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Navigating the Terrain:
Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

Lessons learned during the design implementation of a digital construction site module

Charmaine 'Ilaiū Talei, Mojan Mosavat, Janna Androutsou, Bernd Martin, Heera Kim, Tony Chung
Waipapa Taumata Rau, University of Auckland

Our paper discusses a collaborative project between built environment professionals and academic educators. The project is about digitalising construction site visits as an online Canvas module for senior architecture students as part of their third-year core course titled: Project Management. The course is one of two courses that are required upon graduation to become a registered architect in Aotearoa, New Zealand. The module is designed with two key aspects in mind: the learning objectives that adhere to school accreditation requirements and the 'Signature pedagogical practices' determined by the educational institution: Waipapa Taumata Rau, University of Auckland. In this paper, we discuss our insights gained from designing an interactive, immersive, and hybrid learning experience.

Keywords: Innovative educational practices; TEL; digital learning; real-world learning; architecture; construction; mixed methods, signature pedagogical practices

Introduction

Attending and observing a built project during a construction site visit is important for architecture students' learning to support their comprehension and application of theory-based lecture modules about the construction phase of architectural projects. On a construction site visit students can observe real-world scenarios and learn from construction site managers about how they resolve building, management, and contractual issues during the construction phase. However, learning opportunities to physically visit a construction site can be far and few due to cost, logistical difficulties, and agreement by building contractors. For some students there are mobility and other health concerns, making a physical construction site visit inequitable. Therefore, the outcomes of this digitally designed learning project using Canvas as its platform sought to provide learning accessibility all-year round and enhance and develop sustainable teaching content by covering a range of construction sites and architectural project types located around Tāmaki Makaurau, Auckland. This project is a result of co-creation and collaboration of the course coordinator Dr Charmaine 'Ilaiū Talei and a team of learning designers from Ranga Auaha Ako, the University's Learning and Teaching Design Team: Bernd Martin, Mojan Mosavat, Heera Kim, Tony Chung, and Janna Androutsou.

In response to this conference's themes of navigating emerging frontiers of Learning Spaces and TEL Pedagogies within higher education, our paper contributes a digital course module which was designed over a 12-month period and launched in the classroom 1st of October 2024 for third year architecture students. Our digital module is completed in hybrid delivery to embrace different learning behaviours and environments. Our paper shares key insights gained from designing this interactive and immersive learning experience. In lieu of formal student feedback at the time of writing this paper, our paper presents relevant findings from pilot testing by an independent student reviewer and lessons learnt when implementing the course change to a digital course module.

Digitalising a Course

Designing the digitalised learning experience within the context of this project called for an examination of theoretical frameworks that emphasise the importance of digital learning in creating an immersive, accessible,

and impactful experience. The decision to shift to a digital format stemmed from a need to meet the demands of modern education where flexibility and remote accessibility play a vital role (Aliu et al., 2023).

Our digital design process was rooted in two primary considerations: the 'why' and 'how' of creating an effective digital learning experience. The 'why' was underpinned by the motivation behind the implementation of a digital format, which is to allow us to provide students with access to construction sites that would otherwise be geographically or logistically inaccessible, enhancing their learning experience by offering a real-world context within a virtual space. 'How' we went about it was by integrating various digital tools and methods, such as 360° site videos and interactive modules, to create an engaging, interactive learning environment. The goal was to replicate the immersive experience of a physical site visit while leveraging the flexibility and accessibility of an online platform.

While the digitalisation of a site visit experience was the central focus, the integration of the University's Signature Pedagogical Practices (SPPs) – relational learning, assessment for learning, and technology-enhanced learning (TEL) – was key to shaping our approach within the context of the project. These pedagogical frameworks provided the underlying rationale for creating a collaborative, student-centred digital experience. Relational learning, as described by the University of Auckland (n.d., p.5) emphasises the importance of human connections as the foundation of both digital and face-to-face learning. This was reflected in our project by fostering online spaces where students and teachers could maintain strong and meaningful relationships despite the adaptation of a digital experience. Assessment for learning principles, as proposed by Boud and Falchikov (2006), were integrated into formative assessments to ensure students not only engage with the material but also develop real-world skills, ensuring they prepare students for a lifetime of learning and work. Furthermore, TEL principles aim to "provide more accessible, equitable, and lifelong higher education opportunities" (University of Auckland, n.d.). In line with this, our digital design blended synchronous and asynchronous learning, combining virtual site tours with interactive online activities that allowed students to learn flexibly while still benefiting from instructor and peer interaction. This hybrid approach aligns with best practices in digital learning and pedagogy (De Freitas et al., 2010).

Project Insights

The digital module is structured according to three construction site visits: residential, commercial and heritage projects, that an architecture student may encounter in their practice. A recent article by Gillespie (2022) highlights the benefits of bridging the gap between theory (what students learn in the classroom) and practice (what happens in the outside world) for student learning. Overall, by immersing students in realistic construction site scenarios through various interactive activities and 360° videos, our approach aimed to increase engagement and create a tangible link between coursework and practical application. This method has proven to be effective in increasing student engagement by connecting classroom learning with real-world contexts.

Relational learning is applied through immersive virtual construction site visits that simulate real-world experiences. This innovative application allows students to engage with the material in a more profound way than what is available to them only within a classroom. The virtual environment encourages collaboration and sparks conversation among students as they navigate and explore the site, replicating the teamwork and communication essential to the field. Integrating interactive elements and real-time feedback within the virtual tours was key to building a relational learning space where students can actively and meaningfully engage with their peers and instructors (Felten & Lambert, 2020). Additionally, for this project, the construction sites that students visit virtually are based where students live: Tāmaki Makaurau, Auckland. A wide range of course materials were generated regarding the industry relationships across the stakeholders for each construction site that is captured. This adds to the sense of belonging to the built environment's

professional community, ensuring that every student gains a sense of authentic connection and preparedness for the broader architectural industry.

When implementing a digital course in a class setting to maintain face-to-face relational learning, the existing physical learning spaces of higher institutions and its internet infrastructure must be negotiated to support the digital delivery. Our pilot testing involved completing the digital course inside the actual lecture theatre to test the speed of the internet connection when running digital media. Also, whilst preparing for the module's launch it became apparent that the conventional lecture theatre has limited electrical power outlets that are insufficient for a class of more than 100 students. Similarly, the audio from individual student devices would generate noise concerns, when completing the digital course together in one room. Other concerns about which devices are compatible with Canvas and the online media were raised and discussed amongst the educators and with students. We have learnt that physical learning environments, then, need to be carefully considered and allow for digital accessibility and compatibility with the intended digital hybrid delivery.

When designing the construction site visit module for this course, we focused on assessments that promote learning, with an emphasis on authentic assessments that recreate real-life situations. Students can engage deeply with the subject and can apply their knowledge in a practical and meaningful way. For the immersive architecture course, certification of achievement is essential, and assessment design must enable us to judge students' ability to meet learning outcomes in real-world situations. However, the true value of assessment lies in the confidence students gain in their ability to apply their knowledge to complex, ill-defined, or messy situations. We created a range of assessments including multi-choice quizzes with interactive 360° media, Canvas discussion boards as low stakes assessed participation, and video recordings of interviews by professionals, which students are tested on comprehension. Through varied assessment, from low to high stakes, students can better understand their strengths and areas for improvement.

In our project, scaffolding formative assessments and integrating feedback mechanisms into the digital activities help students actively engage and reflect on their learning process, enhancing their practical and theoretical understanding of construction site environments. For example, we included the opportunity for students to perform a safety check through an interactive activity, identifying the safety requirements needed to enter a particular construction site. 'Spot the hazards' 360° videos are embedded in discussions, allowing students to explore and identify hazards in three different construction sites and then discuss their findings with peers. In addition, a quiz with ten authentic scenarios and information in the form of videos, audio files, and drawings from construction contractors, project managers, and architects provides students with real-life challenges and insights. The use of these authentic assessments goes beyond traditional exams and promotes problem solving, ethical decision making, and transferable skills that are important for the students and their future careers.

Our pilot testing revealed that digital assessments involving various media requires careful curation and design to ensure that what is presented to students is relevant to the assessed learning outcome. Retrospectively, specific assessment questions and objectives must be developed sufficiently, or better, together when curating media content for digital assessments. The independent student reviewer, having some knowledge of the course's theory content, enjoyed the digital content but was unable to make the direct link between the immersive media content and the learning assessment. Our ongoing work has been to update wording of quiz questions as per media content, editing out media content to provide more succinct information, and develop clear instructions and tips to support student learning.

In this project, a quality blended learning approach is applied to combine online and in-person experiences. Our project leverages TEL by creating immersive 360° virtual tours using the LMS platform Canvas and various plug-ins such as H5P activities to enhance and add to the realism of the virtual construction site visits. As

discussed earlier, the learning objectives for the students have organised the multiple activities around these virtual tours. These elements create a comprehensive and realistic virtual experience. Furthermore, TEL in our project is designed to be flexible and inclusive, accommodating diverse learning needs and schedules. The digital content, including interactive elements and real-time feedback, ensures that learning is continuous and engaging.

While creating this blended learning module, we faced several obstacles, particularly in the areas of inclusivity and accessibility. To overcome these difficulties, we utilised the Web Consortium Accessibility Guidelines (WCAG), the principles of Universal Design for Learning (UDL), and tools such as CidiLab's UDOIT Canvas accessibility plug-in. When building H5P-based content, for example, we had to ensure that all activities are keyboard navigable, optimise media file size for efficiency, and provide close captions and transcripts to enable multiple means of engagement (CAST, 2024).

In terms of technical challenges relating to the nature of this project, some of the difficulties we faced were around navigating active construction sites and complying with health and safety regulations while ensuring good lighting and sound quality for filming. Having a team of experts, some of whom had lots of experience in filming and post-production/ editing, was essential. Recording video in LOG format allowed us greater control over exposure and colour correction and using AI tools helped us isolate the voice of our interviewees, making our videos more professional and, as a result, more effective for learning and teaching. It is our goal with each annual iteration of this digital module to track its progress and continually learn from the TEL pedagogies, alongside other SPPs, we have applied. We aim to substantiate our insights with quantitative and qualitative feedback from students who complete this module in Semester 2, 2024 and present its findings in a future paper.

Our final reflection is that we worked well as a team which helped the project run smoothly. We credit this to design thinking collaboration and utilising applications like Microsoft Teams and Miro in ways of working, balancing in person and digital co-creation. Our collaboration was enhanced by drawing on specific technical expertise outside of the core team, collectively being open to learning from each other, and being agile around various academic and professional staff schedules. To create this digital module, we understood we must apply a different mindset in working with each other. For example, we drew on various perspectives across a wide range of team members: senior learning designers, a teaching assistant who is an architecture student, the course director, and a range of technical experts. We applied a growth mindset, to grow as a team and were willing to be open to learn from each other's strengths and develop new skills: raw video data editing and Canvas assessment developments to name but a few. Relationships are key. We have documented the process of design implementation as metadata for this project. We hope to transfer this new knowledge to other similar projects, working as ambassadors of new digital learning implementation within our institution. In a future paper we hope to share the value of how we have worked together in designing a digital course.

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