




Research article

Socio-constructivist pedagogy in physical and virtual spaces: the impacts and opportunities on dialogic learning in creative disciplines

Charlie Smith^{1,*} 

¹ Liverpool School of Art and Design, Liverpool John Moores University, UK

* Correspondence: c.r.smith@ljmu.ac.uk

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

Submission date: 23 April 2021; Acceptance date: 31 March 2022; Publication date: 11 May 2022

How to cite

Smith, C. 'Socio-constructivist pedagogy in physical and virtual spaces: the impacts and opportunities on dialogic learning in creative disciplines'. *Architecture_MPS* 22, 1 (2022): 1. DOI: <https://doi.org/10.14324/111.444.amps.2022v22i1.001>.

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.

Copyright

2022, Charlie Smith. This is an open-access article distributed under the terms of the Creative Commons Attribution Licence (CC BY) 4.0 <https://creativecommons.org/licenses/by/4.0/>, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited • DOI: <https://doi.org/10.14324/111.444.amps.2022v22i1.001> .

Open access

Architecture_MPS is a peer-reviewed open-access journal.

Abstract

The process and outcomes of the design studio are extensively communicated through visual means. However, notwithstanding such tangible manifestations of learning, design education is characterised by dialogue, the discussions in studio between tutors and students and between the students themselves. As such, it aligns strongly with socio-constructivism, where learning is co-constructed and negotiated through a social process of collaborative dialogue. This article evaluates the impact of the transition from studio-based encounters to virtual learning on a pedagogy that revolves around dialogic interaction, the dynamics of which arguably become distinctly different online. Utilising a combination of reflecting on teaching practices and research literature, this article explores the effects of a variety of signature elements on architectural pedagogy through which dialogic learning occurs, such as one-to-one tutorials (desk crits), group tutorials and design reviews (crits or juries). Socio-constructivism suggests that dialogue and co-construction are key processes for learning; the question is: was this effectively

replicated in a virtual format? Post-lockdown, some institutions are retaining elements of virtual teaching alongside face-to-face through a blended learning approach. The article considers the implications of this for creative disciplines. In the return to face-to-face teaching after the prolonged hiatus created by the pandemic, some students have very little experience of studio culture; the article discusses the potential consequences and opportunities that this presents. Learning from the experiences of remote teaching during the pandemic, the article concludes by suggesting qualities that might be embedded within both physical and virtual creative learning spaces to facilitate more compassionate and engaging dialogic learning.

Keywords socio-constructivist pedagogy; dialogic learning; studio learning; virtual learning; social context

Introduction

The pivot to online learning as a consequence of the pandemic created unprecedented upheaval in higher education across the globe. As institutions transitioned from face-to-face to remote teaching in a reactive response to the imposition of lockdowns, a process that, if pre-planned, would have taken years to manage was often accomplished in a matter of days or weeks. At the time, necessity drove innovation. However, with the most disruptive impacts of the pandemic hopefully in the rear-view mirror, this is a timely moment to reflect on the experiences of remote teaching, to evaluate how these strategies impacted on students' learning experiences and to consider which elements of virtual learning might be proactively adapted into creative education following the return to physical learning spaces.

The studio constitutes the principal learning environment in many creative disciplines, where discussion in the form of tutorials, design reviews and informal conversations are essential ingredients in the iterative design process. In socio-constructivist pedagogy, discourse is a primary tool for cognitive development, and learning is co-constructed through interaction, negotiation and collaboration between students and tutors and between students and their peers.¹ Dialogic pedagogy, as described by Teo, is 'an approach that seeks to facilitate students' construction of knowledge through the questioning, interrogation and negotiation of ideas and opinions in an intellectually rigorous, yet mutually respectful, manner'.² This approach falls within the scope of socio-constructivist pedagogy, as dialogic learning is one of a range of joint activities, shared endeavours and interactions through which co-construction can occur.³ Vygotsky, a key protagonist in the development of socio-constructivism who considered learning to be a profoundly social process, emphasises the role that dialogue plays in mediated cognitive growth.⁴

How effectively were these creative discourses maintained in the shift from face-to-face to remote studio education? An integral feature of the design review lies in the event itself – an exhibition and verbal presentation of work for formative or summative discursive feedback: was this successfully replicated in a virtual format? Iranmanesh and Onur posit that the transition of the design studio from physical place to virtual space raised a number of issues because of its intrinsic socio-spatial character.⁵ They also suggest that 'if the lack of spatiality limits the studio culture and informal learning among students, then it can become a liability'.⁶ Peer-to-peer discussion and studio culture are fundamental, if tacit, elements of learning in creative disciplines: did these occur effectively in a virtual space?

This article discusses the significance of social context in supporting dialogic learning, where understanding and identity are co-constructed, and suggests strategies that can be implemented to nurture this within both physical and virtual learning spaces. After reflecting on the shift from physical to virtual studio during lockdowns, and methods used for remote design education, the article discusses the return to face-to-face teaching. Given the prolonged hiatus from the physical studio, students may need support as they encounter their (re-)enculturation into studio practices. Finally, the seismic upheaval in education created by the pandemic arguably provides an ideal moment to question some of its entrenched practices, which may otherwise have remained unchallenged, in order to move forward with progressive, compassionate and engaging pedagogic practices that nurture the complex nature of dialogic learning.

Design studio dialogues

The design process and its outcomes typically take a visual form, such as drawings and models. However, a considerable part of the learning process in studio occurs through students' conversations with their tutors and their peers about these physical manifestations. In understanding the significance of this dialogic learning in design education, the pre-pandemic context is key to being able to reflect on the impact of the transition to a virtual studio and remote learning.

Vygotsky describes how speech and social context are essential parts of cognitive development,⁷ where higher functions originate as interactions between individuals and learning presupposes a social nature.⁸ According to Amineh and Asl, socio-constructivist pedagogy is learner-focused, not content-focused, and characterised by the tutor adopting the role of a facilitator who supports the student in taking an active role in arriving at their own understanding of the subject; the facilitator provides guidelines and creates a learning environment that both supports and challenges the student's thinking through a process of dialogue.⁹ Given how closely this description aligns with the methods and practices of studio teaching, few would argue it captures the essence of design education.

Orr and Shreeve describe dialogue in the art and design curriculum – in the form of tutorials, design reviews and informal conversations – to be where the construction of meaning and identity is acted out.¹⁰ Although criticised by Webster for its tutor-centred nature,¹¹ Schön's iconic account of the discussion between Quist and Petra exemplifies some aspects of the dialogic quality of studio teaching.¹² However, Mewburn proposes that design learning centres on conversations between numerous actors – tutors, students and their peers – through which participants are enculturated into a community of practice.¹³ As such, studio pedagogy aligns strongly with a socio-constructivist approach to learning, in which students and tutors are involved in a social process of collaborative interaction through loops of dialogue.¹⁴

The significance of these dialogic exchanges can also be seen in their affective dimension. Austerlitz and Aravot propose that students' emotional responses to these conversations are some of the most important instruments through which they evaluate studio encounters and interpret meaning from dialogue with their tutors, and therefore exert significant influence on learning.¹⁵ Yoon and Leem describe how the 'cognitive development of students varies with the degree of social interaction they are exposed to',¹⁶ and in collaborative learning – of which the design studio is arguably one form – 'the forming of groups among student participants can reduce anxiety, encourage symbiotic efficacy, stimulate and hasten critical thinking processes, and enhance relational power'.¹⁷

However, the arrangement of physical studios may inhibit, even exclude, some students' learning from their colleagues' discussions; one study suggests that virtual studios enhanced access to and participation in shared dialogue between others.¹⁸ Furthermore, Iranmanesh and Onur posit that in a virtual studio the tutor becomes more of a mediator in the learning process than a leading influence,¹⁹ potentially aligning it more closely with Amineh and Asl's student-tutor dynamic than the physical studio.²⁰ The significance of dialogic learning within creative disciplines therefore raises questions around the impact of the shift from physical place to virtual space in response to the pandemic, and the continued implications that might result from adopting blended learning approaches in its aftermath.

Dialogic learning in an online context

The dynamics of dialogic interaction arguably become different when occurring in virtual space as opposed to a physical place. For example, in a study of verbal and non-verbal signals, Argyle et al. found that non-verbal cues had more than four times the effect of verbal cues in communicating interpersonal attitudes; they suggest verbal and non-verbal channels of communication function simultaneously, with conscious attention focused on the verbal, while the non-verbal channel interprets interpersonal matters, including feedback on what is being said.²¹ In a face-to-face conversation, body language and facial expressions can have a significant impact on how information is interpreted. However, when conducted through a screen, these aspects of language and expression are filtered, and some nuances of dialogue are lost. Riva, Wiederhold and Mantovani describe how video conferencing reduces non-verbal cues and consequently demands a significant increase in cognitive resources to comprehend the meaning of others' communicative acts while creating greater potential for misunderstandings.²² Furthermore, Yoon and Leem observe that 'according to social information processing theory, groups formed in

non-face-to-face environments are restricted from acquiring social information about their peers because of their limited access to non-verbal communication cues'.²³

Using recent findings in neuroscience research, Riva et al. argue that as participants cannot look simultaneously into the camera and at the faces on the screen, 'the impossibility of using eye contact and the exchange of glances, the main tools used to generate joint attention, reduces group engagement, collective performance, and creativity'.²⁴ They describe how 'the experience and development of identity and self are both collectively and individually anchored in the relationship to places'.²⁵ They posit that virtual spaces do not activate the binding experiences constructed through autobiographical memory (the ability to recollect and re-experience events occurring at a particular time and place). The resulting experience of 'placelessness' created by virtual learning spaces weakens an individual's sense of self-concept.²⁶ This suggests that a different learning experience occurs when it takes place in a virtual space as opposed to the design studio or lecture room.

Furthermore, for valid reasons, students can be reluctant to turn on their webcams. These may include: competing obligations; their right to privacy, where they may be self-conscious about their study environment or appearance; social anxiety, with some students experiencing heightened anxiety when their camera is on; the quality of their IT equipment may limit their options to use video; they may have internet issues, such as poor connection speeds, and having their camera on can result in a disjointed session; or their contract with their internet supplier may mean they need to ration broadband use.²⁷ When this happens, even that filtered sense of facial expression and body language is completely absent and key elements of effective dialogue and communication are missing.

Online design tutorials

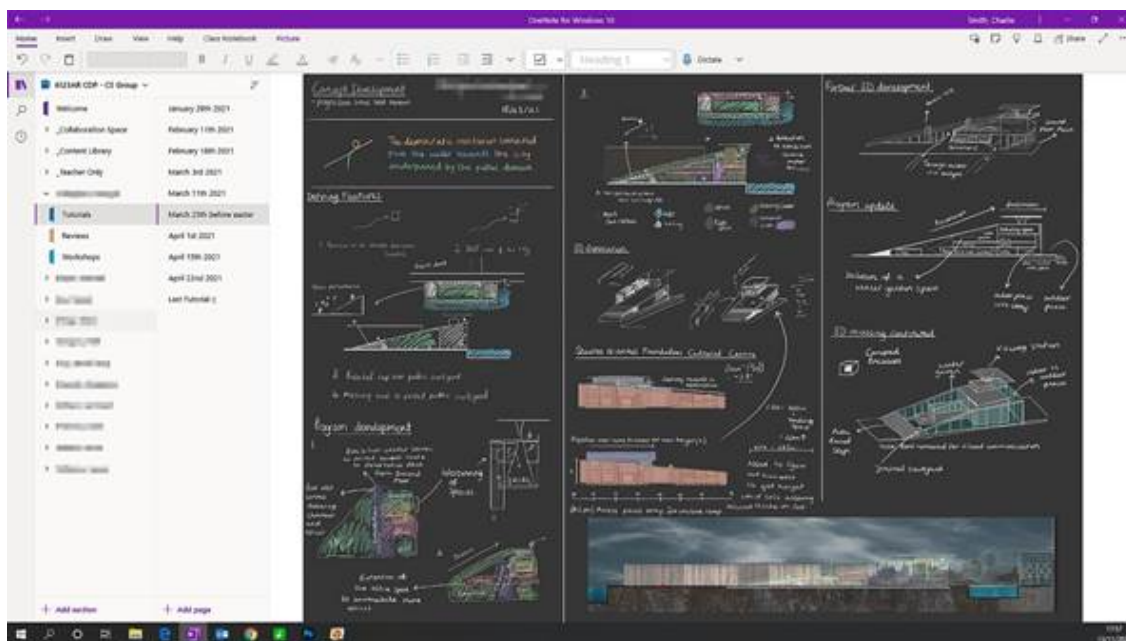
The potential impact of transitioning to a virtual space on dialogue and social context, which are fundamental elements of learning in creative disciplines, warrants exploration of how tutorials, design reviews and peer-to-peer interaction were sustained during the pandemic. A cross-programme approach to online tutorials was established in the Architecture subject area (Architecture, Interior Architecture and Urban Design) at Liverpool John Moores University (LJMU) during the lockdowns. At the onset of the first lockdown in March 2020, the BA programme leader conducted an appraisal of different video-conferencing applications and settled on Zoom, primarily because it was intuitive and easy to use. By the start of the 2020/21 academic year, Zoom was integrated into Canvas, the university's virtual learning environment (VLE), at an institutional level, which meant online teaching over Zoom could be scheduled and accessed through the VLE. Each design tutor created a Zoom meeting for their weekly tutorials with their group (typically 10 to 14 students). The students could attend for a whole day or half that time and see the work of their colleagues, as well as having their own half-hour formative discussion with their design tutor.

A Microsoft OneNote 'Class Notebook' was created for each tutorial group. As shown in Figure 1, these Class Notebooks had a different section for each student in the group, within which subsections were created, with tabs for 'tutorials', 'workshops' and 'design reviews'. Under each designated tab, a page was created for that week's teaching session. The Class Notebook enabled the tutor to access the work of all their students, but each student could only see their own work. Any material to be shared with all students in the tutorial group, such as a relevant precedent or site information, was uploaded to a shared section called the 'Collaboration Space'.

Each week students uploaded their formative work in the form of PDF drawings and JPEG photographs of models. The design tutor shared their screen during the Zoom session, illustrated in Figure 2 by the two screenshots taken during online tutorials. Using OneNote meant that the tutor could annotate and sketch over the students' work during the online tutorial, and at the end of each session the student maintained access to these annotated drawings and images as they continued working during self-directed study time. Additionally, the Class Notebook could be shared with other tutors, which meant students could use it to upload their work for design reviews, keeping all of their developmental work in one location online. Interestingly, in a study reflecting on the transition from physical to virtual studio during the pandemic, Komarżyńska-Świeściak et al. describe how students rated screen-sharing during remote tutorials highly, reporting that it enabled them to follow discussion about their peers' work more easily than in the physical studio, where only a small number of students can observe this process at close range and others may miss feedback salient to their own projects.²⁸

In a research study of architecture students' preferences in their feedback experience, they described wanting more visual feedback, in the form of tutors' sketches, diagrams, images and tutors marking up their drawings.²⁹ OneNote facilitated this very effectively, as students retained a collection of annotations and sketches from each tutorial and review. It could be speculated that in these screened and filtered conversations that took place online, the drawn component of formative feedback played a much more significant role. LJMU students made direct reference to the benefits of being able to use OneNote to refer back to sketches and ideas discussed in previous sessions. For the start of the 2020/21 academic year, each design tutor was provided with a Wacom Intuos S drawing tablet. This additional technology significantly enhanced the ease of sketching over and annotating students' work in the online teaching sessions during the second and third lockdowns.

Figure 1. Screenshot of OneNote 'Class Notebook', with a section for each student, subsections for different teaching formats and pages for each session (student names pixilated for anonymity) (Source: Author, 2022)



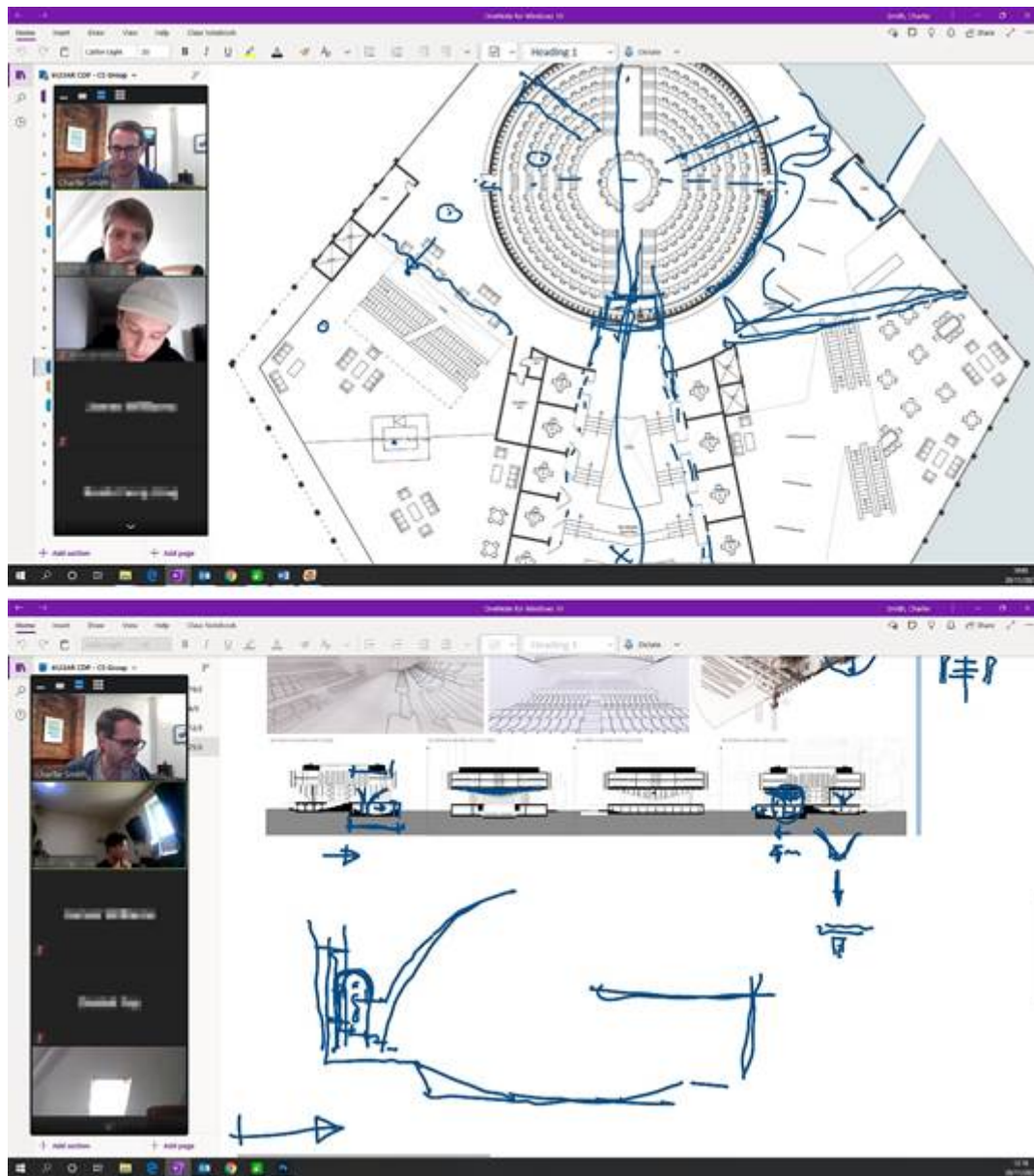
In contrast to these digital drawings, the BA Architecture programme leader at LJMU, Jamie Scott, experimented with techniques to encourage first-year students to engage with physical hand drawing during their design development work – a key skill at the start of the undergraduate course. Utilising two webcams simultaneously, in an arrangement illustrated in Figure 3, he used the 'screen share' option in Zoom to show the image captured by a webcam fixed to an Anglepoise stand set over his sketchbook, while maintaining a 'virtual face-to-face' conversation on Zoom using the laptop webcam for face capture. The direct nature of the webcam over his sketchbook enabled Scott to give a clear demonstration of physical sketching while discussing the students' project work. It reinforced some key principles at that level, where drawing by hand in journals and on drawing boards is strongly encouraged. Scott reported this was an engaging way to conduct tutorials, and that looking at physical paper gave his eyes a change from continuously focusing on a screen.³⁰ He described this configuration as particularly useful during technical discussions with third-year students, as it facilitated his sketching of construction details while also moving easily between online technical resources. In some ways he considered this a better medium than face-to-face teaching for this particular topic.³¹

Online design reviews

The design review, also known as a crit or jury, is a long-standing cornerstone of design pedagogy.³² In studio, its format as an exhibition of work on the wall, with each student standing before their

project to present it to a panel of tutors, guest critics and peers, contrasts significantly with that of a tutorial, where work is typically discussed at a table, often on a one-to-one basis. It is a distinctive event within studio culture, the nature of which provides impetus and motivation to students as they prepare for key milestones in the evolution of their design project. However, during the periods of remote teaching enforced by the pandemic, just like the virtual tutorials, design reviews at LJMU were conducted through Zoom sessions. Consequently, the format became almost indistinct from that of the tutorials themselves. The only differences were that another design tutor from the same cohort and a guest critic from professional practice were included in the Zoom session. Arguably, the gravity and significance of the event was substantially diminished, and a key aspect of studio pedagogy was therefore lost in the transition to online learning.

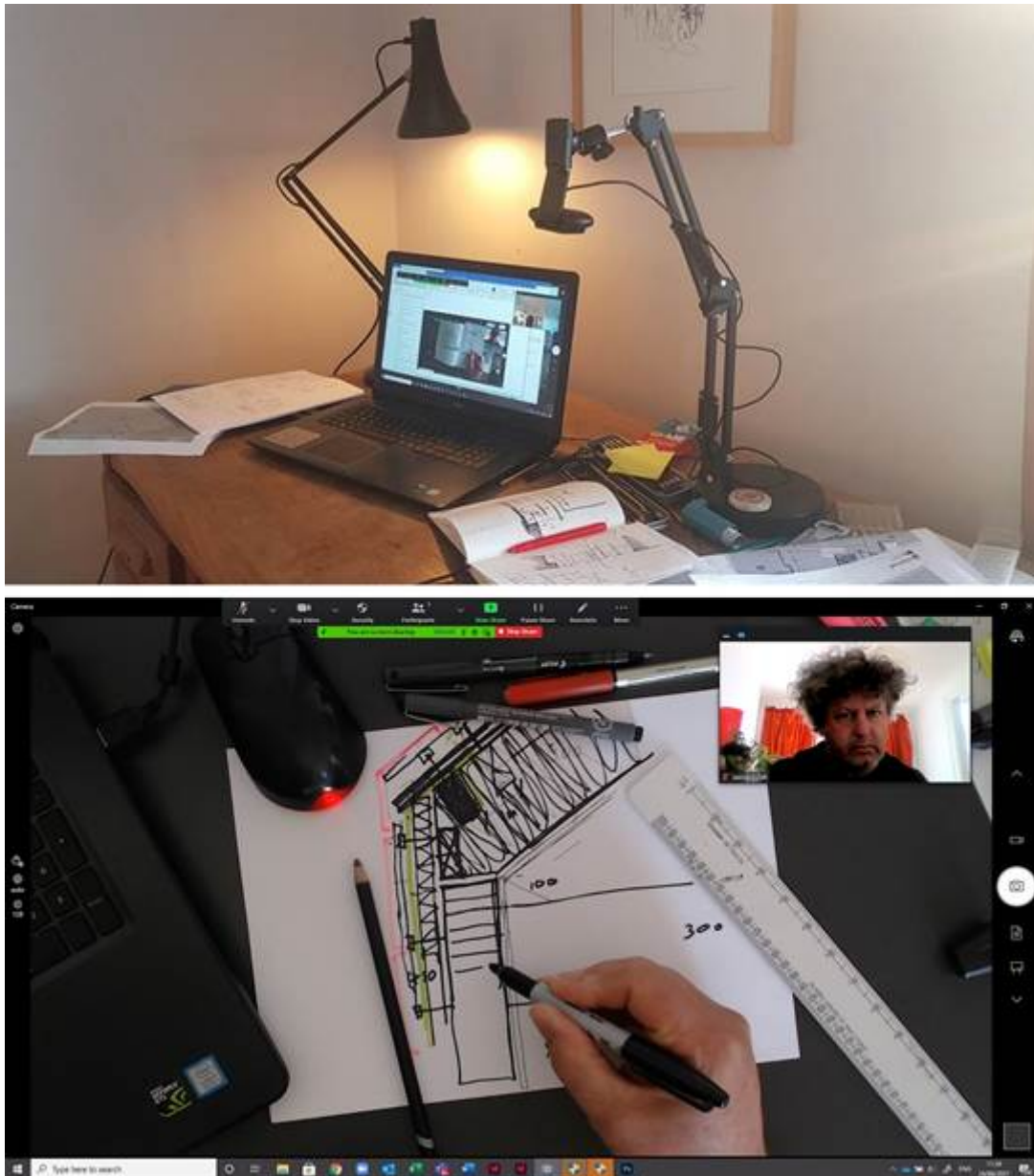
Figure 2. Screenshots of online tutorials, using OneNote to annotate students' formative work during the session (Source: Author, 2022)



Interestingly, in a study exploring architecture students' experiences of the virtual design studio in comparison with its physical counterpart, Iranmanesh and Onur reported online design reviews were

perceived by students as slightly better than their counterpart in the studio. The authors speculate that this may be because the students had more control over what was being presented, as opposed to having all their work on display, enabling them to focus on their project's strengths.³³ They also suggest that the hierarchical structure of virtual reviews was different from that which occurs in the physical studio, making it closer to becoming a student-oriented learning process, which may foster a sense of empowerment for the students.³⁴

Figure 3. Jamie Scott using two webcams to capture physical sketching and facial contact during online tutorials (Source: images courtesy of Jamie Scott)



Anecdotal feedback from LJMU students about virtual design reviews was mixed.³⁵ One described it as easier to see the work being presented, giving them confidence that their work was being shown in the clearest way, and feeling equally motivated afterwards as they had in physical reviews. Another cited the financial benefit of not having to print their work for presentation in studio. Others, however, described difficulty in effectively presenting their work online, due to the disruptive process of scrolling. They

felt that it lacked the visual impact and cross-referencing of a physical exhibition. One highlighted the lack of evidence of process that physical sketchbooks provide, and described feedback as less personal and lacking in quality compared with that received in studio. Echoing the findings of Iranmanesh and Onur, several students considered online reviews more informal, and the dialogic interaction more of a conversation with the reviewers, and consequently they were more relaxed and found the experience less intense than studio reviews. Because of this, however, they lacked the symbolic weight of a physical review, which is a significant source of motivation to advance their work. Several suggested that, while this benefited less confident students, it may have hindered the development of essential skills, experience and confidence in presenting physically and before an audience.

The social context of teaching and learning online

Exploring the social context of learning helps us to understand the interactions that occur when teaching online. In turn, this will facilitate reflection on the impact of virtual learning on the central elements of socio-constructivist pedagogy, where interaction and dialogue are key features of how learning is co-constructed. Amineh and Asl posit that socio-constructivism suggests knowledge is first constructed in a social context and is then internalised by individuals: 'the process of sharing individual perspectives ... results in learners constructing understanding together and this construction cannot be possible alone within individuals'.³⁶ McClean and Hourigan found that socially based interaction between students makes a central contribution to the overall quality of learning based in the physical studio, and is both complementary to, but quite distinct from, learning derived through interaction with tutors.³⁷

When comparing architecture students' experiences of the virtual studio with its physical counterpart, Iranmanesh and Onur found that while students reported an increase in conducting self-directed research and acquiring new skills, there was a significant decline of informal peer learning among students.³⁸ They also found that the majority of students did not consider virtual tutorials an adequate substitute for face-to-face interaction with their tutor, the absence of which made their design studio experience much worse.³⁹ Kaur and Bhatt suggest that disciplinary differences in pedagogy may impact on the appropriateness of virtual learning in different contexts; they posit that programmes that use extensive lecture delivery may benefit through students being able to revisit recorded sessions, but that creative disciplines are much more challenging to transfer online because of the difficulty in creating the back-and-forth discourse and interaction between tutor and student that is inherent to the pedagogic approach.⁴⁰

Rodríguez-Ardura and Meseguer-Artola describe how, in the context of e-learning environments, a sense of 'presence' is thought to accompany constructive understanding; this manifests in the awareness of belonging to a learning community, the relationships built within the virtual environment and in the appreciation, generation and exchange of knowledge in collaborative ways.⁴¹ In the context of a collaborative constructivist learning approach, Garrison defines social presence as 'the ability of participants to identify with the group or course of study, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities'.⁴² When researching factors that influence online communication, Dow found that effective dialogue was the most important factor affecting the social presence of students online.⁴³ The salient issue here is that when a dialogic, socio-constructivist learning approach translates to a virtual space, each student's learning experience may be impacted by the extent of their development of a sense of presence within that social context.

Reflections on the online design learning process

With the most disruptive impacts of the pandemic hopefully in the rear-view mirror, this is a timely moment to look back on the experiences of remote teaching during the various lockdowns. Reflecting on teaching design online at LJMU, Scott suggests that the dialogic teaching afforded via webcams and screens was diminished compared to that which occurs within the shared social space of the design studio.⁴⁴ Furthermore, based on his experience, the enforced move to online delivery widened academic achievement between learners from different social backgrounds and led to a significant attainment gap.⁴⁵ A study of engagement in an online learning environment by Robbins et al. found the level of student activity and a more dynamic online learning space had a strong correlation with retention.⁴⁶

Similarly, Roberts identifies a significant correlation between students who did not progress in their studies and lower perceptions of being socially connected with others, especially other students.⁴⁷ Kaur and Bhatt suggest that virtual learning may hamper academically weaker students in particular, as it constrains the opportunity to quickly seek guidance from tutors and peers in comparison to the more frequent personalised attention they might have received in a physical learning space.⁴⁸ Scott suggests that in cases where students' remote learning environment compromises their opportunity and ability to work effectively, the availability of the different physical setting of the university campus is crucial to their progression.⁴⁹ In a survey of students' experiences of virtual architectural education during the pandemic, Asadpour found that almost two-thirds of respondents rated their tutor's ability to convey feedback poorly, and a similar proportion considered that they themselves had insufficient ability to articulate their own design ideas in the virtual studio.⁵⁰ This suggests implications for a pedagogy where effective dialogue is central to the co-construction of learning.

Student satisfaction during online learning

Although it is difficult to identify specific issues due to the generalised nature of student surveys, they can be used to make some overarching observations. The National Student Survey is a nationwide survey that all students in the final year of their undergraduate degree at UK universities are asked to complete. The 'Overall Satisfaction' score for the undergraduate Architecture programme at LJMU decreased considerably in 2021; it was down over 20 per cent from the pre-COVID cohort who completed the survey in 2019. In stark contrast, in the Postgraduate Taught Experience Survey, the equivalent survey for postgraduate students at UK universities, the 'Overall Satisfaction' score in 2021 was down only 2 per cent from the pre-COVID cohort who completed the survey in 2019. One interpretation of this significant difference in the decrease in student satisfaction between those learning remotely during the pandemic and the pre-COVID survey results is that the postgraduate students adapted better to the virtual learning process, possibly as a consequence of being more independent learners by that stage of their studies. Kaur and Bhatt highlight that the fluid nature of virtual learning transfers a substantial amount of responsibility to students for planning and monitoring their studies and curriculum content, placing tutors in the role of facilitator and guide.⁵¹ In their study of the transition to virtual design studios during the pandemic, Komarżyńska-Świeściak, Adams and Thomas highlight a striking outcome of their student survey: offered the choice, the vast majority of students would prefer blended design studios as the dominant model in future architectural education, combining the benefit of physical and virtual teaching, even over fully physical studio provision.⁵² However, it is worth noting that just under two-thirds of the respondents to their survey were studying on a Master's programme,⁵³ which may align with the difference in overall satisfaction described above, where postgraduate students' satisfaction decreased much less than that of undergraduates.

In a study of how the transition to online learning during the pandemic affected student satisfaction, Nair, Krishna and Nair found that faculty interaction and student interaction were the most significant factors. In relation to the latter, being able to share information, discuss ideas and collaborate with other students were the most consequential parameters affecting satisfaction.⁵⁴ A strategy used to nurture informal interactions in the Architecture programmes at LJMU was to create breakout rooms in the weekly Zoom tutorials. The idea was that, during the tutorial day, students could observe their colleagues' tutorials or they could move into the breakroom for a more informal discussion among themselves, just as they might do in studio. This strategy had mixed results. Some students utilised this opportunity for an informal meeting among themselves, but in other tutorials the students stayed to watch their colleagues' work being discussed and the breakout rooms stood empty for the duration of the session. Anecdotal discussion with students revealed that some were setting up their own online meetings outside of tutorial days, which might explain the redundancy of the breakrooms during Zoom tutorials, as the students preferred to hear the insights in the feedback given to their colleagues.

Challenges posed in online learning spaces

The sudden pivot to online learning posed numerous challenges for students and tutors alike. For many, in addition to grappling with an unfamiliar learning environment and the sudden adoption of new applications and methods, online learning spaces present their own particular challenges. Xie et al. introduce the concept of 'conflictual presence' in virtual learning environments, which they argue

is as inherent as social presence; they caution that, while appearing small, subtle and unpredictable, conflictual interactions have the potential for a far-reaching impact on class culture and undermining students' learning.⁵⁵ A study by Phirangee and Malec found that each participant experienced feeling 'othered' during online learning by their peers or tutor – sometimes both – which resulted in feelings of disconnection, isolation and lack of community, and this led to a breakdown in their ability to benefit from shared meanings and understandings.⁵⁶

This highlights the complex and potentially delicate nature of the virtual learning space. It has significant implications for socio-constructivist pedagogy, where discursive interactions play a multitude of roles in co-construction, including identity and learning. Furthermore, as discussed above, the shift from physical to online learning spaces can also affect both hierarchies and roles within the learning environment, moving power and responsibility towards the students. The implication is that tutors need to give substantial consideration to the nature of the virtual learning spaces they create, the dynamics of the dialogic interaction that takes place within them and the impact this can have on student learning.

Opportunities and inhibitions during online learning

Online teaching at LJMU during the pandemic facilitated some notable opportunities that otherwise would not have occurred. For example, international guest lectures were easily arranged, significantly broadening the scope of students' learning. This is echoed in a study by Komarżyńska-Świeściak et al., where students responding to their survey recognised the positive impact on their design knowledge of online meetings with international architects, the organisation of which was simplified through the virtual studio.⁵⁷ While building visits were largely curtailed during lockdowns, LJMU dissertation students' primary research through interviews was easily facilitated. Furthermore, utilising Zoom meant this was able to be extended to include international architects, with whom the students would previously have been unlikely to meet. Another enhancement was that precedent projects could be readily accessed during tutorials and design reviews, and discussed with students in depth. Rather than just referring a student to an exemplar project they might look at, photographs and drawings could be searched for online, shared on screen and the tutor could discuss particular aspects of the project that were especially salient to the student's work, creating a more informed study than the student might have achieved by seeking out the precedent themselves after their tutorial. Furthermore, tutors could draw and annotate over the precedents, screenshot them and upload them to the student's OneNote page, or the Collaboration Space if the precedents were pertinent across the whole tutorial group. This is similar to the advantage Scott highlighted above – of moving easily between online resources and students' work during technical discussions.

However, the virtual space significantly inhibited other aspects of learning. For example, even though model-making kits were distributed to students during the third lockdown (which lasted from January 2021 until the end of the academic year), relatively few students produced physical models either during their design development or for their final submissions. This is echoed in a study by Asadpour, where the perceived importance and desire to develop physical models during the design process decreased in almost two-thirds of students.⁵⁸ At LJMU, those who did make models seemed to benefit from the process, but the inability to interact with them in the way that would have been possible in the studio was frustrating for tutors. In a physical studio, both discussing drawings, and especially physical models, has a kinaesthetic dimension to it that was all but impossible to replicate in a virtual space.

Post-COVID lessons for dialogic learning in creative disciplines

For academic delivery from the start of the 2021/22 academic year, like many higher education institutions, LJMU adopted an active blended learning (ABL) strategy. This institutional approach encouraged programme teams to timetable approximately 20 per cent of contact hours as structured online activities. The ABL strategy suggested allocating the blended delivery to programme rather than module level, so that online learning could be focused where it would be most effective. It was left to the discretion of programme teams as to how this would be implemented. Following discussion between staff across the Architecture subject area, it was decided to focus face-to-face contact on studio teaching; this includes project introductions, studio workshops, tutorials and design reviews. Lectures

are being delivered remotely, with a live Zoom session taking place at the allocated slot in the timetable and a recording of the lecture uploaded to the VLE. This approach aligns with the findings of Ibrahim et al., where the majority of faculty staff perceived online teaching of history and theory courses to be as effective and reliable as teaching in class, whereas the majority considered teaching design online to be ineffective compared with physical studios.⁵⁹

Lessons for return to the physical studio

On their return to the design studio at the start of the 2021/22 academic year, some students had very little experience of studio culture. The period between then and the first lockdown in March 2020 equates to almost half of some students' undergraduate education. They are acclimatising to a distinctive learning context, one that has explicit and tacit rituals and routines, of which they have minimal or highly disjointed experience. However, this return from an extended suspension of the physical studio also presents opportunities to reflect on and adapt its culture and practices. Should students be specifically supported through their (re-)enculturation into this learning context and the socio-constructivist practices that take place within it? For example, whereas students may previously have been used to working alongside their peers and discussing ideas with each other, these peer-to-peer interactions are a novel experience. McClean and Hourigan found that these informal and socially based conversations between students constitute an important aspect of studio learning processes, which include exposure to different perspectives and approaches, discussion of process and objectives, mutual support and benchmarking of progress.⁶⁰ Initiating an informal programme of student peer reviews is one means to facilitate these dialogic interactions currently being considered at LJMU.⁶¹ They could run concurrently alongside one-to-one tutorials, with students presenting their work to each other when not discussing it with their tutor. The broader learning outcomes achieved through peer review are well established, and include developing critical analysis and communication skills.⁶² This would add a significant additional strand of dialogic interaction to the repertoire of socio-constructivist studio learning methods.

In architectural education it can be a challenge to facilitate the crossover between learning that occurs in modules predominantly taught through lectures, such as history and theory but especially technology and practice, and design project work taking place in the studio.⁶³ Before the pandemic, these subjects were mostly taught in different physical environments, which arguably impacted on the transfer of learning between the two. At LJMU, now that studio-oriented learning in design modules takes place as a face-to-face activity, whereas learning in other modules takes place remotely through online lectures, will this isolation of knowledge developed in different contexts be exacerbated, especially as engagement with online lectures can be sporadic? Several years ago in the LJMU undergraduate Architecture programme, studio workshops were introduced as a strategy to facilitate crossover between technical subjects and design projects. These sessions each focus on exploring a specific topic, such as environmental strategies or structural models, where students apply their knowledge from technical lectures to their design coursework. Arguably, the role of these workshops will now take on increased significance, as the means through which knowledge developed in virtual lectures is applied to learning in the physical studio.

The design review is a signature pedagogic method within architectural education.⁶⁴ Yet it is one that has faced significant criticism,⁶⁵ including the objectification of the power differential between students and tutors⁶⁶ in an adversarial environment.⁶⁷ Iranmanesh and Onur suggest the hierarchical structure of virtual reviews is different from those in the physical studio and might foster a more significant sense of student empowerment.⁶⁸ Returning to studio after the prolonged hiatus created by the pandemic provides an opportunity to rethink the format of this signature element of creative education. Students in their second year of undergraduate study have never engaged with the design review in its traditional guise, and final year students have not done so for 18 months. Their (re-)enculturation into this feedback ritual could be harnessed to introduce new formats and alternative approaches. Webster questions whether a pedagogy insistent on the reproduction of this traditional paradigm can be equated with student-centred learning.⁶⁹ In addition to more widespread use of peer review, discussed above, she proposes the introduction of new rituals that nurture a more supportive, collaborative and dialogic learning environment, such as enhanced tutorials with consultants and practitioners, and student self-evaluation that deters students from adopting the surface tactics sometimes seen in design reviews while encouraging them to present their authentic selves.⁷⁰

Anecdotal observation of design reviews in studio at LJMU during the first semester of the 2021/22 academic year suggests that students who attend them are still adept at presenting their work. Notably, more are doing so digitally, via large-format screens, than before the pandemic, with their online reviews happening via Zoom. In part this may be due to saving the cost of physical printing, but it may also reflect students adopting the practices used to present their work during the extended periods of remote teaching. Another, arguably more disconcerting, trend is that a larger proportion of undergraduate students are not attending their design reviews than before the pandemic. The reason behind this is not known. However, one possibility is that students are unfamiliar with presenting their work in person within the studio environment, before a face-to-face audience of critics and peers, and are opting not to engage with it. Tutors were conscious that progressing students lacked this experience and emphasised that the process would be supportive to reflect this. This may, however, have been insufficient to overcome their reticence. Should this continue, adopting the methods described above to facilitate more supportive and collaborative learning in reviews would seem very apt.

The lack of physical model making during remote learning is also being addressed. With students now back on campus there is a concerted drive across the undergraduate and postgraduate programmes to encourage physical models throughout the design process. All students have been offered induction or refresher sessions for workshops and fabrication spaces, tutors have shown exemplar models at project introductions and discussed the significance of physical models in design development, and assessment criteria make direct reference to physical models for summative submissions. However, coming towards the end of the first semester, there is still a reluctance among students to engage with model making, suggesting that a more sustained effort to nurture this process is required next term. Tutors have also realised that final year students' computer-aided design (CAD) skills are below those of pre-pandemic cohorts. As a result, an additional series of CAD 'boot-camps' and 'drop-in clinics' have been introduced at the start of the second semester to address this.

Lessons for socio-constructive learning spaces

In terms of lessons for creating supportive socio-constructivist virtual learning spaces, Phirangee and Malec identify the importance of establishing social presence to help foster a stronger sense of community among students and alleviate feelings of isolation and alienation. They also highlight the need for tutors to focus on the social aspects of learning to encourage student interactions and discussion, and to introduce strategies that counter feelings of disconnection.⁷¹ In a study of online teaching during the pandemic, Alvarez recognises students' need for affective support and suggests that tutors should let their students feel what he describes as their 'socio-emotional presence' in a 'pedagogy of compassion', characterised by collaborative understanding and support.⁷² When questioning students about which strategies used during the pandemic they would like to see retained afterwards, Basford identifies the theme of empathetic teaching practices, where students feel connected with each other and tutors are willing to show their vulnerability when seeking suggestions over how to improve teaching.⁷³

The positive learning experiences that virtual spaces facilitated, such as international guest lectures and research interviews, and enhancing access to digital resources during tutorials, should be nurtured to further their contribution to the richness and diversity of students' pedagogic encounters. Using technology more effectively and finding flexible ways to connect students with those in the outside world are two of the means through which Aras proposes that the liberation of learning from the studio environment facilitated by the pandemic is maintained after the return to its physical space.⁷⁴ Given that the vast majority of their respondents suggested a preference for blended studio for their future architectural education, Komarzyńska-Świeściak et al. propose that the tools and methods of physical and virtual learning evolve in conjunction with each other to offer more sources of knowledge and skills, and widen the community engaged with the design studio.⁷⁵

Recognising that barriers to online design education relate to interaction and the social environment, Wragg proposes that when translating design education to an online environment 'the social aspect of the studio cannot be left to evolve by chance, but requires the engineering of a social environment conducive to experiential learning'.⁷⁶ This could be seen as nurturing students' social presence. She describes how, in the development of an online design programme, a key priority was to create social activities at the beginning of teaching sessions, designed to engage students and stimulate reflective conversations to establish a community of practice and sense of belonging, and that

encouraging students' engagement during the first weeks was critical in establishing expectations for online behaviour.⁷⁷ In a study of group work in an online environment, Jaber and Kennedy highlight the importance of social interaction between students, who relate it to emotional support as well as learning. Their findings point towards the incorporation of learning experiences that provide for both spontaneous behaviours and informal interactions, which are more associated with building trust between participants, such as requiring students to switch on their cameras during synchronous sessions, even if only for a short time.⁷⁸ Crucially, however, given the significance of nurturing students back into the physical studio highlighted above, such approaches are not limited to virtual teaching spaces.

Conclusions

For Vygotsky, learning is a profoundly social process, one in which dialogue plays a crucial role.⁷⁹ This raises the question of whether socio-constructivist pedagogy can function effectively in virtual spaces where the dynamics of interaction are different. Both the experiences at LJMU of teaching architecture remotely during the pandemic and evidence in the research literature have shown that, for design teaching, the social context can prove challenging to recreate in an online environment. One reason for this is the rich mixture of types of dialogue that occur in studio between different participants, including one-to-one tutorials, group discussions, design reviews and informal peer-to-peer exchanges. When these transitioned to a virtual context, they reverted to a single format. On reflection it would seem that, like the conversations themselves, learning was rendered filtered and lacking in nuance, variety and depth.

Orr and Shreeve identify dialogue as the glue that holds the art and design learning environment together and enables students to practise the critical language of their discipline.⁸⁰ For institutions that have opted to retain elements of virtual teaching alongside face-to-face teaching, this article highlights that there are significant implications for design disciplines, where socio-constructivist learning predominates. In a pedagogy where discourse between students, tutors and peers forms such a central role, caution must be exercised when the format of those interactions changes. Concurrently, the unique opportunities that virtual learning have facilitated must be harnessed, to enrich the student learning experience.

The social context exerts significant influence over the nature of interaction and dialogue between participants. Students should be supported in developing their social presence, in both physical and virtual learning spaces, and an environment conducive to interaction and experiential learning must be carefully constructed.⁸¹ Their sense of belonging within a community of practice, whether in a physical place or virtual space, requires especially careful nurturing. When considering design pedagogy in the post-COVID era from the perspective of socio-constructivism, where discursive interactions, negotiation and collaboration play myriad roles in the co-construction of identity and learning, teaching strategies should foster the numerous dialogic processes that characterise design education, in a manner that is compassionate and that facilitates trust and encourages students to present their authentic selves.

Notes

¹ Palincsar, 'Social constructivist perspectives', 361 and 365.

² Teo, 'Teaching for the 21st century', 170.

³ Wells, 'Dialogic learning', 62.

⁴ Vygotsky, *Mind in Society*, 131.

⁵ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 2.

⁶ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 3.

⁷ Vygotsky, *Mind in Society*, 27 and 32.

⁸ Vygotsky, *Mind in Society*, 57 and 88.

⁹ Amineh and Asl, 'Review of constructivism and social constructivism', 14–15.

¹⁰ Orr and Shreeve, *Art and Design Pedagogy*, 45 and 82.

¹¹ Webster, 'Architectural education after Schön', 69–70.

¹² Schön, *The Reflective Practitioner*.

¹³ Mewburn, 'Lost in translation', 377–8.

- ¹⁴ Askew and Lodge, 'Gifts, ping-pong and loops', 13; Wragg, 'Online communication design education', 2289.
- ¹⁵ Austerlitz and Aravot, 'The emotional structure of the student–tutor relationship', 95 and 102.
- ¹⁶ Yoon and Leem, 'The influence of social presence', 1.
- ¹⁷ Yoon and Leem, 'The influence of social presence', 1.
- ¹⁸ Komarzyńska-Świeściak et al., 'Transition from physical design studio', 14.
- ¹⁹ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 14.
- ²⁰ Amineh and Asl, 'Review of constructivism and social constructivism', 14.
- ²¹ Argyle et al., 'The communication of inferior and superior attitudes', 230.
- ²² Riva et al., 'Surviving COVID-19', 80.
- ²³ Yoon and Leem, 'The influence of social presence', 3.
- ²⁴ Riva et al., 'Surviving COVID-19', 83.
- ²⁵ Riva et al., 'Surviving COVID-19', 80.
- ²⁶ Riva et al., 'Surviving COVID-19', 80–1.
- ²⁷ Liverpool John Moores University, 'Blog post: Zoom'.
- ²⁸ Komarzyńska-Świeściak et al., 'Transition from physical design studio', 14.
- ²⁹ Smith, 'How does the medium affect the message?', 46.
- ³⁰ Scott, personal communication, 9 February 2021.
- ³¹ Scott, personal communication, 24 April 2021.
- ³² Salama, *Spatial Design Education*, 92–4; Anthony, *Design Juries on Trial*.
- ³³ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 10–11.
- ³⁴ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 11 and 14.
- ³⁵ LJMU Architecture students, various personal communications, March and April 2021.
- ³⁶ Amineh and Asl, 'Review of constructivism and social constructivism', 14.
- ³⁷ McClean and Hourigan, 'Critical dialogue in architecture studio', 51.
- ³⁸ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 11 and 13.
- ³⁹ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 6.
- ⁴⁰ Kaur and Bhatt, 'The face of education', 41.
- ⁴¹ Rodríguez-Ardura and Meseguer-Artola, 'What leads people to keep on e-learning?', 1039.
- ⁴² Garrison, 'Article review', 252; cited in Jaber and Kennedy, "'Not the same person anymore'", 218.
- ⁴³ Dow, 'Implications of social presence for online learning', 238.
- ⁴⁴ Scott, personal communication, 25 March 2021.
- ⁴⁵ Scott, personal communication, 24 April 2021.
- ⁴⁶ Robbins et al., 'Online communication', 152 and 156.
- ⁴⁷ Roberts, 'Student satisfaction and persistence', 99–100.
- ⁴⁸ Kaur and Bhatt, 'The face of education', 44.
- ⁴⁹ Scott, personal communication, 24 April 2021.
- ⁵⁰ Asadpour, 'Student challenges', 518–19.
- ⁵¹ Kaur and Bhatt, 'The face of education', 41–2.
- ⁵² Komarzyńska-Świeściak et al., 'Transition from physical design studio', 15.
- ⁵³ Komarzyńska-Świeściak et al., 'Transition from physical design studio', 8.
- ⁵⁴ Nair et al., 'Analysis of student satisfaction', 572.
- ⁵⁵ Xie et al., 'The interactions between facilitator identity', 230 and 233.
- ⁵⁶ Phirangee and Malec, 'Othering in online learning', 163, 165 and 169.
- ⁵⁷ Komarzyńska-Świeściak et al., 'Transition from physical design studio', 17.
- ⁵⁸ Asadpour, 'Student challenges', 521.
- ⁵⁹ Ibrahim, et al., 'Evaluation of the online teaching', 2348–51.
- ⁶⁰ McClean and Hourigan, 'Critical dialogue in architecture studio', 41–3.
- ⁶¹ Smith, 'When students become critics', 71–92.
- ⁶² Lladó et al., 'Student perceptions of peer assessment', 593; Mulder et al., 'How does student peer review influence perceptions?', 663; Vickerman, 'Student perspectives', 222–3.
- ⁶³ Banerjee and de Graaff, 'Problem-based learning in architecture', 185; Levy, 'Total studio', 29.
- ⁶⁴ Carless et al., 'Disciplinary perspectives', 3; Webster, 'The analytics of power', 21; Orr and Shreeve, *Art and Design Pedagogy*, 88–90.
- ⁶⁵ Olweny, 'Students' views of the architectural design review', 378–9.
- ⁶⁶ Osborne and Crowther, 'Butterpaper, sweat and tears', 237–8; Webster, 'The analytics of power', 24.

- ⁶⁷ Smith, 'Understanding students' views', 51–2.
- ⁶⁸ Iranmanesh and Onur, 'Mandatory virtual design studio for all', 11 and 14.
- ⁶⁹ Webster, 'The architectural review', 280.
- ⁷⁰ Webster, 'The analytics of power', 26.
- ⁷¹ Phirangee and Malec, 'Othering in online learning', 169–70.
- ⁷² Alvarez, 'The phenomenon of learning', 150.
- ⁷³ Basford, "'COVID keepers'", 2–5.
- ⁷⁴ Aras, 'Liberating design education', 3.
- ⁷⁵ Komarzyńska-Świeściak et al., 'Transition from physical design studio', 17.
- ⁷⁶ Wragg, 'Online communication design education', 2291.
- ⁷⁷ Wragg, 'Online communication design education', 2291–2.
- ⁷⁸ Jaber and Kennedy, "'Not the same person anymore'", 226–7.
- ⁷⁹ Vygotsky, *Mind in Society*, 131.
- ⁸⁰ Orr and Shreeve, *Art and Design Pedagogy*, 82.
- ⁸¹ Hargis, 'What is effective online teaching?', 3.

Acknowledgements

The author thanks Jamie Scott for permission to reproduce the images in Figure 3 and comments made in personal communications. Thanks also to the students who gave permission for tutorials to be screenshot and provided their opinions about online learning at LJMU during the pandemic.

Declarations and conflicts of interest

Research ethics statement

Not applicable to this article.

Consent for publication statement

The author declares that research participants' informed consent to publication of findings – including photos, videos and any personal or identifiable information – was secured prior to publication.

Conflicts of interest statement

The author declares no conflicts of interest with this work. All efforts to sufficiently anonymise the author during peer review of this article have been made. The author declares no further conflicts with this article.

References

- Alvarez, Abel V., Jr. 'The phenomenon of learning at a distance through emergency remote teaching amidst the pandemic crisis'. *Asian Journal of Distance Education* 15, no. 1 (2020): 144–53. [CrossRef]
- Amineh, Roya Jafari, and Hanieh Davatgari Asl. 'Review of constructivism and social constructivism'. *Journal of Social Sciences, Literature and Languages* 1, no. 1 (2015): 9–16. Accessed 16 March 2021. [http://blue-ap.org/j/List/4/iss/volume%201%20\(2015\)/issue%2001/2.pdf](http://blue-ap.org/j/List/4/iss/volume%201%20(2015)/issue%2001/2.pdf).
- Anthony, Kathryn H. *Design Juries on Trial: The renaissance of the design studio*. New York: Van Nostrand Reinhold, 1991.
- Aras, Lerzan. 'Liberating design education after corona days'. *Academia Letters* 670 (2021): 1–5. [CrossRef]
- Argyle, Michael, Veronica Salter, Hilary Nicholson, Marilyn Williams, and Philip Burgess. 'The communication of inferior and superior attitudes by verbal and non-verbal signals'. *British Journal of Social and Clinical Psychology* 9 (1970): 222–31. [CrossRef]
- Asadpour, Ali. 'Student challenges in online architectural design courses in Iran during the COVID-19 pandemic'. *E-Learning and Digital Media* 18, no. 6 (2021): 511–29. [CrossRef]

- Askew, Susan, and Caroline Lodge. 'Gifts, ping-pong and loops: Linking feedback and learning'. In *Feedback for Learning*, edited by Susan Askew, 1–17. London: Routledge Falmer, 2000.
- Austerlitz, Noam, and Iris Aravot. 'The emotional structure of the student–tutor relationship in the design studio.' In *Enhancing Curricula: Contributing to the future, meeting the challenges of the 21st century in the disciplines of Art, Design and Communication*, edited by Allan Davies, 91–106, London: Centre for Learning and Teaching in Art and Design, 2006.
- Banerjee, H.K., and Erik de Graaff. 'Problem-based learning in architecture: problems of integration of technical disciplines'. *European Journal of Engineering Education* 212, no. 2 (1996): 185–95. [CrossRef]
- Basford, Letitia. "'COVID keepers": The teaching strategies we should hold onto after the pandemic ends'. *Academia Letters Article* 2332 (2021): 1–5. [CrossRef]
- Carless, David, Jessica To, Connie Kwan, and Jonathan Kwok. 'Disciplinary perspectives on feedback processes: Towards signature feedback practices'. *Teaching in Higher Education* (2020): 1–15. [CrossRef]
- Dow, Mirah J. 'Implications of social presence for online learning: A case study of MLS students'. *Journal of Education for Library and Information Science* 49, no. 4 (2008): 231–42.
- Garrison, D. Randy. 'Article review: Social presence within the community of inquiry framework'. *The International Review of Research in Open and Distributed Learning* 13, no. 1 (2012): 250–3. [CrossRef]
- Hargis, Jace. 'What is effective online teaching and learning in higher education?'. *Academia Letters* 13 (2020): 1–6. [CrossRef]
- Ibrahim, Anwar F., Ahmed S. Attia, Asma' M. Bataineh, and Hikmat H. Ali. 'Evaluation of the online teaching of architectural design and basic design courses case study: College of Architecture at JUST, Jordan'. *Ain Shams Engineering Journal* 12, no. 2 (2021): 2345–53. [CrossRef]
- Iranmanesh, Aminreza, and Zeynep Onur. 'Mandatory virtual design studio for all: Exploring the transformations of architectural education amidst the global pandemic'. *The International Journal of Art and Design Education* (2021): 1–17. [CrossRef]
- Jaber, Rowaida, and Eileen Kennedy. "'Not the same person anymore": Groupwork, identity and social learning online'. *Distance Education* 38, no. 2 (2017): 216–29. [CrossRef]
- Kaur, Naginder, and Manroshan Singh Bhatt. 'The face of education and the faceless teacher post COVID-19'. *Journal of Humanities and Social Sciences Research* 2 (2020): 39–48. [CrossRef]
- Komarzyńska-Świeściak, Elżbieta, Britt Adams, and Laura Thomas. 'Transition from physical design studio to emergency virtual design studio. Available teaching and learning methods and tools – A case study'. *Buildings* 11, no. 7 (2021): 1–20.
- Levy, Alan. 'Total studio'. *Journal of Architectural Education* 34, no. 2 (1980): 29–32. [CrossRef]
- Liverpool John Moores University. 'Blog post: Zoom, why webcams are important (staff)'. Posted 13 November 2020. Accessed 19 February 2021. <https://ltech.ljmu.ac.uk/?p=10615>.
- LJMU Architecture students. Personal communications. March and April 2021.
- Lladó, Anna Planas, Lúdia Feliu Soley, Rosa Maria Fraguell Sansbelló, Gerard Arbat Pujolras, Joan Pujol Planella, Núria Roura-Pascual, Joan Josep Suñol Martínez, and Lino Montoro Moreno. 'Student perceptions of peer assessment: An interdisciplinary study'. *Assessment and Evaluation in Higher Education* 39, no. 5 (2014): 592–610.
- McClellan, David, and Neasa Hourigan. 'Critical dialogue in architecture studio: peer interaction and feedback'. *Journal for Education in the Built Environment* 8, no. 1 (2013): 35–57. [CrossRef]
- Mewburn, Inger. 'Lost in translation: Reconsidering reflective practice and design studio pedagogy'. *Arts and Humanities in Higher Education* 11, no. 4 (2012): 363–79. [CrossRef]
- Mulder, Raoul, Chi Baik, Ryan Naylor, and Jon Pearce. 'How does student peer review influence perceptions, engagement and academic outcomes? A case study'. *Assessment and Evaluation in Higher Education* 39, no. 6 (2014): 657–77. [CrossRef]
- Nair, Anish, Radeep Krishna, and Radhakrishnan Nair. 'Analysis of student satisfaction in the current online teaching scenario'. *Journal of Engineering Education Transformations* 34 (2021): 566–73. [CrossRef]
- Olweny, Mark R. O. 'Students' views of the architectural design review: The design crit in East Africa'. *Arts and Humanities in Higher Education* 19, no. 4 (2020): 377–96. [CrossRef]
- Orr, Susan, and Alison Shreeve. *Art and Design Pedagogy in Higher Education: Knowledge, values and ambiguity in the creative curriculum*. Abingdon: Routledge, 2018.
- Osborne, Lindy, and Philip Crowther. 'Butterpaper, sweat and tears: The affective dimension of engaging students during the architectural critique'. In *Proceedings of the 2011 International Conference of*

- the *Association of Architecture Schools of Australasia*, edited by L. Xu, H. Elkadi and J. Coulson, 235–45. Victoria: Deakin University, 2011. Accessed 19 May 2020. <https://eprints.qut.edu.au/46003/>.
- Palincsar, A. Sullivan. 'Social constructivist perspectives on teaching and learning'. *Annual Review of Psychology* 49 (1998): 345–75. [CrossRef]
- Phirangee, Krystle, and Alesia Malec. 'Othering in online learning: An examination of social presence, identity, and sense of community'. *Distance Education* 38, no. 2 (2017): 160–72. [CrossRef]
- Riva, Giuseppe, Brenda K. Wiederhold, and Fabrizia Mantovani. 'Surviving COVID-19: The neuroscience of smart working and distance learning'. *Cyberpsychology, Behavior, and Social Networking* 24, no. 2 (2021): 79–85. [CrossRef]
- Robbins, Jackie, Aleksandra Malicka, Laia Canals, and Christine Appel. 'Online communication in a higher education EFL course: The role of student and teacher activity in student retention'. In *Proceedings of the 1th D4|Learning International Conference Innovations in Digital Learning for Inclusion*, edited by Elsebeth Korsgaard Sorensen, Andras Szucs, and Md. Saifuddin Khalid, 152–9. Aalborg: Aalborg Universitetsforlag, 2015. Accessed 26 March 2021. <https://vbn.aau.dk/en/publications/proceedings-of-the-1th-d4learning-international-conference-innova>.
- Roberts, Jalyann Glenn. 'Student satisfaction and persistence: A study of factors which are vital to student retention'. PhD thesis, University of Southern Mississippi, 2009. Accessed 26 March 2021. <https://aquila.usm.edu/cgi/viewcontent.cgi?article=2056context=dissertations>.
- Rodríguez-Ardura, Inma, and Antoni Meseguer-Artola. 'What leads people to keep on e-learning? An empirical analysis of users' experiences and their effects on continuance intention'. *Interactive Learning Environments* 24, no. 6 (2016): 1030–53.
- Salama, Ashraf M. *Spatial Design Education: New directions for pedagogy in architecture and beyond*. Farnham: Ashgate, 2015.
- Schön, Donald A. *The Reflective Practitioner: How professionals think in action*. New York: Basic Books, 1983.
- Scott, Jamie. Personal communication. 9 February 2021.
- Scott, Jamie. Personal communication. 25 March 2021.
- Scott, Jamie. Personal communication. 24 April 2021.
- Smith, Charlie. 'How does the medium affect the message? Architecture students' perceptions of the relative utility of different feedback methods'. *Assessment and Evaluation in Higher Education* 46, no. 1 (2021): 54–67. [CrossRef]
- Smith, Charlie. 'Understanding students' views of the crit assessment'. *Journal for Education in the Built Environment* 6, no. 1 (2011): 44–67. [CrossRef]
- Smith, Charlie. 'When students become critics: Reviewing peer reviews in theory and practice'. *Charrette* 6, no. 1 (2020): 71–92. Accessed 11 March 2021. <https://www.ingentaconnect.com/contentone/arched/char/2020/00000006/00000001/art00005>.
- Teo, Peter. 'Teaching for the 21st century: A case for dialogic pedagogy'. *Learning, Culture and Social Interaction* 21 (2019): 170–8. [CrossRef]
- Vickerman, Philip. 'Student perspectives on formative peer assessment: An attempt to deepen learning?'. *Assessment and Evaluation in Higher Education* 34, no. 2 (2009): 221–30. [CrossRef]
- Vygotsky, Lev Semyonovich. *Mind in Society*, edited by Michael Cole, Vera John-Steiner, Sylvia Scribner, and Ellen Souberman. Cambridge, MA: Harvard University Press, 1978.
- Webster, Helena. 'The analytics of power: Re-presenting the design jury'. *Journal of Architectural Education* 60, no. 3 (2007): 21–7. [CrossRef]
- Webster, Helena. 'Architectural education after Schön: Cracks, blurs, boundaries and beyond'. *Journal for Education in the Built Environment* 3, no. 2 (2008): 63–74. [CrossRef]
- Webster, Helena. 'The architectural review: A study of ritual, acculturation and reproduction in architectural education'. *Arts and Humanities in Higher Education* 4, no. 3 (2005): 265–82. [CrossRef]
- Wells, Gordon. 'Dialogic learning: Talking our way into understanding'. In *Education as Social Construction: Contributions to theory, research and practice*, edited by Thalia Dragonas, Kenneth J. Gergen, Sheila McNamee, and Eleftheria Tseliou, 62–89. Chagrin Falls: Taos Institute Publications, 2015. Accessed 8 January 2022. <https://www.taosinstitute.net/product/education-as-social-construction-contributions-to-theory-research-and-practice-editors-thalia-dragonas-kenneth-j-gergen-sheila-mcnamee-eleftheria-tseliou>
- Wragg, Nicole. 'Online communication design education: The importance of the social environment'. *Studies in Higher Education* 45, no. 11 (2020): 2287–97. [CrossRef]

- Xie, Kui, Lin Lu, Sheng-Lun Cheng, and Serkan Izmirli. 'The interactions between facilitator identity, conflictual presence, and social presence in peer-moderated online collaborative learning'. *Distance Education* 38, no. 2 (2017): 230–44. [CrossRef]
- Yoon, Pilhyoun, and Junghoon Leem. 'The influence of social presence in online classes using virtual conferencing: Relationships between group cohesion, group efficacy, and academic performance'. *Sustainability* 13 (2021): 1–19. [CrossRef]