Architecture_MPS

UCLPRESS

Research article

COVID-19 catalyst: emergent pedagogies and a DIAgram framework

Kate Tregloan,[1,*] Nancy Samayoa,[1] Adrian Chu,[1] Fernando Jativa[1]

[1] The University of Melbourne, Australia
* Correspondence: k.tregloan@unimelb.edu.au

Guest Editors: Sean Burns and Matthew Wilson, Ball State University, USA

Submission date: 20 May 2021; Acceptance date: 31 March 2022; Publication date: 5 July 2022

How to cite
Tregloan, K., Samayoa, N., Chu, A., Jativa, F. 'COVID-19 catalyst: emergent pedagogies and a DIAgram framework'. *Architecture_MPS* 22, 1 (2022): 3. DOI: https://doi.org/10.14324/111.444.amps.2022v22i1.003.

Peer review
This article has been peer-reviewed through the journal's standard double-blind peer review, where both the reviewers and authors are anonymised during review.

Abstract

The global COVID-19 pandemic has delivered extraordinary challenges across geographies as well as practices, and clearly academia has not been spared. While the events of 2020 and 2021 have revealed some limits to teaching in the 'old (pre-pandemic) normal', technology-supported pedagogies have been emerging for several years. This pandemic has been a potent catalyst, not only for ad-hoc adaptation, but potentially for long-term change and improvement. The 'old normal' is now long passed, and approaches to learning and teaching continue to explore new ground. This article draws on the work of Built Environments Learning + Teaching (BEL+T), an academic group within the Faculty of Architecture, Building and Planning at the University of Melbourne. The BEL+T group applies creative problem-solving and design-led approaches, evidence-based research methodologies and project-focused consultancy to improve teaching quality and student engagement in built environment disciplines. The following sections introduce a learning design framework – the Delivery, Interaction, Assessment (DIA) framework – which was developed by BEL+T as a tool to communicate

with and support staff throughout 2020 and 2021, and continues to be used to support teaching efforts. The translation of the elements of the DIA framework and its related 'DIAgram' to specific learning activities are presented in the following sections 'on the (virtual) ground'. Some emergent pedagogies for virtual learning environments (VLEs) are outlined, exploring relationships between students, teachers, objects, sites and VLEs for learning, alongside implications for teacher presence and performance online. These key factors have influenced online approaches both before and since the onset of the pandemic. They deliver implications for emergent hybrid approaches such as dual delivery and blended synchronous learning, which are in turn driven by the needs of a still-distributed student cohort and the challenges of ongoing unpredictability.

Keywords education; digital; online; virtual; site visit; learning tools; teacher performance; DIAgram; learning design

Introduction and context

The integration of technologies and teaching has been developing over decades in academic institutions, although debate remains about the best way to support learning through this intersection.[1] It has become common practice to use technologies to inform and support pedagogy even in institutions with more traditional approaches to teaching.[2] This engagement may respond to a range of prompts. Cohn and Puentedura suggest that it is informative to compare the drivers for adopting technology in teaching.[3] They identify a 'deficit model' as a driver in which blended learning techniques offer a substitute for a face-to-face experience – this may be due to lack of resources (financial, spatial, too many students, not enough teachers). Their contrasting 'enhancement model' proposes that blended learning platforms can offer an experience to complement and augment face-to-face teaching activities, or may even be superior for some applications. While the uptake of blended learning has been steady, resistance to such changes has also been a reality.[4] This resistance was swept aside by a pandemic, and in this context both models can describe the drivers for experiments in online and blended pedagogies.

The University of Melbourne is no exception to increased engagement with technologies to support teaching, nor to resistance to these changes. The university has undertaken focused investigations of technologies for quality teaching and learning over many years, within the disciplinary specialisations of this large comprehensive institution, as well as for university-wide application. Investigations prior to COVID-19 identified a requirement for a new learning management system (LMS) that could support a wide range of generic and specialised online tools for teaching and learning. Options for a next-generation LMS were reviewed as a crucial part of this decision-making. Canvas was selected as the preferred solution for the university. This platform offered pedagogical features and flexible functionality both within the LMS and through external third-party tool integration. The incorporation of other digital tools, through learning tools interoperability (LTI), could support a more specific and responsive personal learning environment tailored to specific disciplines or learning needs.[5] LTI integration was a crucial aspect that was not available with all platform choices and it proved invaluable in response to COVID-19 challenges. Following this, a major transition of subject sites to the new Canvas LMS was underway at the beginning of 2020.

Moving from this 'standing start', the university established 6,887 virtual spaces (Subjects/Communities) in the new Canvas platform in the course of 2020 and 2021. Some include migrated content from the previous LMS, but many have been built from scratch to incorporate new content and approaches. The new LMS is fully integrated with key staff and student information systems such as enrolments, class allocations, assessments and exam shell creation and allocation. In addition, custom tools have also been developed to support staff roles, the publishing of subjects and management of external users.

The coincident move off campus driven by the pandemic and migration to the new Canvas LMS has increased engagement with novel teaching practices and technologies. The digital aspects of teaching with technology became an absolute necessity; however, this has challenged staff with an especially

https://doi.org/10.14324/111.444.amps.2022v22i1.003

steep and time-pressured learning curve. Subject coordinators engaged with new tools and additional options while experiencing teaching practices in flux. Over time, the Canvas LMS platform developed as a focus for new pedagogies and the technologies that have influenced them. The platform has offered a way to showcase and share the techniques discussed in this article that are particular to architecture and built environments disciplines.

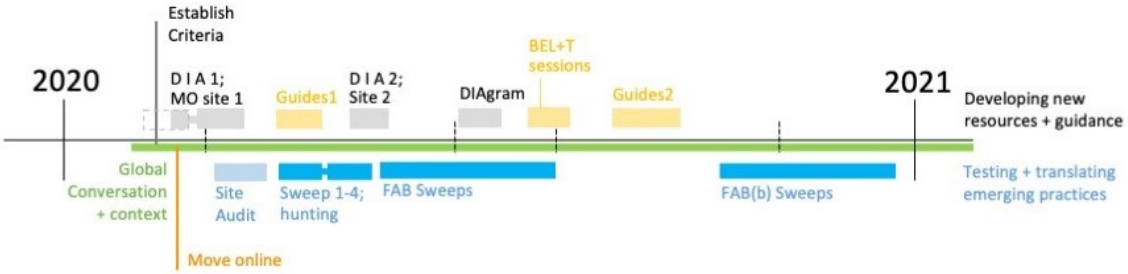
Developing the DIA

The Built Environments Learning + Teaching (BEL+T) group within the Faculty of Architecture, Building and Planning (ABP) at the University of Melbourne is an academic group focused on the sustained improvement of education for built environment disciplines. Since its establishment in mid-2018, the BEL+T group has drawn on a diverse skillset from its interdisciplinary membership to apply creative problem-solving and design-led approaches, evidence-based research methodologies and project-focused consultancy to improve teaching quality and student engagement. The ABP faculty is the location, inspiration and beneficiary of focused built environment learning and teaching research performed by and with the group.

The sudden exodus from campus in March 2020 challenged BEL+T to support faculty educators thrown into a very unfamiliar world, working in alignment with emerging learning and teaching support that was funded and delivered across the institution. BEL+T drew on previous work to develop 'online criteria' for ABP subject sites on the new LMS, offering an early brief and rubric for educators' online teaching decisions. Those criteria fell into three broad categories: the quality of the designed site presence; the tailoring of pedagogy, content and activity; and the provision of support for students with particular needs.[6] The second of these highlighted the tailoring of delivery, interaction and assessment (DIA) activities to the teaching mode and in alignment with intended learning outcomes for each subject.

During this period, BEL+T was tasked with supporting staff under significant pressure, many of whom initially sought to translate familiar on-campus experiences into an online mode quickly and with minimal change. In this context, part of BEL+T's task was to develop ways to understand, communicate and support new student needs and approaches, and to work with teachers to investigate how new practices were being received. Figure 1 presents the timeline of BEL+T's iterative process in support of the faculty's move online.[7]

Figure 1. DIA development: BEL+T 2020 activity timeline (Source: Kate Tregloan, 2020)



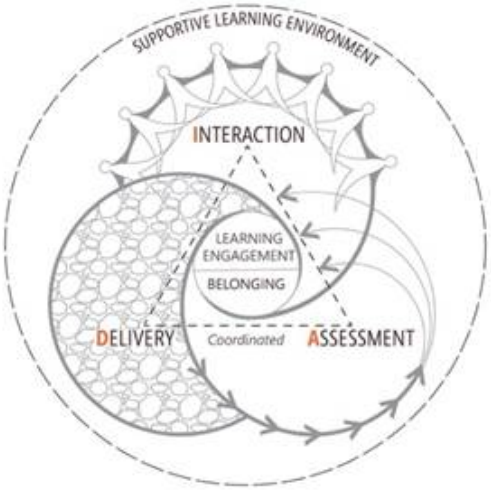
As indicated in Figure 1, BEL+T developed the DIA framework and its DIAgram over several stages, while engaging with a global conversation that was identifying similar challenges. Refinement of the DIA was informed by iterative refocusing between two types of local activity – developing new resources and guidance, and translating and testing emerging practices – each of which informed the other.

The development of the DIA framework was informed initially by Oliver's tripartite model for online learning design, which incorporates 'learning resources', 'learning activities' and 'learner supports'.[8] The development of a visual DIAgram as a 'spatialization of a selective abstraction' helped to conceptualise the challenge, to clarify communication of its elements during consultations with staff and to focus on the development of resources and support.[9] The DIAgram presents three of teaching's primary tasks, shown interlocked: *delivery* of subject content; supporting *interaction* among students, peers and staff; and effective *assessment* for learning, all connected by good *coordination* (see Figure 2). It presents this

https://doi.org/10.14324/111.444.amps.2022v22i1.003

cyclical workflow of synchronous and asynchronous activities with a central focus on some foundational aims for learning experiences: *learning engagement* and *belonging*. The whole is represented within a context that highlights well-being: a *supportive learning environment*. Details of its development and implications for coordination have been outlined elsewhere.[10]

Figure 2. BEL+T DIAgram v2.0 complete (Source: Tregloan et al., 2021)

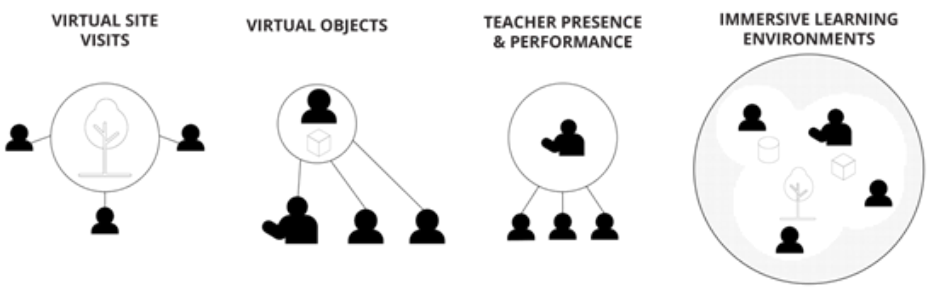


The DIA framework also informed the development and refinement of guidance pages within the BEL+T website. This teacher-facing 'Guidance for teaching online'[11] highlighted the DIA activities alongside examples of related practices, suggested online tools and particular aspects of subject design or practices that might influence the effective introduction of each. These were identified as 'things to consider'. The website also celebrated innovative approaches that faculty colleagues were developing. The 'Guidance for teaching online' section had 3,900 views in 2020, and over 5,600 in 2021. While many of these unique views came from beyond ABP, it is a high rate for a faculty with 170 academic staff. Most importantly, the page both guided and was informed by many hundreds of teaching-focused consultations and the redesign of over 400 LMS subject sites over that time.

DIA on the (virtual) ground

Beyond its role as a focus for consultation, and as a framework for support and resources, the DIA and its DIAgram have also been very valuable on the ground. The following section presents examples of some issues, technologies and practices that were prompted by the catalyst of COVID-19 through the lens of the DIA. These challenges are represented in the diagrams in Figure 3, indicating the relationships of students, teachers, objects, sites and virtual learning environments for these activities. Parts of Figure 3 are reproduced for each of the relevant sections below.

Figure 3. Models of learning relationships in virtual learning spaces (Source: Nancy Samayoa, 2021)



https://doi.org/10.14324/111.444.amps.2022v22i1.003

Virtual Site visits

Site visits are a crucial tool in the built environment educator's toolbox, as they can connect students with practice, interdisciplinary approaches or connections;[12] offer a forum for pedagogical intervention;[13] strengthen the link between architectural documentation and built form;[14] and provide a narrative element to sites (for example, to enhance heritage aspects).[15] Without access to site visits, the educator is left with one of two options: they can limit students' access to these opportunities and the learning they offer or they can substitute alternatives that seek to address learning needs.

For built environment academics, local lockdown restrictions prevented both the site visits themselves and the collection of on-site data through photography, videography or surveys. In response, the BEL+T group drew upon their previously developed virtual site visits and related research. These previous projects aimed to deliver experiential learning opportunities for bespoke and difficult-to-access sites or places with limited capacity that proved a challenge for large student cohorts. Lockdown restrictions and ongoing pandemic uncertainty prompted the development of a toolbox that could help academics to produce and deliver virtual site visits with minimal additional support.

Processes for virtual site visit production needed to accommodate travel restrictions as well as the documentation, resources and capacity already to hand, and to suit staff with a range of equipment and technical experience and aptitudes. Conceptualised and presented within the DIA framework, virtual site visits were considered part of delivery (an enhanced method to provide succinct site-specific content to students) and linked strongly to assessment (allowing for associated reflections and/or assessments).

BEL+T developed a series of guides to suit various educational technologies, technical skills and access to material and resources. Approaches ranged from embedding Google Maps into an LMS page in the case of limited or missing site documentation, to 360-degree imaging when site or artefact access was allowed. Outcomes were disseminated through a dedicated staff hub (see Figure 4), including examples of each platform and method, and instructions to produce and deliver them via LMS sites. The Canvas LMS allowed for relatively easy integration of these learning technologies by using its LTI capabilities. BEL+T also developed a Canvas community site as a means to disseminate this advice, to provide examples of the tools and their effective application and to demonstrate their integration on the platform (see Figure 5).

Subject coordinators, who are the lead academics for each subject, came from built environment disciplines, including architecture, urban planning and construction management. These staff produced virtual site visits to supplement student learning resources during lockdown restrictions. They have continued to use these virtual site visits after the easing of some local restrictions and some have further developed these methods to offer equitable site experiences for students affected by ongoing border closures or lockdowns who are unable to study on campus. Existing research on virtual site visits shows that these tools can enhance both online and face-to-face learning experiences and can provide students who are unable to access sites with equitable learning opportunities.[16]

Virtual environments for built environment education

When learning face to face, built environment education typically makes use of particular types of spaces to support discipline-specific pedagogical culture, activities and moments. Some key physical space typologies associated with built environment education are:

1. presentation and feedback spaces, where students present proposals to be examined and interrogated by peers, experts or industry professionals
2. object-based learning spaces, where artefacts are presented for interrogation
3. exhibition spaces, where students curate their work for viewing and dissemination
4. collaborative working spaces, where multiple actors participate in learning and research activities.

The versatility of the 'studio space' is intrinsic to most design education settings and offers a space for all of these activities over the course of a typical teaching semester.

https://doi.org/10.14324/111.444.amps.2022v22i1.003

Figure 4. Virtual site visit staff hub with how-to guides (Source: https://msd.unimelb.edu.au/belt/technology-for-teaching/virtual-site-visits)

Virtual Site Visits

The following resources will guide staff on how to create virtual site visits, such as 360˚ tours and interactive images; and integrate these into your learning and teaching at the Faculty of Architecture, Building and Planning (ABP). To view working examples of the virtual site visits, self-enrol in to the ABP BEL+T Canvas Community that showcases all virtual site visit examples listed below, along with Canvas templates, additional user interface and navigational tools.

BEL+T is happy to assist with the production of virtual site visits for ABP teaching staff. If you are interested in producing a virtual site visit, please get in touch with us at abp.belt@unimelb.edu.au

ABP BEL+T Canvas Community (new enrolments) >

ABP BEL+T Canvas Community: Virtual Site Visit Examples >

Google Street View in Canvas

Google Street View can remove the need for you to get on site to capture your own images, which may not always be possible. A straightforward approach to virtual site visits, however, does not allow for customisation or enhancement options.

Interactive Static Images in H5P

H5P provides the ability to create a series of interactive image scenes. With H5P, you can integrate hotspots to overlay key information and guide the viewer through a site. This virtual method only requires standard photography.

Kaltura 360° Video

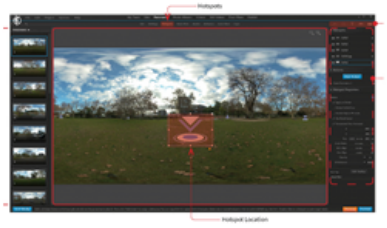
Kaltura can host 360° video footage of your site. The advantages of using Kaltura are its easy integration into Canvas, and its ability to be accessed by students globally, unlike alternatives, such as YouTube.

Creating a 360° Virtual Tour in H5P

H5P provides the ability to create interactive virtual 360° tours using standard and 360° images to create a series of scenes and can integrate hotspots to guide the viewer.

Sway

Sway is a Microsoft application that allows for creating and sharing interactive reports, presentations, video recordings and documents. Capable of holding documents and images of large file sizes, we recommend the use of Sway when delivering large amounts information relevant to physical site documentation. Sway has been used in ABP subjects to present videos and images related to project sites and construction documentation

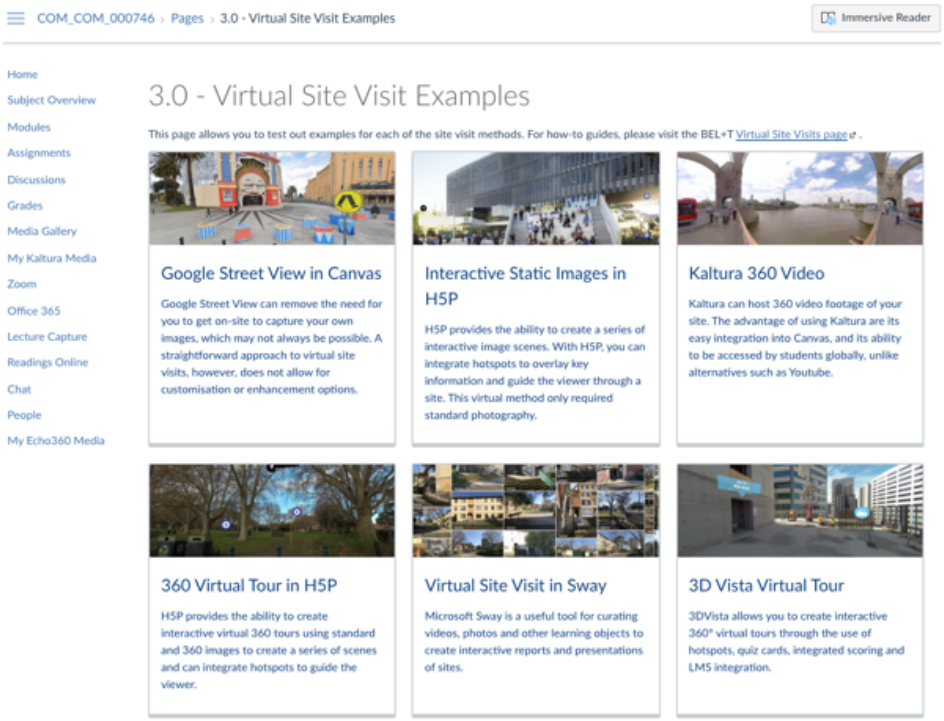


3D Vista Virtual Tour Pro

3DVista Virtual Tour Pro is a multimedia software package that allows you to create interactive 360° virtual tours. 3DVista Virtual Tours can be used to facilitate virtual learning and teaching through the use of hotspots, quiz cards, integrated scoring, reporting systems and LMS integration.

https://doi.org/10.14324/111.444.amps.2022v22i1.003

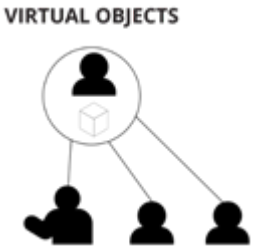
Figure 5. Canvas LMS community site, presenting virtual site visit examples (Source: Site produced by BEL+T to support teaching, 2021)



During 2020, our students were globally dispersed, and face-to-face learning spaces and many resources were off limits. BEL+T's challenge was to identify accessible tools that could help mediate and facilitate learning in the virtual environments through which students and staff now needed to interact. While computer-supported collaborative learning (CSCL) has long been integral to built environment disciplines, lockdown limitations and our move online highlighted the need to develop this within our pedagogical practices.[17]

As Baxter et al. note, 'the use of digital technologies in higher education requires ongoing and thorough critical appraisal, especially since these technologies develop so quickly.'[18] This is especially true if students and educators encounter access and technical limitations with new technologies. When appraising potential technologies, the DIA framework offered a lens to identify some of the benefits that such tools could offer. BEL+T identified tools that could host digital objects, allowing for Delivery and Assessment via object-based learning, alongside tools that supported DIA through the creation of synchronous immersive environments.

Digital object-based interactions



Object-based learning offers a range of improved outcomes for students across multiple disciplines, enhancing knowledge and understanding through the encouragement of 'active over passive approaches to learning' and the ability for objects to 'ground abstract experiences', 'enable recall of knowledge' and 'arouse curiosity'.[19] Object-based learning has long been central to built environment pedagogy, but the sudden move online called for a new approach that would allow objects and models to be experienced by a dispersed cohort. Three-dimensional (3D) viewing platforms and online browser-based virtual environments offered the capacity to deliver object-based learning for students remotely. BEL+T found that the traditional benefits of object-based learning, such as to 'encourage

https://doi.org/10.14324/111.444.amps.2022v22i1.003

close observation, problem solving and creative interpretation', were able to be translated into virtual learning activities.[20] When face-to-face teaching was not possible, 3D viewing platforms could provide an engaging learning experience for students that would reframe the learning dialogue from educator-to-student (for example, teacher showing a model for students) to one that supported both student-to-educator and student-to-peer engagement – these are described as *interaction* in the DIA framework. This approach could build on the 3D modelling skills that built environment students were already developing through their use of computer-aided design tools and would be foundational to their future professional practice. Pedagogical cultures of built environment disciplines allowed object-based learning to continue remotely, including presentations and reviews, to deliver student-created objects to the centre of live feedback and discussion (see Figure 6).

In addition to student-created content, 3D viewing platforms were also used to offer digital collections for use in virtual learning environments through digital object-based interrogation. In these platforms, students were able to explore digital objects with features such as 360-degree rotational views and measuring sections of 3D models (see Figure 7).

Figure 6. A virtual environment for students to interrogate 3D concept models (at.studio) (Source: Nancy Samayoa, 2021)

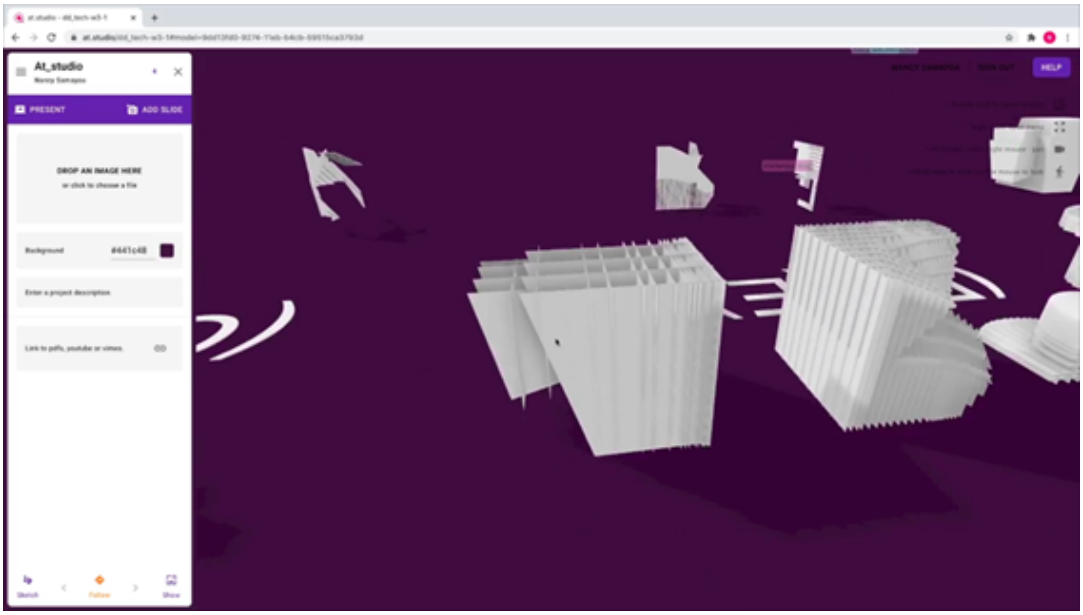
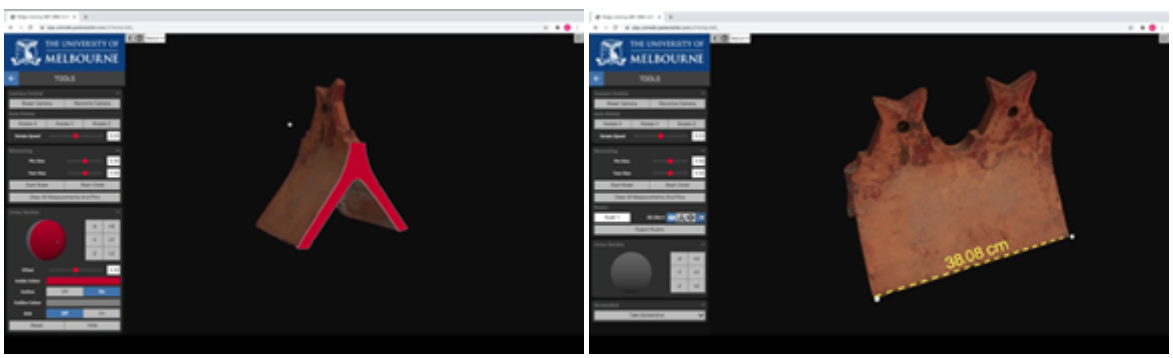
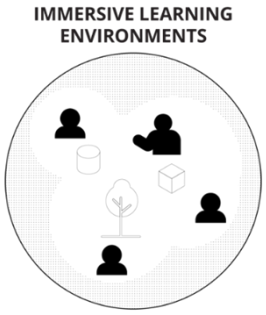


Figure 7. Photogrammetric object displayed in 3D viewer (Pedestal) which can allow users to interrogate. Left: screenshot of measuring tool applied to a photogrammetric object in 3D viewer (Pedestal); right: screenshot of sectioning tool applied to a photogrammetric object in 3D viewer (Pedestal) (Source: https://unimelb.pedestal3d.com/r/FNUlqv345)



https://doi.org/10.14324/111.444.amps.2022v22i1.003

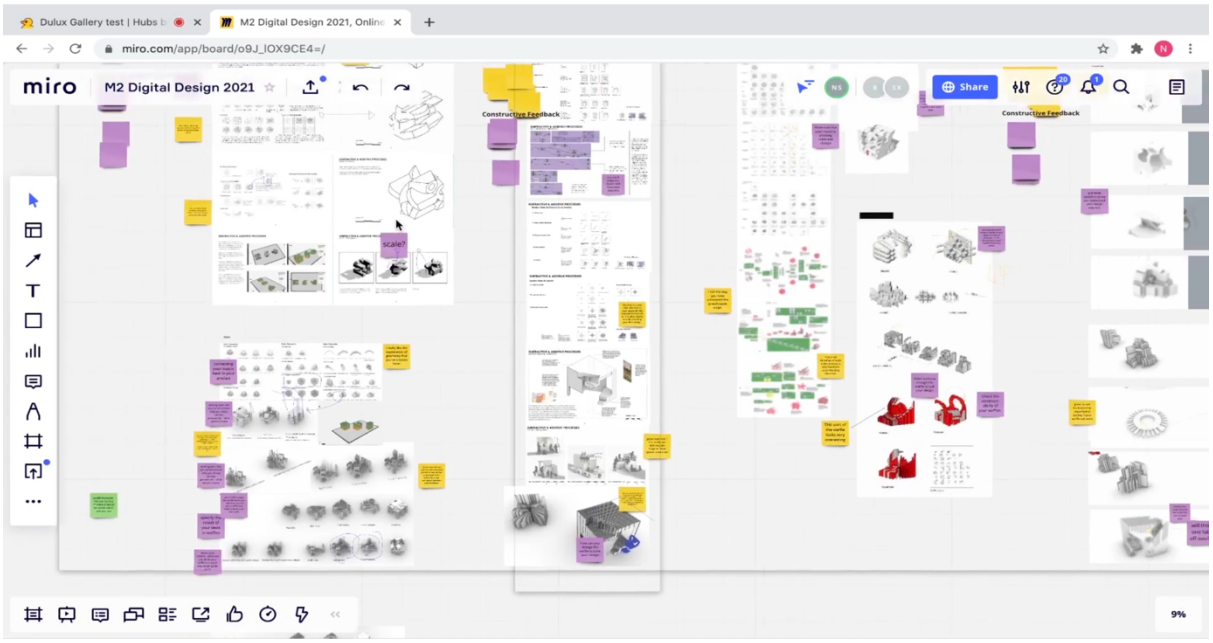
Immersive learning environments



Just as traditional built environment teaching modes use physical studio spaces to facilitate DIA, new online learning environments also need to accommodate these key learning activities. Participants in online modes, contributing as field experts, educators or student peers, need to interrogate digital artefacts (for example, drawings, models and representations of design proposals) actively and autonomously. This prompted exploration by BEL+T and others of navigable learning environments, with a focus on those that could enable students and teachers to experience spaces and objects in a collaborative, social way.[21]

As a collaborative platform for immersive virtual spaces, online whiteboarding tools were quickly adopted by the faculty for digital pin-up presentations or table crits (see Figure 8). When used alongside a synchronous audio/video platform like Zoom, online whiteboarding tools allow viewers to become active participants in the interrogation process, providing real-time collaborations.

Figure 8. An online whiteboard for students to share progress and pin-up presentations (Miro) (Source: student work on the Miro platform as part of teaching by Nancy Samayoa, 2022; the students whose work is presented have agreed to this reproduction for publication)

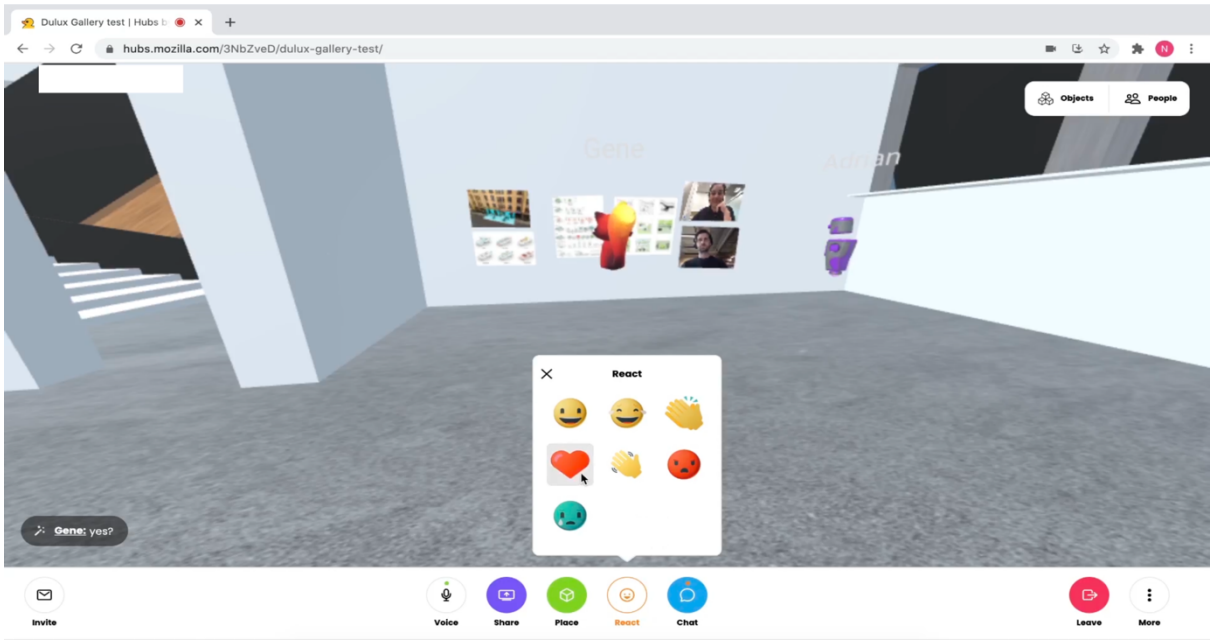


Browser-based virtual reality platforms provide 3D online environments in which participants can insert or create artefacts. They also allow for a designed environment and/or artefact to be interrogated by others, both synchronously or asynchronously with representative avatars of collaborators/viewers. In the ABP faculty, online platforms such as Mozilla Hubs (see Figure 9) and at.studio were used as exhibition spaces, in which students could 'world build' and present proposals and early concepts as images, videos or 360-degree scenes for peers and panel members to interrogate. When engaging with spaces, objects and presentations, users within a virtual learning setting have been shown to exhibit interactivity and social/community-building tendencies, even when not called for by the activity being undertaken.[22] Scarvelli et al. argue that it is important to consider the social interactions that VR/AR technologies can provide. For example, there are learning methodologies, such as learning together and alone which focuses on structured cooperative learning supported by the use of interpersonal and small group skills,[23] and computer-supported collaborative learning[24] which involves making meaning through small group

https://doi.org/10.14324/111.444.amps.2022v22i1.003

interactions. These methodologies suggest that closely coupled collaborative interactions enhance learning.[25] Immersive collaborative platforms can provide opportunities for social interaction through gamified features such as character avatars, emoticon reactions and audio/video sharing capabilities.

Figure 9. A browser-based virtual reality environment that allowed for pin-ups, camera and screen sharing, and social interactions to occur (Mozilla Hubs) (Source: model produced by Nancy Samayoa and BEL+T for testing, 2021)



Adopting new digital tools was a necessity driven by the move online. This change also allowed new modes for student learning experiences with a focus on distance learning, 'where multisensory learning experiences have traditionally been much harder to facilitate than in face-to-face classroom settings'.[26] However, adopting and using these tools in a higher education setting can be costly in terms of time and resources for both educators and students.

An investigation and appraisal process should be undertaken on a tool-by-tool basis in the context of intended learning outcomes to support decision-making. When appraising digital tools, Baxter et al. suggest considering the 'extent to which digital technologies can support or stifle the development of creativity and creative learning – or learning per se'.[27] As the feasibility of each tool was investigated, the DIA provided a useful framework to consider how new technologies might contribute to learners' experiences across its elements. The framework continues to prove useful as new digital tools emerge and existing tools evolve.

Teacher presence and performance online

While many of the initial challenges of teaching online centred on mastering technologies, implications for pedagogy, learning design and student engagement quickly followed. Despite the transformative teaching practices enabled by modern educational technologies (asynchronicity, flexibility, interactivity), criticisms of online teaching often revolve around lack of student engagement.[28] While students were able to interact with virtual environments and objects, interaction with teachers and peers also proved emotionally and culturally challenging. There was a sense that digital platforms, including those discussed above, could create a perceived disconnection or a 'veil'

https://doi.org/10.14324/111.444.amps.2022v22i1.003

between students and teachers. This lack of connection translated to a perceived limitation on the important interpersonal aspects of teaching from teachers' perspectives.

Virtual environments can appear dry and sterile but do not have to be. Supporting pedagogy with the affordances offered by virtual environments and educational learning tools, alongside the creative and innovative use of human skills and attributes, can link to effective learning.[29] The role of teacher performance outside the performing arts is not well documented in academic literature, other than through concepts such as 'charisma' and 'humour'. Lin and Huang identify four elements that may contribute to charisma in teaching: knowledgeability; positive character traits (friendliness, approachability, empathy); teaching skills and methods; and a good sense of humour. Lin and Huang insist that the greatest learning stimulus is not necessarily how well the class is prepared but the type of learning environment fostered by the teacher.[30] This is in many ways directly linked to the four elements of charisma identified by the authors earlier, and more specifically the positive character traits identified as friendliness, approachability and empathy. One aspect highlighted through the isolation of studying remotely is the important role that social interactions play within a tertiary learning environment. Harris et al. explored the role of live lectures in the context of the COVID-19 pandemic and found that while live lectures were not necessarily more pedagogically appropriate than asynchronous delivery, they were essential elements in creating a sense of 'togetherness and personal connectivity' among the student cohort and between the students and the teacher.[31] As the classroom (and by extension the teachers) became the primary source of social contact in an institutional setting for many students, creating an accessible environment for learning that includes human interactions was therefore critical to stimulate and engage students in their learning.

The importance of teacher contributions to the creation of a supportive learning environment is further reinforced by Bambaeeroo and Shokrpour, who have explored the impacts of non-verbal forms of communication, including the use of emotions and body language in support of student learning.[32] They report a close correlation between non-verbal communication skills by teachers and educational performance. Beyond the direct impact that non-verbal forms of communication may offer in terms of communicating information to students, the authors also explore the role of emotion for effective communication and suggest that relationships between teachers and students can use 'supportive, collaborative and emotive methods' in the form of body language.[33] Thus, the 'veil' between participants in online learning environments may limit the ability of educators to employ charisma in teaching or to communicate positive character traits such as humour and empathy.[34] In addition, interacting through a screen may also inhibit non-verbal forms of communication for both students and educators. As such, teachers who rely on charisma to teach effectively may find the translation of successful pedagogies from face-to-face to online environments particularly challenging. While the shift of content delivery has taken many forms across various disciplines, pre-recorded PowerPoint presentations were often a model favoured by many instructors. This approach, while offering ease of recording, removes the visibility of human pedagogical agents from the delivery. Schneider et al. concluded from their study of 163 participants that gestures and facial expressions were often associated with better learning outcomes in video delivery models, reinforcing the importance of teacher presence, even in online environments.[35]

The DIAgram shows learning design as an intersection of multiple elements, including DIA, within a *supportive learning environment*. While interactions with students will change in a virtual environment, some of the human elements that may have seemed lost could also be revived in a different form. Humour could be injected into videos, empathy communicated through tone of voice and inspiration conveyed in recordings. Even body language and non-verbal forms of communication could be introduced in a virtual class through the creative use of video- and audio-capture equipment.

BEL+T produced a series of demonstration videos offering practical and technical advice to recreate some of these face-to-face elements for teaching remotely. The videos covered home-based audiovisual technologies to support production of the best possible recording quality from home. In addition, other videos focused on some aspects of human delivery, including body language and facial expressions, suggesting that some more sophisticated use of cameras and computer applications could enable instructors to bring the focus to specific items, including (at times) to themselves. While the technical aspects of recording or streaming videos are not often seen as having pedagogical significance, high-quality video and audio ensures that subtle changes in tone of voice or facial expressions are also captured and can be conveyed to a student audience to enhance learning. Workshops to support the use of BEL+T's purpose-built recording studio encourage staff to upskill and create engaging content

https://doi.org/10.14324/111.444.amps.2022v22i1.003

for teaching when they can return to campus, instead of relying on improvised home setups or content produced by others.[36]

Moving to dual delivery

While many students and staff were able to access campus in early 2021, closed international borders meant that a significant portion of the student cohort still remained online. The situation was not particularly stable, as our city continued to experience both 'snap' and 'extended' lockdowns affecting those who could access campus. Restrictions on movement and social distancing continued to change over the year, and ultimately Melbourne became the 'most locked-down city in the world' before the lifting of restrictions on 22 October 2021. In this developing context, teaching and learning activities therefore needed to be designed to respond to these fluid circumstances, as well as to support distributed learners who were in a wide range of environments.

The University of Melbourne determined in late 2020 that teaching and learning for 2021 would make use of three modes: on campus; fully online; and dual delivery. Dual delivery subjects are taught in two modes: blended mode (blending online and campus-based activities) for students who are able to attend campus; and entirely online mode for students who cannot. While clearly a challenging undertaking, dual delivery brought with it some good opportunities to test blended synchronous or hybrid flexible approaches.[37]

BEL+T developed guidance for Dual Delivery[38] to highlight some key considerations for staff preparing for teaching in this mode, further updating it at the end of the first semester in 2021, by drawing on experiences on the ground. Key considerations were identified at the outset for staff preparing to teach dual delivery: to focus on learner equity and access (both real and perceived), effective cohort building to include students in both modes and the need for clear communication and a shared language to inform staff and student perceptions of this new experience. Specific approaches and activities related to these considerations were explored, with academics focusing on studio teaching. These and other emergent approaches and concerns are reported elsewhere.[39]

Both university-wide and BEL+T guidance highlighted the crucial point that all students should be appropriately and equitably supported to work towards the intended learning outcomes and their assessment in each subject, regardless of their participation via online or blended mode. This impacted the design of teaching and learning activities within dual delivery subjects in subtle but significant ways. BEL+T extended a taxonomy to describe the implications for different or similar teaching and learning activities when both modes were offered to students, while also considering both synchronous and asynchronous engagement. This taxonomy built on the more familiar term 'blended synchronous', in which students online and on campus simultaneously engage in the same activities, added to parallel synchronous, parallel tailored and mixed types of teaching and learning design.[40]

BEL+T's guidance for Dual Delivery drew once again on the DIA framework as a means to explore and frame this new and nuanced pedagogical challenge and its elements. All seven of these (delivery, interaction, assessment, coordination, learning engagement, belonging, supportive learning environment) are impacted by the mix of blended or online modes and contexts for learning, and each section explored these further. This work built once again on the approaches and tools prompted by the events of 2020 and outlined above, and their testing by staff and students on the (virtual) ground since that time. In this, a primary focus on the subject LMS site as a 'shared space' for all students became an even more important focus to inform students of learning activities over the semester, as well as a mechanism to deliver innovative resources for learning such as virtual site visits, and a 'place' to connect with staff and fellow students around platforms and objects. As outlined above, the capacity to engage with objects and each other as part of learning and teaching in architecture has been highlighted and also challenged in an online space. Surprising solutions continue to emerge, and the creativity of our students as well as our staff inform and test these and their use as we all start to design learning opportunities with an eye to contingency.[41]

Conclusions and next steps

There are certainly many aspects of 2020 and 2021 that will not be quickly forgotten and outcomes from the catalyst delivered by COVID-19 will remain with us for some time. Extended lockdowns forced many

https://doi.org/10.14324/111.444.amps.2022v22i1.003

to rethink teaching practices and to extend their comfort zones. The prospect of additional COVID-19 variants and the disruptions they may bring continue to challenge us, along with the unpredictable nature of the future. Our preparations for 2022 now include more nuanced considerations of dual delivery approaches, including blended synchronous learning, and upgrades to campus environments and equipment to facilitate these approaches.

The opportunity to discuss and interrogate teaching approaches and the affordances of technologies for student cohorts still distributed between the physical and virtual campus are themselves central and valuable outcomes from all of this disruption. The coming year will again require students and teachers to navigate more change. They will need to draw thoughtfully on the practices and approaches that have grown in response to the 'pandemergency' and seek to use the best of these in both physical and virtual engagements, and as part of longer-term solutions. As we move forward, the DIA framework and its DIAgram offer not only a framework and a model, but also a focus on these emergent teaching challenges. The clean slate provided by the move to a new LMS at our university is one particular example of how educators worldwide are starting anew. The adoption of clear frameworks such as the DIA, coupled with the hastened testing of technology for teaching, has laid some foundations for progressive and equitable teaching as we all continue to teach in a time of change.

Notes

[1] Smith and Hill, 'Defining the nature of blended learning'.
[2] Cronje, 'Towards a new definition of blended learning'.
[3] Cohn, *Active Learning BT*; Puentedura, 'Building transformation'.
[4] Shenoy et al., 'COVID 19 lockdown technology'.
[5] Severance et al., 'The coming functionality mash-up'.
[6] Tregloan and Thompson, 'Buckle up!'.
[7] This figure was first published in Tregloan and Thompson, 'Buckle up!'.
[8] Oliver, 'Exploring strategies'; Oliver, 'Seeking best practice', 209.
[9] Garcia, *The Diagrams of Architecture*.
[10] Tregloan and Thompson, 'Buckle up!'; Soccio et al., 'Well-coordinated'.
[11] This guidance is now available on Melbourne School of Design, 'Steps for moving online'. Access 3 June 2022. https://msd.unimelb.edu.au/belt/teaching-quality/pedagogical-practices/teaching-in-online-environments/b/abp-moving-online-steps.
[12] Domask, 'Achieving goals in higher education'.
[13] Lee and Schottenfeld, 'Internationalising experiential learning'.
[14] Newton, 'Architecture as alchemy'.
[15] Maícas and Viñals, 'Design of a virtual tour'.
[16] Brazley, 'Architecture, virtual reality'; Burden et al., 'Fieldscapes'.
[17] Lymer et al., 'Contrasting the use of tools'.
[18] Baxter et al., *Creativity and Critique in Online Learning*, 102.
[19] Chatterjee and Hannan, *Engaging the Senses*, 118; Hooper-Greenhill, *The Educational Role of the Museum*, 21.
[20] Chatterjee and Hannan, *Engaging the Senses*, 102.
[21] Williamson et al., 'Proxemics and social interactions'.
[22] Holt et al., 'Thanks for inviting me to the party'.
[23] Johnson and Johnson, 'Learning together and alone'.
[24] Cress et al., 'Foundations, processes'.
[25] Scavarelli et al., 'Virtual reality and augmented reality'.
[26] Baxter et al., *Creativity and Critique in Online Learning*, 108.
[27] Baxter et al., *Creativity and Critique in Online Learning*, 108.
[28] Stott, 'The perils of a lack of student engagement'.
[29] Gurley, 'Educators' preparation to teach'.
[30] Lin and Huang, 'Examining charisma'.
[31] Harris et al., '"A more personal way"'.
[32] Bambaeeroo and Shokrpour, 'The impact of the teachers' non-verbal communication'.
[33] Bambaeeroo and Shokrpour, 'The impact of the teachers' non-verbal communication'.

https://doi.org/10.14324/111.444.amps.2022v22i1.003

[34] Vrasidas and McIsaac, 'Principles of pedagogy'.
[35] Schneider et al., 'The impact of video lecturers' nonverbal communication'.
[36] Stott, 'The perils of a lack of student engagement'.
[37] Beatty, *Hybrid-Flexible Course Design*.
[38] Melbourne School of Design, 'Dual delivery'. Accessed 3 June 2022. https://msd.unimelb.edu.au/belt/teaching-quality/pedagogical-practices/teaching-in-online-environments/b/dual-delivery.
[39] Thompson et al., 'Dual delivery design studios'.
[40] Thompson et al., 'Dual delivery design studios'.
[41] Thompson et al., 'Dual delivery design studios'.

Declarations and conflicts of interest

Research ethics statement

Not applicable to this article.

Consent for publication statement

Not applicable to this article.

Conflicts of interest statement

The authors declare no conflict of interests with this work. All efforts to sufficiently anonymise the authors during peer review of this article have been made. The authors declare no further conflicts with this article.

References

Aboagye, Emmanuel, Joseph Anthony Yawson and Kofi Nyantakyi Appiah. 'COVID-19 and e-learning: The challenges of students in tertiary institutions'. *Social Education Research* 2, no. 1 (2020): 109–15. [CrossRef]

Bambaeeroo, Fatemeh and Nasrin Shokrpour. 'The impact of the teachers' non-verbal communication on success in teaching'. *Journal of Advances in Medical Education & Professionalism* 5, no. 2 (2017): 51–59.

Baxter, Jacqueline, George Callaghan and Jean McAvoy. *Creativity and Critique in Online Learning: Exploring and examining innovations in online pedagogy*. Milton Keynes: Palgrave Macmillan, 2018. [CrossRef]

Beatty, Brian J. (ed.). *Hybrid-Flexible Course Design*. EdTech Books, 2019.

Brazley, Michael Duwain. 'Architecture, virtual reality, spatial visualization, learning styles and distance education'. *International Journal of Architecture, Arts and Applications* 4, no. 2 (2018): 10. [CrossRef]

Burden, David J. H., Tom Argles, Shailey Minocha, James Rock, Steve Tilling and Philip Wheeler. 'Fieldscapes – Creating and evaluating a 3D virtual fieldtrip system'. In *Proceedings from the Third Immersive Learning Research Network Conference*, 18–29. Online, 2017. [CrossRef]

Chatterjee, Helen J. and Leonie Hannan. *Engaging the Senses: Object-based learning in higher education*. London: Routledge, 2016. [CrossRef]

Cohn, David. 'Active Learning'. In *BT: Encyclopedia of machine learning and data mining*, edited by Claude Sammut and Geoffrey I. Webb, 9–14. Boston: Springer US, 2017. [CrossRef]

Cress, Ulrike, Jun Oshima, Carolyn Rosé and Alyssa Friend Wise. 'Foundations, processes, technologies, and methods: An overview of CSCL through its handbook'. In *International Handbook of Computer-Supported Collaborative Learning*, edited by Ulrike Cress, Carolyn Rosé, Jun Oshima and Alyssa Friend Wise and Jun Oshima, 3–22. Cham: Springer, 2021.

Cronje, Johannes C. 'Towards a new definition of blended learning'. *Electronic Journal of E-Learning* 18, no. 2 (2020): 114–35. [CrossRef]

Domask, Joseph J. 'Achieving goals in higher education: An experiential approach to sustainability studies'. *International Journal of Sustainability in Higher Education* 8, no. 1 (2007): 53–68. [CrossRef]

Garcia, Mark. *The Diagrams of Architecture*. Chichester: Wiley, 2010.

Gurley, Lisa E. 'Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments'. *Online Learning Journal* 22, no. 2 (2018): 197–220.
Harris, Richard, Pam Blundell-Birtill and Madeleine Pownall. '"A more personal way to learn during such an isolating time": The value of live lectures in online teaching'. *Student Success* 12, no. 3 (2021): 113–17. [CrossRef]
Holt, Emily A., Ashley B. Heim, Erin Tessens and Robert Walker. 'Thanks for inviting me to the party: Virtual poster sessions as a way to connect in a time of disconnection'. *Ecology and Evolution* 10, no. 22 (2020): 12423–30. [CrossRef] [PubMed]
Hooper-Greenhill, Eilean. *The Educational Role of the Museum*. 2nd ed. Abingdon: Routledge, 1999.
Johnson, David and Roger Johnson. 'Learning together and alone: Overview and meta-analysis'. *Asia Pacific Journal of Education* 22 (2002): 95–105. [CrossRef]
Johnson-Glenberg, Mina C. 'Immersive VR and education: Embodied design principles that include gesture and hand controls'. *Frontiers in Robotics and AI* (2018). [CrossRef]
Lee, Young S. and Matthew A. Schottenfeld. 'Internationalising experiential learning for sustainable development education'. *Journal of Education for Sustainable Development* 6, no. 2 (2012): 341–54. [CrossRef]
Lin, Shu Hui and Yun Chen Huang. 'Examining charisma in relation to students' interest in learning'. *Active Learning in Higher Education* 17, no. 2 (2016): 139–51. [CrossRef]
Lymer, Gustav, Jonas Ivarsson and Oskar Lindwall. 'Contrasting the use of tools for presentation and critique: Some cases from architectural education'. *International Journal of Computer-Supported Collaborative Learning* 4, no. 4 (2009): 423–44. [CrossRef]
Maícas, JoséMiguel and María José Viñals. 'Design of a virtual tour for the enhancement of Llíria's architectural and urban heritage and its surroundings'. *Virtual Archaeology Review* 8, no. 17 (2017): 42–8.
Newton, Clare. 'Architecture as alchemy: Changing documentation languages and their translation into built forms'. In *Proceedings of the IEEE Symposium on Information Visualization*, 316–19. London, UK, 31 July 1998.
Oliver, Ron. 'Exploring strategies for online teaching and learning'. *Distance Education* 20, no. 2 (1999): 240–54. [CrossRef]
Oliver, Ron. 'Seeking best practice in online learning: Flexible learning toolboxes in the Australian VET sector'. *Australian Journal of Educational Technology* 17, no. 2 (2001): 204–22. Accessed 19 April 2022. https://doi.org/10.14742/ajet.1791 [CrossRef]
Puentedura, Ruben R. 'Building transformation: An introduction to the SAMR model'. 2014. Accessed 19 April 2022. http://www.hippasus.com/rrpweblog/archives/2014/08/22/BuildingTransformation_AnIntroductionToSAMR.pdf.
Scavarelli, Anthony, Ali Arya and Robert J. Teather. 'Virtual reality and augmented reality in social learning spaces: A literature review'. *Virtual Reality* 25, no. 1 (2021): 257–77. [CrossRef]
Schneider, Sascha, Felix Krieglstein, Maik Beege and Günter Daniel Rey. 'The impact of video lecturers' nonverbal communication on learning: An experiment on gestures and facial expressions of pedagogical agents'. *Computers & Education* 176 (2021): 104350.
Severance, Charles, Joseph Hardin and Anthony Whyte. 'The coming functionality mash-up in personal learning environments'. *Interactive Learning Environments* 16, no. 1 (2008): 47–62. [CrossRef]
Shenoy, Veena, Sheetal Mahendra and Navita Vijay. 'COVID 19 lockdown technology adaption, teaching, learning, students engagement and faculty experience'. *Mukt Shabd Journal* 9, no. 4 (2020): 698–702.
Smith, Karen and John Hill. 'Defining the nature of blended learning through its depiction in current research'. *Higher Education Research & Development* 38, no. 2 (2019): 383–97.
Soccio, Philippa, Kate Tregloan and James Thompson. 'Well-coordinated: Learner-focused coordination tactics beyond the pandemergency'. *Archnet-IJAR* 15, no. 1 (2020): 237–51. [CrossRef]
Stahl, Gerry and Kai Hakkarainen. 'Theories of CSCL'. In *International Handbook of Computer Supported Collaborative Learning*, edited by Ulrike Cress, Carolyn Rosé, Jun Oshima and Alyssa Friend Wise, 23–43. Cham: Springer, 2021.
Stott, Philip. 'The perils of a lack of student engagement: Reflections of a "lonely, brave and rather exposed" online instructor'. *British Journal of Educational Technology* 47, no. 1 (2016): 51–64. [CrossRef]

Thompson, James, Kate Tregloan, Philippa Soccio and Huiseung Song. 'Dual delivery design studios'. *Design and Technology Education: An international journal* 26, no. 4 (2021): 231–38. Accessed 19 April 2022. https://ojs.lboro.ac.uk/DATE/article/view/2981.

Tregloan, Kate, Philippa Soccio and James Thompson. 'BEL+T DIAgram v1.0'. 2021. [CrossRef]

Tregloan, Kate and James Thompson. 'Buckle up! BEL+T group learnings from a (very fast) move online'. *Charrette* 7, no. 1 (2021): 59–75. http://hdl.handle.net/11343/281089.

Vrasidas, Charalambos and Marina S. McIsaac. 'Principles of pedagogy and evaluation for web-based learning'. *International Journal of Phytoremediation* 21, no. 1 (2000): 105–11. [CrossRef]

Williamson, Julie, Jie Li, Vinoba Vinayagamoorthy, David A. Shamma and Pablo Cesar. 'Proxemics and social interactions in an instrumented virtual reality workshop'. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–13. Yokohama, Japan, 8–13 May 2021. [CrossRef]

https://doi.org/10.14324/111.444.amps.2022v22i1.003