatGPT is predominantly perceived as a complementary and supportive learning partner that, however, requires appropriate guidance and caution to ensure efficient and error-free assistance. The following section discusses these findings in relation to existing literature and broader educational implications.

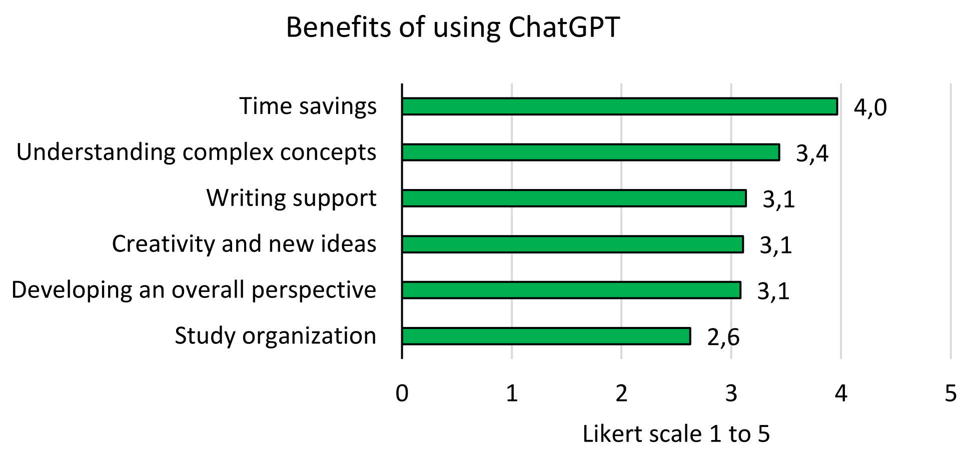

Fig. 5. Perceived benefits of ChatGPT use

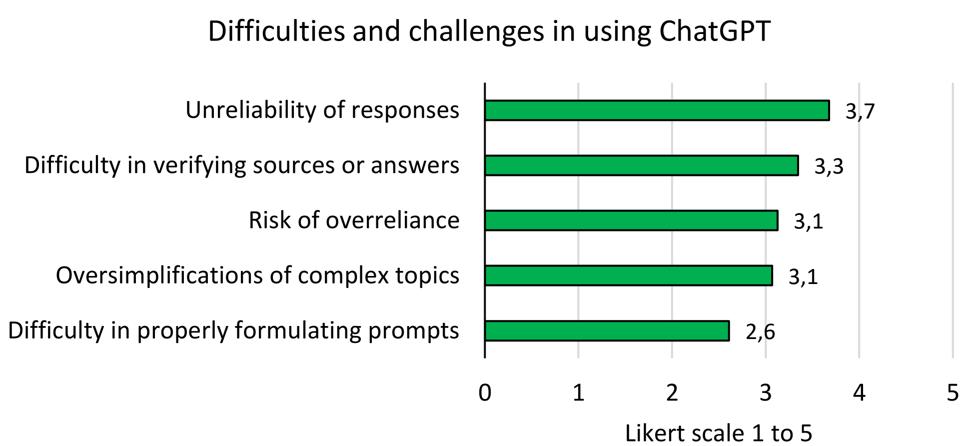

Fig. 6. Perceived difficulties and challenges of ChatGPT use

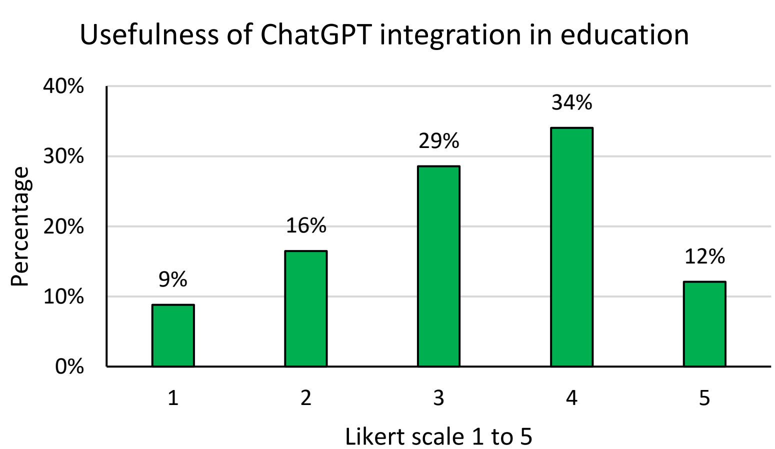

Fig. 7. Perceived usefulness of ChatGPT integration in education

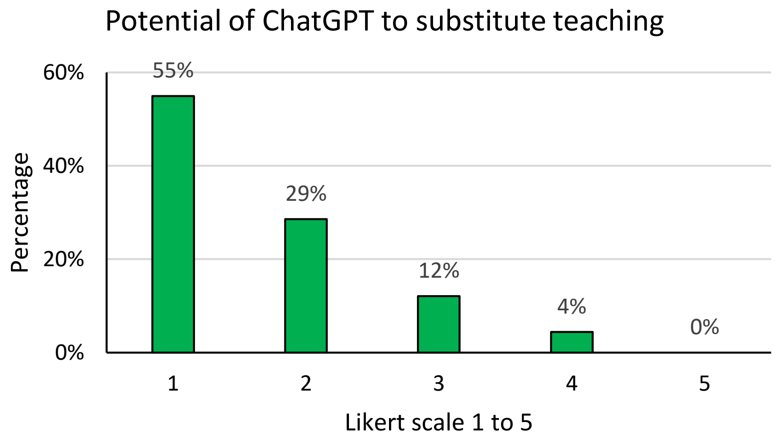

Fig. 8. Students' views on ChatGPT as a substitute for teaching

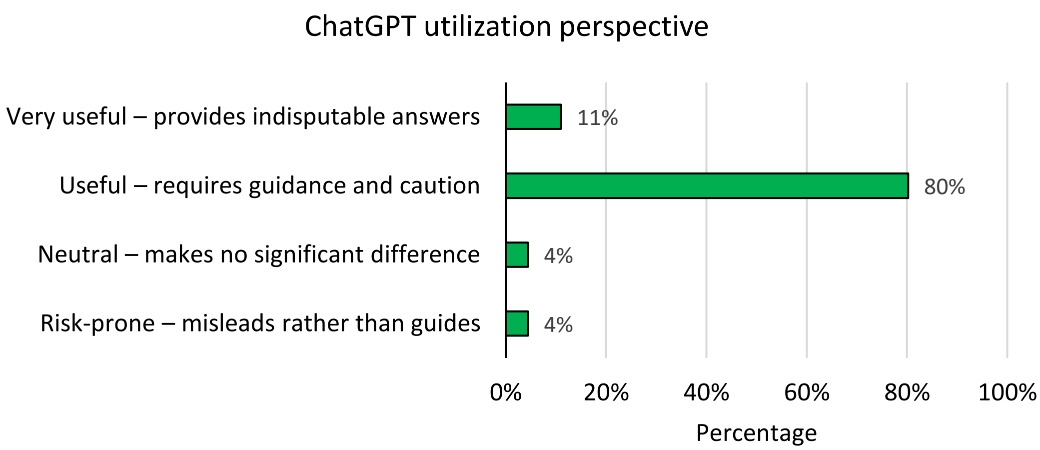

Fig. 9. Overall perceived ChatGPT utilization perspective

4. Discussion

The findings of this study align with international evidence on the adoption of generative AI in higher education. Students recognize clear benefits such as time efficiency, improved comprehension, and creative support. At the same time, they show awareness of potential limitations related to the reliability of outputs, verification of information, and over-dependence, suggesting an emerging culture of critical engagement rather than passive reliance on AI tools. ChatGPT was found to be used across diverse areas of Construction Project Management (CPM), ranging from technical domains such as cost estimation and scheduling to digital technologies like BIM and Digital Twins. This versatility reflects students' perception of ChatGPT as a flexible learning assistant that supports both analytical and conceptual understanding. However, the consistently low acceptance of ChatGPT as a substitute for instructors underscores the enduring importance of human guidance and contextual reasoning in engineering education. Overall, the results portray ChatGPT as a complementary educational tool, useful for improving efficiency and comprehension but dependent on proper guidance, verification, and ethical awareness. From a pedagogical standpoint, this supports the notion that generative AI can contribute meaningfully to education only when embedded within structured learning environments and aligned with clear instructional objectives. The ethical, transparent, and effective integration of such tools will be essential to ensure that they enhance, rather than dilute, students' critical thinking and professional preparedness.

Nevertheless, the study results should be regarded as exploratory rather than conclusive. Respondents displayed varying familiarity with ChatGPT and uneven exposure to CPM topics, limiting the depth of interpretation. Moreover, students represent only one facet of the educational ecosystem; educators, AI developers, and institutions also shape the meaningful integration of AI tools. Previous research shows that many educators remain cautious toward generative AI, prioritizing plagiarism prevention and assessment integrity over pedagogical innovation. These observations reflect the broader uncertainty that still surrounds the responsible adoption of AI in education. Accordingly, this analysis aims to capture emerging student perceptions and to stimulate critical reflection on the pedagogical role of AI in engineering education.

5. Conclusions

This study explored civil engineering students' perceptions of ChatGPT in Construction Project Management (CPM) education. Students generally regard ChatGPT as a valuable, creative, and time-efficient learning companion, while acknowledging limitations related to reliability, verification, and dependence. They support its integration into teaching as a complementary, not substitutive, tool that reinforces instructor-led learning. The findings contribute to the early-stage understanding of how future engineers perceive AI-assisted learning and highlight the need for pedagogical frameworks promoting ethical, transparent, and responsible integration of AI in higher education. Such frameworks should aim to develop critical thinking, creativity, and informed use rather than mechanical dependence.

Given the exploratory scope and the early phase of AI adoption in higher education, the results should be interpreted as indicative perceptions rather than generalizable conclusions. Future research should expand the analysis to include educators, developers, and institutional actors, employ mixed methods, and examine longitudinally how AI integration shapes learning behavior and professional preparation in engineering disciplines.

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