INNOVATIVE PEDAGOGIES IN CONSTRUCTION PROJECT MANAGEMENT EDUCATION: INTEGRATING ACTIVE BLENDED LEARNING, TECHNOLOGY AND AUTHENTIC APPLICATIONS

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This study examines innovative pedagogical teaching strategies in MSc. Construction Project Management (CPM) education, focusing on active blended learning (ABL), advanced classroom technologies, and real-world applications. Drawing on a mixed-methods research design including surveys, interviews, focus groups, classroom observations, and industry consultations, the research explores how ABL enhances flexibility, interactivity, and student engagement, ultimately improving knowledge retention and professional readiness. The student co-creation, where learners actively contribute to shaping course content and activities, fosters a sense of ownership, creativity, and alignment with both academic goals and industry expectations. Using real-world applications, interactive role-plays, industry cases, and technology-driven simulations, which cultivate critical thinking, leadership, and a deeper understanding of complex project dynamics. The existing ABL and experiential learning literature provides limited insight into its mechanisms and effectiveness in CPM education. Preliminary findings, based on data from 24 postgraduate students, suggest that ABL, integrated with block-teaching, technology, authentic assessment, and student-driven learning, bridges the gap between theory and practice, offering a robust framework for curriculum innovation. This study recommends scaling these strategies to foster a more sustainable, collaborative, and industry-aligned CPM education.

Keywords: Active blended learning; authentic assessment; construction project management education; innovative pedagogies; student co-creation

INTRODUCTION

Engineering and Construction Management curricula in post-secondary institutions provide the perfect forum for integrating new and advanced pedagogies, specifically in project control subject (Alborz, *et al.,* 2024). Katende, E. (2023) recommend that institutions strengthen project management instruction by adopting blended learning, emphasising critical thinking, prioritising continuous assessment, and student-centric approach. By learning and harnessing the power of AI and new technologies, organisations can streamline project workflows, improve collaboration, and achieve greater efficiency and effectiveness in project delivery (Shamim, 2024). University of Portsmouth is recognised as one of the best universities in the UK for quality of teaching and student experience, with a gold rating in the national Teaching

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Excellence Framework (TEF). The university launched its modern London campus in Walthamstow, UK in September 2023, offering career-focused courses, flexible learning, state-of-the-art facilities that support cutting-edge pedagogical innovations. Its features implemented and studied here enhance the student learning experience:

Active Blended Learning and Co-creation: It entails active participation, multi-media, belonging and purpose, student co-creation and commitment in the learning process.

Focused or Block teaching: The student learning is compressed in 4 weeks of classes with 2 weeks of catch-up and assessment, when students study one module at a time.

Authentic and Experiential: This approach allows the students to explore, discuss, and meaningfully construct concepts in contexts that involve real-world problems.

Technology in Classroom: It provides various tools and online platforms to enhance the learning, while to engage students in unique, innovative, and equitable experience.

Learners' Performance: Focus is to commit knowledge to long-term, not immediate, application, and performance which leads to better retention and future employability.

LITERATURE REVIEW

Construction Project Management (CPM) education is facing significant challenges in aligning academic content with rapidly evolving industry needs. Individuals entering building and construction industries must consistently update and adapt their skillset to sustain their relevance and employability in this fast-changing environment (Emmitt, 2016). Graduates often encounter gaps between theoretical knowledge and practical industry competencies, which hinders their immediate employability (Wu *et al.,* 2018). This directly relates to the primary research aim of this paper, which is investigating the effectiveness of ABL, technology integration, and student co-creation strategies to enhance student engagement and industry readiness.

ABL combines face-to-face instruction with digital learning methods, creating a flexible and interactive educational experience. Armellini and Padilla Rodriguez (2021) articulate a comprehensive framework for implementing ABL, emphasising careful pedagogical design, clear learning outcomes, and structured interactions. Vodovozov *et al. (*2022) further substantiate this by showing how ABL significantly boosts student engagement, particularly at the postgraduate level, due to the flexibility and relevance of online and face-to-face activities. These studies support adopting structured ABL models such as flipped classrooms, peer-assisted learning, and interactive discussions to enhance student engagement.

Despite its advantages, student acceptance of ABL can be variable, heavily influenced by perceived relevance, assessment clarity, and instructor engagement. Lomer and Palmer (2023) and Armellini *et al. (*2021) both highlight that students prefer blended learning activities when explicitly linked to assessments and when face-to-face interactions enrich online experiences. Their findings underline the critical importance of clear pedagogical intent and communication to foster positive student perceptions, emphasising the need for clearly articulated active learning tasks that are meaningfully integrated into assessments.

Integrating advanced technologies such as Artificial Intelligence (AI) and Building Information Modelling (BIM) significantly enrich CPM education. Muhie and Woldie (2020) propose a comprehensive AI integration framework emphasising intelligent tutoring systems, adaptive learning environments, and personal student experiences. On the other hand, Park *et al. (*2023) illustrate practical challenges faced

by educators in adopting AI-driven instructional methods, suggesting substantial faculty training to optimise technology benefits. In this research, we treat AI as an emerging component within the broader objective of technological enhancement, particularly as it relates to personalised learning, adaptive assessment, and digital construction tools.

Authentic assessments, directly linked to real-world challenges, significantly enhance students' industry readiness and deeper cognitive engagement. Merrill (2002) and Chickering and Gamson (1987) provide foundational support, highlighting principles such as problem-centred instruction, active learning, immediate feedback, and the integration of learning into practical contexts. El Sadik and Al Abdulmonem (2021) further validate this approach by demonstrating how flipped classrooms significantly enhance higher-order cognitive outcomes. These studies underpin the importance of shifting from traditional exams to competency-based, industry-relevant assessment practices, including portfolio-based and scenario-based tasks.

Student involvement in curriculum design effectively bridges academia-industry gaps by aligning course content with professional aspirations and industry expectations. Zarandi *et al. (*2024) detail various successful student co-creation strategies such as advisory panels, elective provision, and industry-integrated project learning that significantly enhance students' satisfaction and employability. Dickinson *et al. (*2022) further highlight the unique benefits of involving industry practitioners ('pracademics') in curriculum development, enhancing practical relevance and student engagement. These insights directly support structured student co-creation approaches, including collaborative curricular workshops and student-designed assessment scenarios.

Effective pedagogical strategies in CPM education depend heavily on the authenticity and professional credibility of educators. Kreber (2010) argues convincingly that educators who authentically engage students through genuine dialogue, critical reflection, and real-world relevance profoundly influence student engagement and learning outcomes. Dickinson *et al. (*2022) reinforce this perspective, demonstrating how practitioners transitioning into academia significantly improve curriculum authenticity and student motivation. This aligns with stressing industry collaboration through mentorship programs, live projects, and guest lecturers (industry educators).

Finally, for innovative pedagogical strategies and technological tools to be effectively sustained, scalability and institutional support are crucial. Armellini and Padilla Rodriguez (2021) and Margolis *et al. (*2017) underline the necessity of scalable digital platforms, robust institutional backing, and faculty development to sustain blended learning innovations. These issues emphasize the importance of developing sustainable, scalable digital learning platforms and continuous training initiatives. In conclusion, the reviewed literature comprehensively supports the research aim and objectives, providing robust theoretical grounding and practical guidance for implementing ABL, technology integration, student co-creation, authentic assessments, and sustainable institutional frameworks in CPM education.

METHOD

The newly established campus provided an ideal environment for experimenting with innovative pedagogical approaches and emerging technologies, fostering a highly interactive and student-centred learning experience. The study leveraged this setting to explore how ABL, technology integration, and student co-creation influence postgraduate education, particularly in Construction Project Management (CPM). The

first two cohorts of MSc. Construction Project Management students at the London campus were participants in the study after completing three or four modules, ensuring they had substantial exposure to the ABL framework. The study employed a mixed-methods approach, combining both qualitative and quantitative data collection to provide a comprehensive understanding of ABL's impact.

Objectives

The study aimed to investigate the effectiveness of ABL in postgraduate CPM education. Specifically, it sought to:

- Evaluate the impact of ABL on student engagement, knowledge retention, and active participation.
- Assess how technology integration enhances the learning experience and facilitates collaboration.
- Explore the role of student co-creation in fostering critical thinking and problem-solving skills.
- Determine the extent to which ABL improves industry readiness by bridging the gap between academic learning and professional practice.

Data collection

9. Surveys and Questionnaires: Students completed structured surveys to assess their perceptions of ABL, engagement levels, knowledge retention, and preparedness for industry challenges.
10. Focus Groups and Interviews: Small-group discussions and in-depth interviews were conducted to capture students' experiences, insights, and reflections on the effectiveness of various pedagogical strategies.
11. Academic Performance Analysis: Students' coursework, assessments, and overall academic performance were analyzed to measure the effectiveness of ABL and technology-enhanced learning.
12. Classroom Observations: Lectures, workshops, and collaborative sessions were observed to evaluate student participation, interaction, and co-creation activities aligned with higher levels of Bloom's Taxonomy.
13. Industry Feedback: Future potential employers and industry professionals were consulted to assess whether students demonstrated improved industry readiness and practical competencies as a result of the ABL approach.

FINDINGS

By employing the above multi-faceted research methodology, the study provides valuable insights into the pedagogical innovations that can enhance postgraduate education, ensuring students develop the skills and competencies needed for success in the construction industry.

To assess student preferences and engagement with ABL, an initial survey was conducted among MSc. Construction Project Management (CPM) students. The survey aimed to determine the effectiveness of ABL in postgraduate education and gauge students' receptiveness to this innovative approach, particularly in contrast to their prior experiences with traditional learning methods. The survey targeted a current cohort of 27 international postgraduate CPM students, all of whom had prior exposure to conventional, lecture-based education. A total of 24 students responded, yielding an 89% response rate. The survey employed a structured, multiple-choice questionnaire designed to capture quantitative insights into student preferences,

engagement levels, and perceptions of the ABL framework. Additionally, open-ended questions were included to gather qualitative feedback on individual experiences and expectations. The survey will be applied to the future cohorts.

Figure 1: Rank the reasons for your ABL preference

Figure 2: Evaluate the following statements using the Likert scale

Figure 3: Which transferrable skills did you gain with ABL?

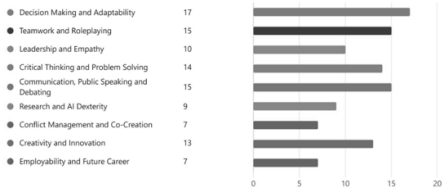

Figure 4: Do you recommend ABL approach to future CPM cohorts?

Survey outcomes

Preliminary results reinforced the effectiveness of ABL in postgraduate education. Key findings include:

- Strong Preference for ABL: A significant majority of students (95%) expressed a preference for ABL over traditional lecture-based learning, citing increased engagement and improved understanding of complex concepts.
- Increased Student Participation: 82% of respondents reported feeling more actively involved in discussions, group activities, and problem-solving exercises compared to their previous educational experiences.
- Positive Impact of Technology Integration: 75% of students found that the use of digital tools, online collaboration platforms, and interactive content enhanced their learning experience.
- Higher Knowledge Retention: 79% of students agreed that ABL facilitated deeper learning and better retention of course material, particularly through practical application and experiential learning.

- Improved Industry Readiness: Most students felt the real-world applicability of ABL methodologies, such as case studies and project-based learning, better prepared them for professional roles in construction management.

The survey results validate the effectiveness of ABL in postgraduate education, demonstrating its capacity to enhance engagement, knowledge retention, and industry readiness. The overwhelmingly positive response from students underscores the need for continued refinement and expansion of ABL methodologies in higher education. Future studies will explore longitudinal impacts and further optimise the integration of technology and student co-creation in learning environments.

Focus group

Six CPM students along with two tutors participated in a focus group discussion. The meeting focused on the effectiveness of ABL and its impact on student performance. We reviewed the value of student engagement and co-creation, group activities, and blending classroom technologies such as Vevox, Padlet, Montimeter, Moodle, Teams, H5P. The students also collaborated on the solutions for challenges that arise in using ABL, like student absences, diverse backgrounds and various prior level of education.

Participants highlighted the benefits of ABL, such as improved problem-solving skills, better work-life balance, and increased student engagement. However, challenges were noted, including the need for better integration of AI, addressing group dynamics, and ensuring all students are engaged. Suggestions included using digital tools for more vivid presentations, providing printed notes, and stricter attendance policies. The discussion also emphasized the importance of authentic teaching methods and industry visits to enhance learning outcomes. A summary of points raised in the meeting and a sample of actual quotes are below:

- How ABL and student engagement helps students learn better.
- Students share insights on how ABL helps them better learn and perform.
- The effectiveness of different teaching methods, such as traditional vs. ABL, asynchronous vs. synchronous, online vs. in-person.
- Interactive teaching methods over passive listening.
- Classroom setup and group dynamics, for participation and engagement.
- Group work is challenging when some individuals do not contribute equally.
- Using technology and real-world examples to enhance learning.

All participant confirmed the effectiveness of ABL. “ABL approach promotes critical thinking more than traditional teaching. It improves problem solving skills and we're doing the research, trying to solve the problems which the tutor shows in the class.” In fact, the students enjoyed the ABL class approach and found it very rewarding.

Majority of students appreciated the teaching approach and class pedagogy. One participant noted, “Block teaching is the better way and learning technology like YouTube and eBooks is useful. It helps work life balance This allows you to do more things outside of the university, and you still have time to focus on your studies.”

Participants valued the classroom group activities, one stated, “I personally, when someone's just talking, I really get tired. In this kind of teaching I'm involved, and my mind is focused more on the things that happens in the classroom. My background is not from the Construction Management, but I learn from my groupmates.”

Some participants, on the other hand, argued the challenges and shortcomings of working on groups. A person stated, “Being in a group make some people do nothing

and put much pressure on others. We decide member one must do something and member two must do something else. It is great for every person to be involved."

The students welcomed the real-world application. One student commented, "We have industry visits, the industry educators come, and we do case studies. While doing all these industry-oriented activities, we know more about the industry, and what exactly is needed. Everything is unique for me, compared to back in my country."

The students were pleased with the class and course setup. One individual stated, "The class sizes are small, and interaction is more, with one-to-one interaction. If we have questions, we just ask. That's what we want here. I prefer to study in groups. I prefer block teaching. I can learn better from this type of course structure."

Participants praised the integration of digital tools, with one student noting that, "Using technology in classroom is good. Without it is back to the basics, books and articles. Using YouTube to show, for example, scaffolding helps our understanding." The participants appreciated the digital tools and technology used in the classroom.

DISCUSSION

ABL is increasingly recognised as a transformative approach in higher education institutions across the UK and globally. Despite its growing adoption, a fundamental question remains: under what mechanisms and conditions does ABL yield a more significant impact on learners' performance? This question requires an understanding of the mediating factors that enhance the ABL effectiveness in real-world education.

Our research includes an existing literature review, thematic analysis of focus groups, and observations during module delivery at the London campus, three key mediating factors were identified. These factors serve to amplify the effects of ABL and student co-creation, leading to improved engagement, knowledge retention and employability.

Proposed model

The initial model suggests the mechanisms through which ABL enhances learners' performance. As in Figure 5, 3 primary mediating factors influence the ABL impact:

Focused Schedule: By structuring the curriculum to focus on a single module at any given time, students can immerse themselves fully in the subject matter. The dedicated approach minimises cognitive overload, allowing learners to develop a deeper understanding of core concepts while effectively managing summative assessments.

Authentic and Experiential Exercises and Assessment: The integration of real-world scenarios, industry-relevant projects, and experiential learning activities provides students with a practical foundation. These foster critical thinking and problem-solving skills, ensuring that students not only grasp theoretical concepts but also gain the necessary competencies for future employability and professional success.

Classroom Technology for Effective Blended Learning: Leveraging interactive digital tools and online learning platforms enhances the flexibility and accessibility of blended learning. Whether in face-to-face or online environments, technology enables active engagement, seamless collaboration, and an adaptive learning experience tailored to individual needs.

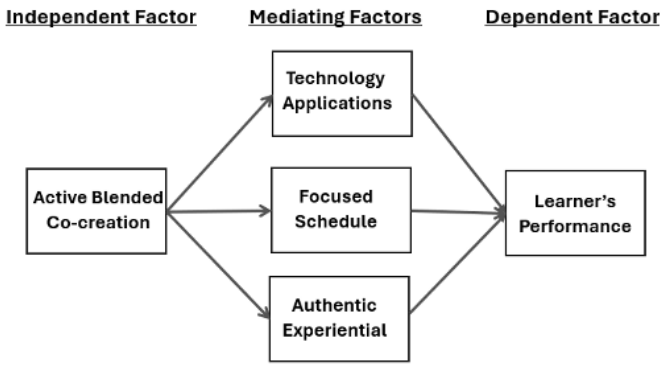

Figure 5: The proposed model considering initial findings

Further research is required to quantitatively refine and validate the proposed model, along with its associated hypotheses, using empirical data and statistical analysis. While a formal quantitative validation is not yet done, we carried out a preliminary qualitative validation through in-depth discussions with domain experts. These experts included several tutors and former main campus students, whose insights provided valuable feedback on the model's relevance, coherence, and potential applicability.

Challenges and limitations

Despite the valuable insights derived from this study, several challenges and limitations must be acknowledged. One key limitation is the scope of data collection. The research primarily relies on a survey and a focus group of students at MSc. CPM, which may not fully capture the variability present in different geographic or industry-specific contexts. Future studies could benefit from broader, multi-regional datasets to enhance generalisability.

Another challenge is methodological constraints. While thematic analysis provides a robust framework for analysis, it has inherent limitations in capturing dynamic, real-time interactions and contextual nuances. For instance, qualitative data may be subject to interpretation biases, whereas quantitative models might oversimplify complex relationships. A mixed-methods approach integrating both could provide a more holistic perspective.

Additionally, technological and practical barriers remain significant. The adoption of innovative pedagogies such as ABL faces hurdles such as high implementation costs, interoperability issues, and resistance from stakeholders. Many organisations still struggle with integrating innovative solutions into legacy systems, leading to suboptimal adoption rates. Addressing these barriers requires collaborative efforts between industry practitioners, policymakers, and researchers.

Finally, regulatory and ethical considerations present further challenges. Data privacy concerns, compliance with industry standards, and ethical implications related to technology-based learning and AI-driven assessments must be carefully navigated. As regulations evolve, ongoing research is necessary to ensure that solutions align with legal and ethical frameworks.

Future research

Building upon the findings of this study: several promising avenues for future research emerge. By addressing these research gaps, future studies can build on the foundations laid by this paper, driving further innovation and impact in the field.

Longitudinal Studies and Big Data Integration: Future research could explore long-term trends by conducting longitudinal studies that track the evolution of learner's performance over time, using big data analytics and machine learning capabilities.

Expanding and validating the model: The preliminary model in Figure 5 may be extended to include more factors, including moderating and mediating variables. Quantitative tools may be used to obtain and analyse data to validate the model.

Cross-Sectoral and Global Comparative Studies: Expanding the research to different sectors and global regions for comparative insights of contextual factors. Exploring best practices across industries to refine strategies and identify universal solutions.

Advanced Technological Applications: Emerging technologies such as AI, digital construction, and digital twins hold significant potential in current limitations. A particular focus on their scalability and integration into existing systems is valuable.

Policy and Governance Frameworks: Research into regulatory frameworks and governance mechanisms is crucial to ensure ethical and sustainable implementation. The policies impact new technologies, legal challenges, and industry compliance.

Human-Centric and Behavioural Insights: Investigating the human factors influencing adoption of stakeholder perceptions, resistance to change, and behavioural dynamics. Behavioural psychology studies provide valuable insights in optimising engagement.

CONCLUSIONS

ABL has become a fundamental approach in many UK university courses, offering a dynamic and interactive learning experience that enhances student engagement, knowledge retention, and overall academic performance. This study aimed to explore the mechanisms and pedagogical strategies that can further optimise ABL, combined with innovative pedagogies and class technology, in postgraduate CPM education.

The University of Portsmouth's London campus integrated ABL, focused teaching, authentic and experiential learning, and innovative technology applications to create a more immersive and effective learning environment. Preliminary findings suggest that these elements serve as key mediators in amplifying the positive impact of ABL on student outcomes. By fostering critical thinking, practical application of knowledge, and digital fluency, this approach not only improves academic performance but also enhances students' employability prospects in an increasingly competitive job market.

Future research should probe deeper into long-term student outcomes, the scalability of this approach across diverse disciplines, and the role of emerging technologies in further refining ABL. As higher education continues to evolve, institutions must remain adaptive, leveraging innovative pedagogical models to meet the needs of modern learners and prepare them for success in the ever-changing global landscape.

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