Students connecting: Advancing hybrid teaching and learning at the University of Oxford

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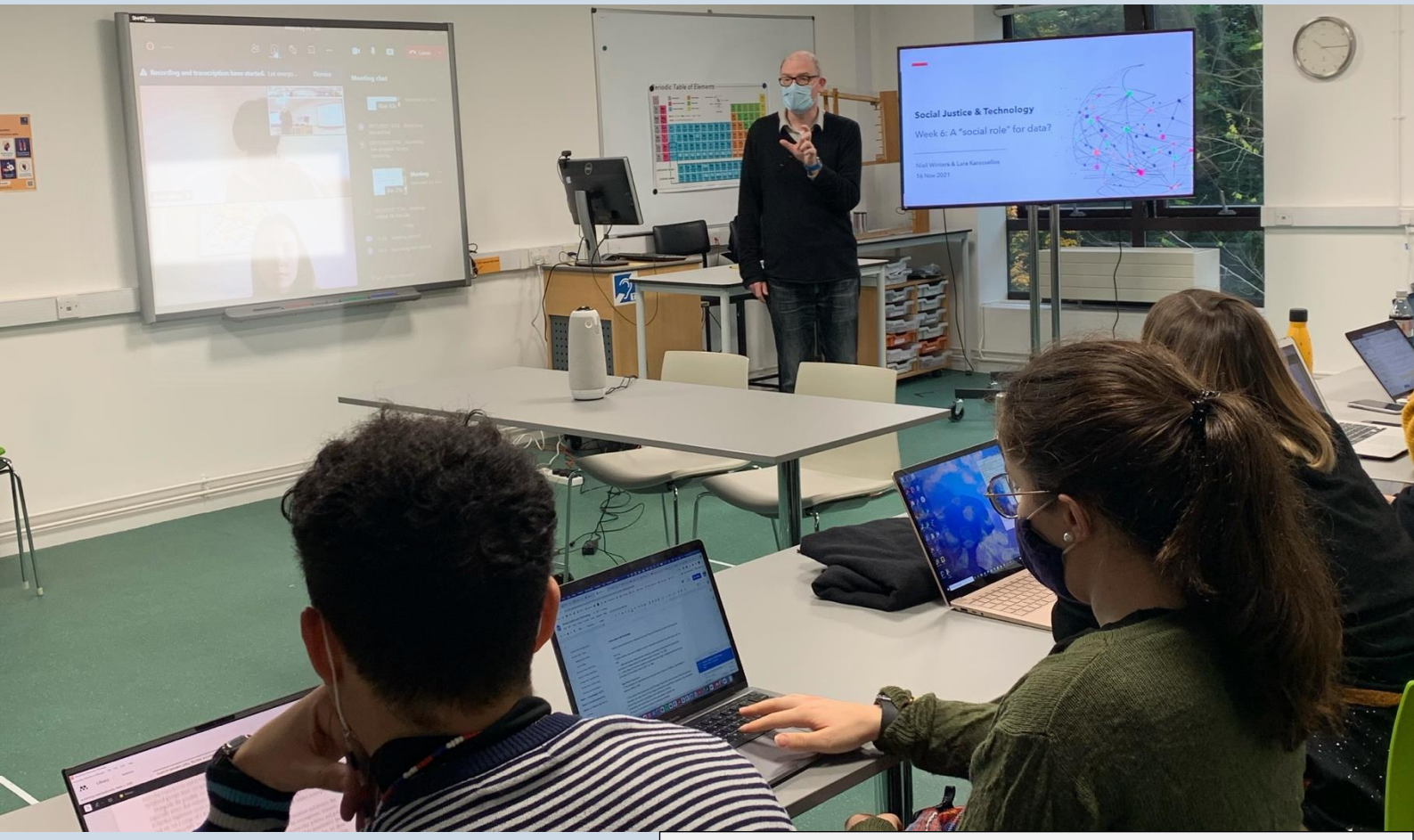


Hybrid space with dual monitors displaying remote students and presentation with Meeting OWL Pro capturing audio with 360 tracking camera.

Overview

The HyTeL (Hybrid Teaching and Learning) project aimed to develop an improved understanding of pedagogical practice within hybrid teaching spaces. While much is known about teaching in the physical classroom and also about teaching online, the very particular circumstances of the hybrid educational space remain under-researched. More specifically, the project explored:

1. How staff engaged in hybrid teaching pedagogies;
2. How technology can be embedded in teaching spaces to support these pedagogies;
3. How students responded to hybrid teaching approaches;
4. The role of social learning with the hybrid context.

HyTeL addressed these knowledge gaps by bringing together conceptualisations of teaching spaces with empirical evidence of the ways in which lecturers and students engage in technology-mediated teaching and learning. Case studies focused on postgraduate small and medium group learning, but are more widely applicable.

"I felt heard, and I felt that I was integrated into the classroom dynamic. The instructor did an excellent job balancing the communication and participation of both populations of students (in-class and online). However, for small group activities, face-to-face students always worked with other face-to-face students, and remote students always worked with other remote students" (Student).

Hybrid modes of educational delivery continue to be employed by universities around the world in order to provide learning continuity throughout the ebbs and flows of an ever-changing, ever-persistent pandemic. This report offers a deeper understanding of how the design of hybrid technology, pedagogical practice and learner experiences interact. The University of Oxford provided face-to-face teaching and learning throughout the entirety of Michaelmas Term 2021. However, to respond to the varied needs of students and teaching staff, remote attendance was offered as an additional tool throughout the term to navigate the unpredictability of a pandemic-induced new normal.

The option to study remotely during Michaelmas Term 2021 was valued by teaching staff and students. Although face-to-face teaching was available to all during MT21, data from this study show that 80% of surveyed students participated remotely in hybrid classes during the term, and 70% did so with relative frequency. Were it not for the hybrid capability, many students would not have been able to attend class during specific sessions, some students for the entire term, and some teaching staff would not have been able to teach.

Analysis supports five major conclusions:

1. Although face-to-face learning was offered throughout MT and was generally the preferred modality of attendance, the majority of students also used and valued the option of remote attendance. Therefore, hybrid learning strengthens the university's resilience and expands access to its teaching spaces, as flexibility in attendance policies support the diverse needs of an international student community.
2. Many did not believe that the hybrid learning experience was equitable for remote students. At the beginning of term, audio-visual problems and pedagogical challenges impeded remote students from fluid and effective class participation. Although AV/IT challenges largely improved by the end of the term, social learning experiences remained unequal between in-person and remote students. This was largely due to (1) remote and in-person students often working in siloed groups, (2) the difficulty of natural discussion across remote and physical realms, and (3) the lack of informal social opportunities for remote students. The report recommendations detail how to address these issues.
3. Creating a sense of belonging and connectedness in hybrid teaching spaces was a central driver of the development of creative hybrid pedagogical practices.
4. Co-teaching was unanimously perceived as an asset in co-taught classrooms, due to the academic, social, and technical support that teaching assistants offered lecturers and students.
5. Teaching staff appreciated having opportunities to peer reflect on their teaching practice and discuss their approaches with colleagues; collaborative and holistic further development of hybrid pedagogy should involve teaching staff, students, IT/AV support and designers.

Hybrid teaching represents an opportunity for innovation in the way teaching and learning is carried out at the university. The final section of this report presents recommendations for teaching staff before, during, and after hybrid class sessions, based on the study's findings. The report concludes by addressing the initial research questions and outlining the way forward for the informed development of hybrid design and pedagogic practice. The report calls for further research to strengthen the deepen the understanding of the shifts in pedagogical approach catalysed by hybrid spaces.

The quotes presented in this report reflect a range of hybrid experiences. Most students who attended remotely during the majority of MT 2021 were interviewed twice, giving their accounts more authority regarding the evolution of the approach to hybrid teaching and learning throughout the term, and thus are used to support broader reflections. Critical commentary from students interviewed at the beginning of term alone are largely found in the Recommendations section, as their critiques highlight the possible impact of engaging in hybrid instruction without the necessary structures in place for its success.

> "We shouldn't only think about the weaknesses of online and see it as a secondary or inferior alternative, but think about what are the affordances and what it can offer us that we didn't have in the traditional space" (Teaching Assistant).

Key findings

1. Although face-to-face learning was offered to all students throughout Michaelmas Term 2021 and was the preferred modality, 80% of students participated remotely at some point during the term. Cited reasons for remote attendance were both related and unrelated to the pandemic, such as: physical or mental health, isolation, caring duties, convenience, work commitments, and travel costs or restrictions.

2. The majority of surveyed students (over 80%) value having the option to attend hybrid sessions remotely, and the experiences of remote students improved over the course of the term. Some teaching staff and students would not have been able to participate in MT21 without the hybrid capability.

3. The majority of surveyed students felt teaching staff used hybrid technologies effectively (75%) and inclusively (69%), and 65% felt staff use of technology improved throughout the term. Interview data supports that the hybrid experience of MT 2021 improved on that of MT 2020, citing increased comfort and familiarity with the modality on the part of students and teaching staff, as well as improvement to the audio-visual technology.

4. Poor audio-visual quality of teaching spaces (pre-upgrade and/or at the beginning of term) led to remote student isolation or exclusion from learning spaces. However, interviews with students who were remote throughout all of MT 2021 indicate that AV/IT quality improved throughout the term as issues were addressed and teaching staff grew more comfortable with the equipment.

5. There are many ways of delivering hybrid effectively. Often, these require low AV/IT investment and higher investment in pedagogical support. Knowledge exchange was important to optimising the use of new hybrid tools for teaching in inclusive ways.

6. Most remote students felt academically included (61%) and able to engage fluidly in hybrid classes (56%), but many remote students did not feel socially included; 85% of students stated that having the option to attend remotely was important to them, but nearly 50% felt that hybrid learning spaces were not yet equitable for all students.

7. Interactivity, connection, and belonging were important to remote students' perception of the effectiveness and value of hybrid learning.

8. Co-teachers provided academic and social support to fellow teaching staff and students in hybrid teaching spaces.

9. How staff engaged in hybrid teaching pedagogies depended on the balance of remote and in-person participants in the teaching space, the regularity of students' remote attendance, and the varied needs of their learners.

10. There is a need for engagement between technical designers and teaching staff to understand the range of pedagogic needs for hybrid teaching spaces to be fit for purpose.

Introduction to hybrid teaching and learning

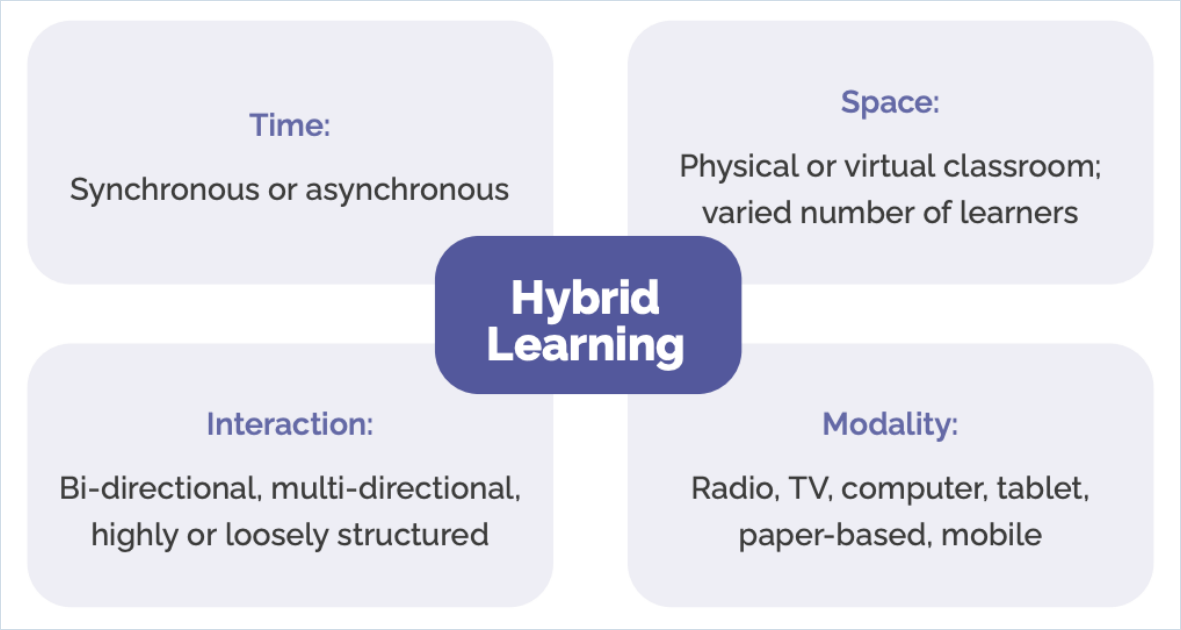
What is hybrid space?

Prior to the COVID-19 pandemic, the term *hybrid* indicated a combination or cross of two different things, commonly heard in the context of car engines or biological breeds. Today, the term has been firmly supplanted in the collective lexicon to describe a mixture of the virtual and the physical, the remote and the in-person. Rarely was it used to describe environments. Despite the frequency with which 'hybrid school' or 'hybrid work' appear in contemporary conversation, the precise dimensions of this combination–the ratio of virtual to physical–remains flexible and highly context-dependent. In fact, flexibility is a defining factor of hybrid modalities, often harnessed as a compelling reason for its adoption in unpredictable times when presence in a physical space may be restricted for reasons ranging from safety and socioeconomic status to geography and environmental advocacy (Bonderud, 2021).

What is hybrid learning?

With the rapid expansion of online and digitally mediated schooling as a means of ensuring educational continuity throughout pandemic disruptions, *hybrid learning* is now widely understood as a model of educational delivery that merges, in real-time, offline and online components. The fundamental feature of this model is the combination of instruction in a physical space with technology-mediated pedagogies that reinforce or replace face-to-face activities. The many iterations of hybrid teaching and learning are illustrated below.

Figure 1. Defining the dimensions of hybrid learning



Source: The Broadband Commission for Sustainable Development. 2021. "Connecting Learning Spaces: Possibilities for Hybrid Learning." Working Group on Digital Learning.

In the context of Higher Education, hybrid learning typically indicates a degree of choice over the modality of learning that best suits a student's–or professor's–personal and situational needs. Hybrid learning can be understood at both the course and classroom levels. With regard to course design, a hybrid model may blend offline and online components by replacing an in-person lecture with a pre-recorded one, which allows students to choose when, where, and even how quickly they watch the content. A hybrid classroom comprises the synchronous instruction of students participating both in-person and remotely.

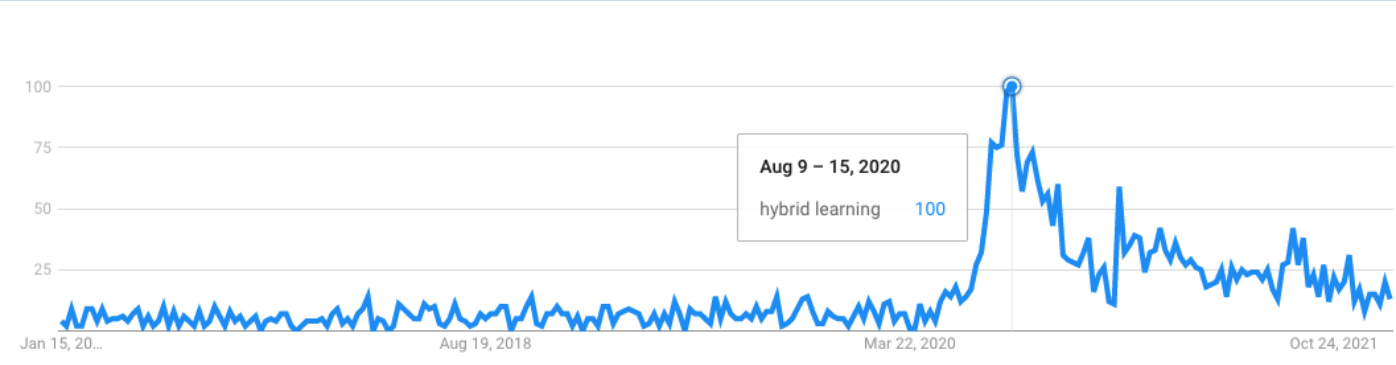
Hybrid or blended?

The terms ‘hybrid’ and ‘blended’ learning are often understood as synonymous, with both indicating educational delivery that merges online and offline components. However, the terms remain distinct due to subtle but important distinctions.

Blended learning is an in-person session *accompanied* by online resources and activities. In-person time is not replaced by online components. All students are present in person and technology is used to enhance–rather than replace–the instructional content (Singh et al., 2021).

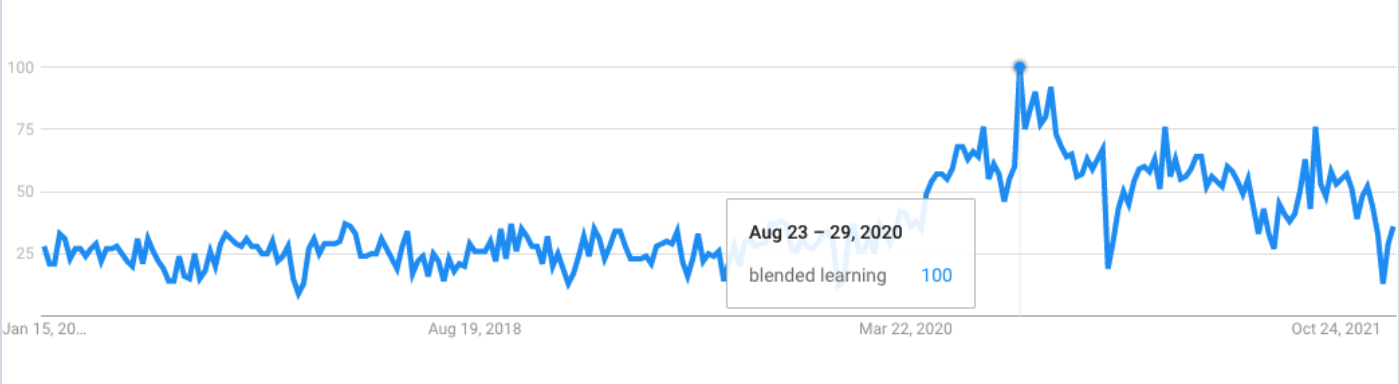
Hybrid learning comprises components intended to substitute in-person class time. Sessions can either take place in real-time with the option to connect virtually or asynchronously, in which students interact online at different times before meeting in a physical classroom for an in-person session (Siegelman, 2019).

Figure 2. ‘Hybrid learning' interest over time



Source: Google Trends.

Figure 3. ‘Blended learning’ interest over time



Source: Google Trends.

A simple search of Google Trends, as seen in Figure 1, reveals the skyrocketing of both ‘hybrid learning’ and ‘blended learning’ in internet searches, peaking in August 2020. The term ‘hybrid learning’ was relatively unsearched prior to May 2020, especially in comparison to ‘blended learning’, which experienced a consistent quarter of its peak popularity for the years leading up to the pandemic. The spike in ‘hybrid learning’ is largely due to the rapid, global increase in educational institutions employing ‘hybrid’ models of teaching and learning, largely due to school closures and phased re-openings to mitigate the spread of the ebbs and flows of COVID-19.

These search results are supported by the large gap in research in hybrid models of educational delivery (Goodyear, 2020). Singh et al. (2021) conducted a SWOT analysis of hybrid learning by reviewing more than a decade of research on the impacts of different teaching modalities in Higher Education, concluding

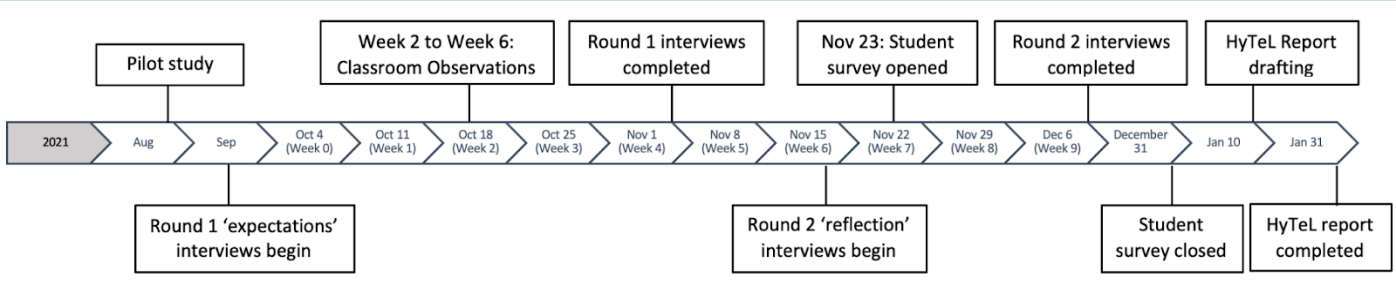
that there is a paucity of research on the effectiveness of hybrid and blended learning and how they impact student learning experiences. Over the past two years, the discourse around hybrid learning has been largely negative, focusing on the challenges of hybrid modes of educational delivery (Singh et al., 2021). With the exception of reports by development organisations (see Broadband Commission, 2021; McKinsey & UNESCO, 2020; World Bank, 2021), less attention has been given to the potential role of hybrid models in expanding educational access and opportunity, especially within Higher Education. This report will address this research gap by providing recommendations to faculty, students and admin who are considering combining online and face-to-face delivery, supporting them with data from dozens of in-depth interviews and survey responses captured during the University of Oxford's eight-week Michaelmas Term 2021.

Methodology and timeline

The HyTeL project began with a **pilot study** in August 2021 of a course induction on a Department of Education Masters program, which was delivered in *hybrid mode* from a mid-sized seminar room. Twenty-minute, semi-structured interviews were conducted with 5 students (3 in person, 2 remote) and 2 teaching staff. The pilot study aided the development and refinement of the interview guidance document and the student questionnaire. The survey was opened on 27 August 2021 and received 18 total responses by 15 September 2021.

The **main study** followed five cohorts of postgraduate students and their teaching staff throughout Michaelmas term. All 5 cohorts comprised approximately twenty students and at least two lecturers. Two of the cohorts had a remote Teaching Assistant who virtually attended every session. Two rounds of semi-structured interviews were the study's main research instrument, supported by a student questionnaire disseminated in Week 6 of Michaelmas Term (see Figure 3 for timeline). Given that the ratio of in-person and remote students was significantly skewed toward those in person, a purposeful sampling method was used to invite individuals with the requisite experiences of virtual learning to participate in an interview. Such choices reflect a pragmatic methodological approach that allowed the researchers to investigate both the remote and physical realms of the hybrid classroom experience deeply and equally. Thus, at least two in-person and two remote students were interviewed from each sample classroom in the preliminary round of interviews.

Figure 4. Timeline of HyTeL study



For the second round of interviews, students who had participated in multiple weeks of remote learning during MT were invited to partake in a reflection interview at the end of the term. 3 additional students with experiences of both virtual and in-person learning were also invited, given their particular ability to speak to the differences between the virtual and in-person learning experiences. These students were identified by classmates and were approached after receiving permission from their teaching staff to reach out. In total, 52 interviews were conducted, with the breakdown as follows.

Table. Distribution of interviews

Type of interview	**Number**
Student interviews	30
Teaching assistant interviews	4
Lecturer interviews	14
AT/IV interviews	3
Admin interviews	2

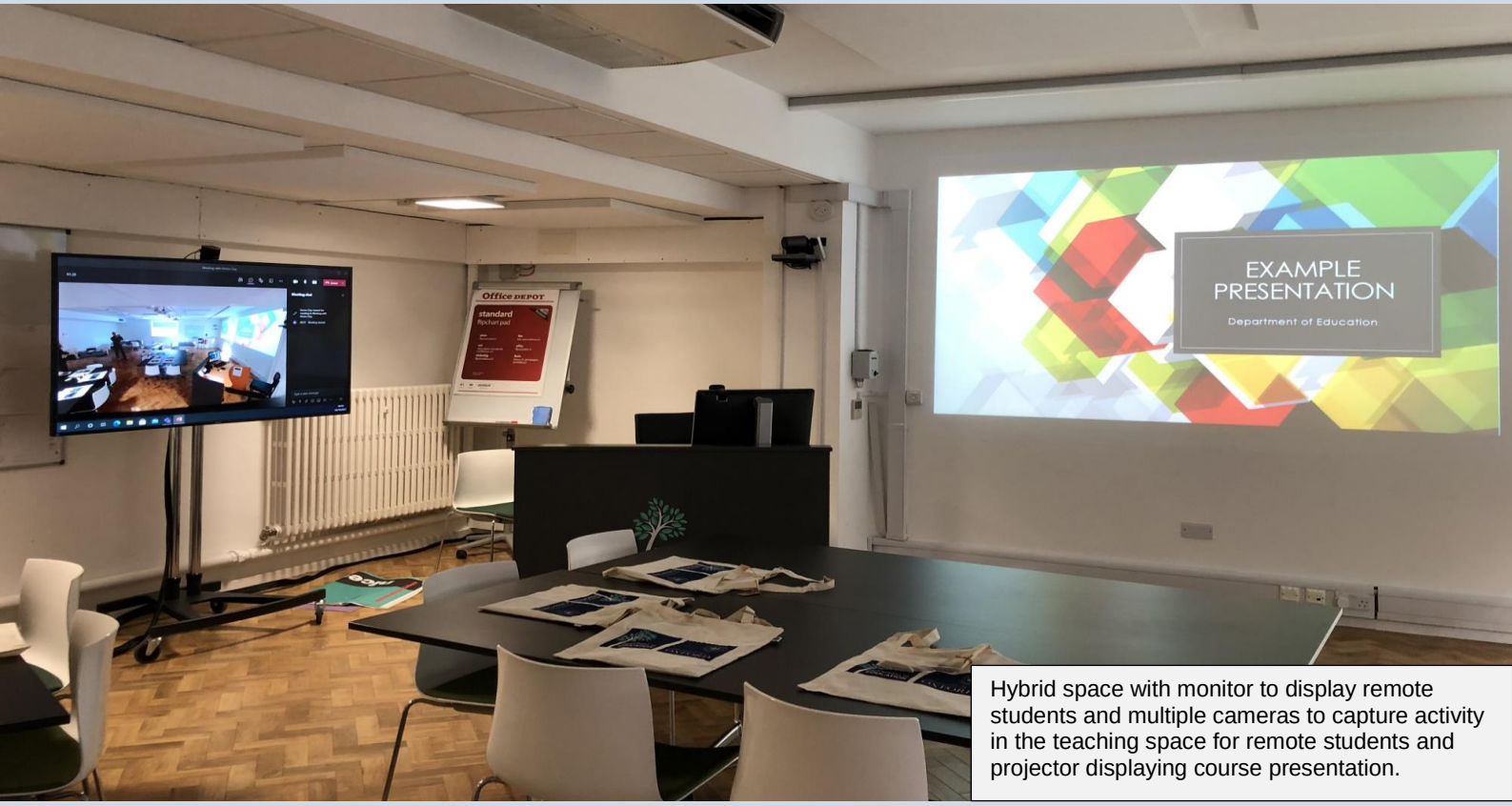
The survey, which was opened in Week 6 on 23 November 2021 and kept open through 1 January 2022, sheds light on the distribution of student participation in the two realms of hybrid classrooms. Of the 65 survey respondents, 80 percent of students participated in a class remotely during MT. While only 10 percent were always remote students, 48 percent joined virtually either sometimes or often, while 22 percent joined rarely, and the remaining 20 percent went to the physical classroom for every session. The questionnaire contained 12 closed-ended, multiple choice, and open-ended questions that produced both quantitative and qualitative data (see Appendix for full survey).

Lecturers from the study's five classrooms were also invited to participate in two rounds of interviews. When it became clear, through interview data, that the role of teaching assistants was of significance to the hybrid teaching and learning experience, these individuals were invited to take part in interviews as well. To better capture the diversity of experiences of hybrid classrooms, interviews were also conducted with IT staff, administrators, visiting librarians, and teaching staff who participated in the Department of Education's Hybrid Teaching reflection sessions but whose classrooms were not the five the study followed throughout the term. The supplemental interviews were conducted flexibly over the course of the term, while Round 1 "expectations" interviews were completed by Week 4 and Round 2 "reflections" interviews were completed by Week 9 (See Figure 4 for full timeline).

Full ethical approval for the study was obtained from the University of Oxford's Social Sciences and Humanities Interdivisional Research Ethics Committee (SSR IDREC). Before each interview, participants were emailed an information sheet with a consent form to be signed. Verbal consent to participate and to record was acquired at the beginning of each interview after reminders of, (1) the aims of the project, (2) request to stop the interview could be sought at any point, (3) their names would be pseudonymized in the final report. These reminders were also embedded in the first page of the student survey, which required a positive acceptance of the consent to participate before any answers could be submitted. Any data from student interviews that was shared with teaching staff participants during the data collection process in order to give actionable feedback to teaching staff engaged in shaping and improving their hybrid teaching practices was first shared and approved by participating students. Requested adjustments, additions, or eliminations to these anonymized feedback forms were made at the students' request.

Interviews loosely followed an initial guidance document, although the semi-structured format allowed for responsiveness to conversational flows, as well as further exploration of topics deemed significant during the interview. Interview length was generally between 20 and 40 minutes, with an average duration of approximately 30 minutes. All interviews were audio recorded and transcribed with permission to ensure authentic reporting of the voices of the participants in the study.

In addition to the interview and survey data, a formal observation of each of the sample classrooms was conducted. The observations were intended to better understand the ways in which group work happened, dialogue was supported, and how the lecturer used the totality of the space, both physical and virtual. The nature and positioning of the technology was also described. Observations were all conducted remotely using an observation guidance sheet. The duration of observations was, on average, one hour, during which the observer noted and described each crossing–or attempted crossing–of the boundary of the screen between the virtual and physical class spaces.



Hybrid space with monitor to display remote students and multiple cameras to capture activity in the teaching space for remote students and projector displaying course presentation.

Design for hybrid teaching and learning

The design of teaching spaces for hybrid teaching and learning is highly complex. Hybrid teaching spaces must meet technical demands of acoustics and visual clarity with the dynamic interactivity of different modes of pedagogic practice for remote and in-person participants.

Hybrid pedagogic practice is a developing field accelerated by the COVID-19 pandemic. The hybrid teaching environment can pose challenges to both students and teaching staff. Different departments have been able to respond to the challenges and support their teaching staff and students in different ways.

This section starts by reflecting on students' and staff's challenging experiences of remote and hybrid teaching in MT20.

Perceptions of remote and hybrid teaching and learning in MT20

"Last year's focus was really about making the tech work in the most basic way" (Lecturer MT21).

"The biggest challenge for me is to hear everyone clearly. We have to constantly ask each other to clarify some points they've made" (Student MT20).

"The audio is clear for lecturers, but it's not clear for students in the classroom" (Student MT20).

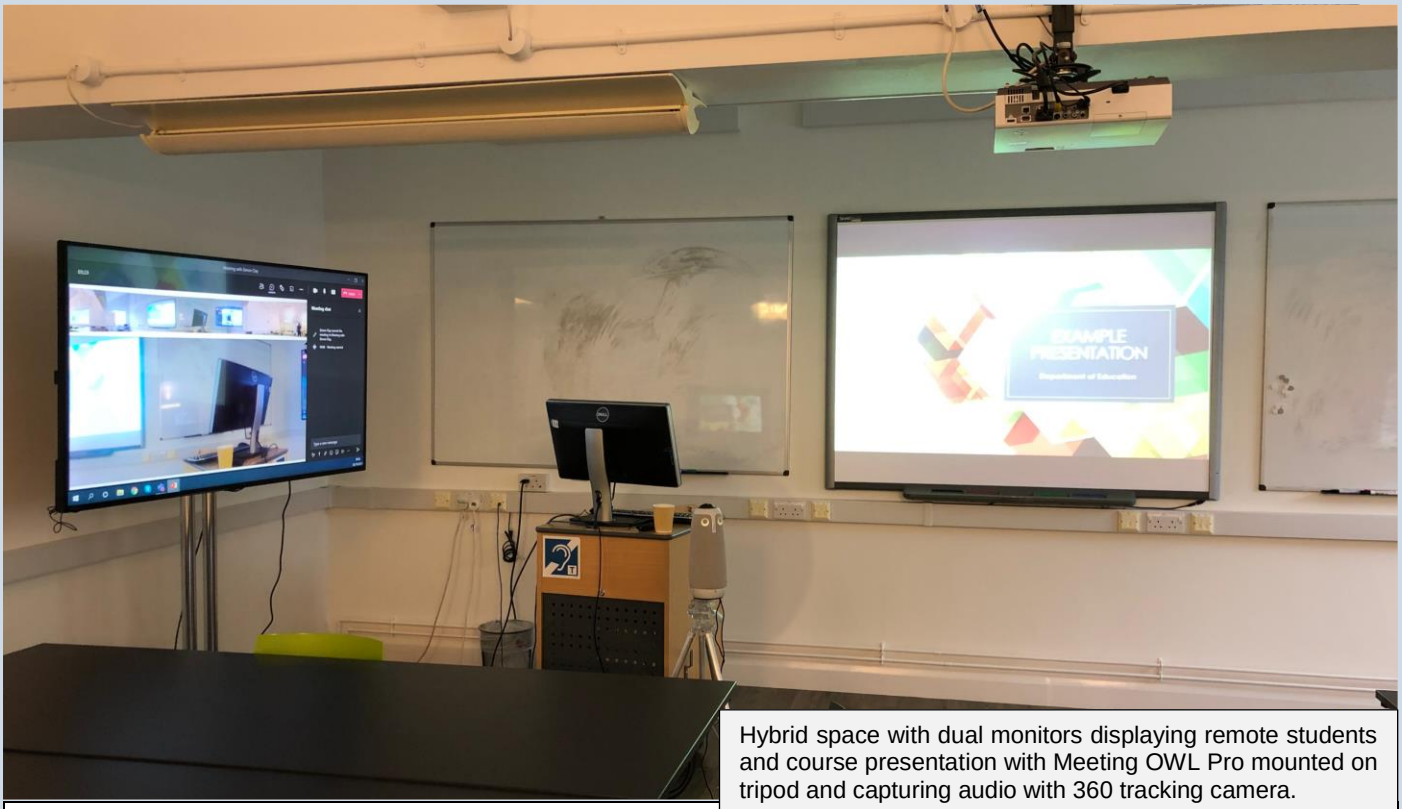
"I can see the shared screen, I can see the teachers standing in the front of the classroom but without any eye contact, they're just someone speaking to others, just like I'm a passerby perspective. I can see other students in the classroom but very blurry" (Student MT20).

In MT20, interview data with staff and students showed that even though there was general agreement that the academic content was consistently of high quality, there was a wide range of technical capabilities and competences across the University in the students' experiences of remote and hybrid pedagogies. The main concerns were the lack of student discussion and debate in the remote/hybrid learning space. The majority of students felt that technical capability in the teaching spaces to hear and see other students significantly were lacking, which impacted their academic and social learning. Remote lectures delivered excellent academic content, but the experiences often felt passive and unidirectional. In response to the

concerns of the ongoing pandemic, the University of Oxford funded an innovative programme of new hybrid installations across the different departments to enhance teaching and learning in 2021. This study presents the findings from the evaluation of the Phase I hybrid installations.

"[It was] very hard to actually facilitate conversation in a meaningful way…to make a truly hybrid space where one attempted to foster conversation between two groups of people who couldn't hear each other and couldn't see each other. The intention was there, but the tech wasn't" (Lecturer MT20).

"Two approaches last year demonstrate the tendency of either trying to **replicate in-person learning for the online learners**, or to think of it as essentially a **digital learning environment in a physical space**, rather than a **third space with specific considerations for pedagogy"** (Lecturer MT21).



Hybrid space with dual monitors displaying remote students and course presentation with Meeting OWL Pro mounted on tripod and capturing audio with 360 tracking camera.

"The technology will always be the biggest single barrier to entry for hybrid teaching. Twenty years ago, it was access to high bandwidth and stable internet connections that caused issues. Once the network problem has been mitigated (and I appreciate that it's still an issue for some geographies) the next biggest challenge is the technology used within the classroom to provide good audio and video distribution to remote participants.

The AV industry is a maturing market, but the acceleration towards hybrid teaching and remote working has happened due to the pandemic, whereby necessity and requirements trumped a long development cycle, proof of concepts and staged deployments. Another aggravating factor has been cost. It is still relatively expensive to deploy good quality AV capture and stream within a room to enable remote participants to enjoy an experience closely linked to those within the classroom" (AV Engineer).

Findings from this study highlighted the technical issues that add to the complexity of how students and teaching perceived the hybrid experience in practice. The individual networks, hardware equipment and software interfaces of each participant—both staff and students—affected their personal visual and audio experiences.

Clarity of audio was found to be the highest priority for students and staff within the hybrid environment. Second to audio was the ability to see clearly all the materials presented in the classroom, especially when items were pointed at or discussed in presentations or interactive sessions around a whiteboard or object.

Students also wanted to visually see who was talking in class. All participants desired a hybrid space where dynamic interactions could be exchanged fluidly between remote and onsite participants, which depended on high quality audio-visual capabilities of the technology. Some installations in this study achieved this active hybrid experience, but it was dependent on the hybrid AV design meeting the needs of desired pedagogic practice in the hybrid teaching environment.

The overall design concept for the hybrid teaching standards is on simplicity of operation, synergy of hardware throughout using Microsoft Teams as the communications software platform and Panopto for lecture capture. The study evaluated different hardware to deliver hybrid teaching. Within the room, the main installations for medium sized teaching groups included dual/ multiple screens for display to the participants in the room so they could clearly see and interact with remote participants and see presentations at the same time; omnidirectional microphones for audio pick up of the presenter and capture for student discussion; audio amplification & speakers to hear remote participants; dual/multiple cameras with pan & zoom capability for remote participants to see all class activity, visualizer, wireless collaboration hardware, user panel controller and PC computers for the presentation of course material as content source & run Microsoft Teams and Panopto.

Some lower cost installations used dual screens and the Meeting Owl Pro (360-degree camera, mic, and speaker combined into one device) in the hybrid space. The study showed the Meeting OWL Pro to be a highly effective hybrid tool for smaller to medium teaching group sizes. The device has a maximum 5.5m sound pick up radius and require specific U shaped seating layout configurations for optimal hybrid teaching use.

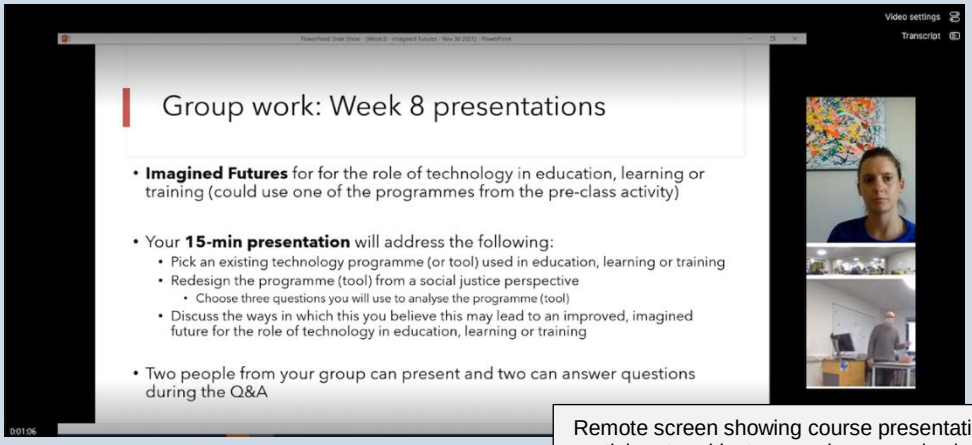
Meeting OWL used for lecture capture in lecture theatre.

Relationship between hybrid design and pedagogy

This study has found a critical relationship between hybrid design and pedagogic practice that can actively support the nature of interactivity in the teaching environment. Collaborative engagement to develop the design brief is required between the AV engineers and the teaching staff to fully understand the different approaches to teaching practice in each space, as well as the adaptability to add innovative methods and tools to future proof each installation.

Following extensive previous IT implementation literature to understand what factors contribute to the effective use of new digital technologies in pedagogic practice, the HyTeL evaluation project developed cycles of rapid feedback and response loops to capture technical and practice issues as soon as they arise in the initial post installation phase. The teaching staff were supported with a range of tools including technical guidance training and drop-in days to trial and ‘play’ with the equipment and an informal weekly drop-in reflection session to support pedagogic development open to all teaching staff. Such feedback loops resulted in improvements in the audio-visual experiences of remote students, who by the end of term felt satisfied with the academic experiences the technology afforded:

> “I can’t complain. The technical issues were mainly on my side. I think they gave me all the necessary support and tools and they’re always available whenever I ask a question” (Student MT21).



Remote screen showing course presentation, remote participant and lecturer and panoramic view of teaching

Case study

Following testing and sign off by departmental IT technicians of the new hybrid installation, the first group of teaching staff piloted the new equipment. The lecturer made two test recordings on Panopto but reported that he was extremely concerned as the acoustic quality was worse than before the new installation and would prefer to switch rooms for teaching. The AV engineers were able to collaborate and diagnose the problem with the lecturer the next day. The two ceiling-mounted central mics were not picking up certain points, especially specific frequencies in the room due to the irregular form of the space.

The departmental IT technicians and the AV engineer did not envision the lecturer to frequently move around all areas of the room when developing the design specifications. The engineer expected the lecturer to be predominately fixed at the lectern and not switch frequently between different modes (e.g., presentation, group work, discussion). The two mics were re-calibrated and moved to more optimal positions. The controls were adjusted to enable the teaching staff to easily switch between the different modes within the teaching session. The lighting and camera angles were also fine-tuned in the room to allow the optimal visual connection for remote participants. The rapid feedback and response cycles supported the hybrid pedagogic development of the teaching staff. Interactivity increased rapidly in the hybrid space as students and staff learned to optimize the capabilities of the new tools. An open, rapid, responsive approach by the department and the AV engineers from pre-implementation to post-implementation was central to positive perceptions of staff and students to the new technology.

> “I am stuck here but I can hear and see everything. I can interact easily. I feel I am in the room with everyone” (Student MT21).
>
> “I think I have other advantages that the in-person group are not having. They keep asking me questions, keep writing and talking to me directly. I'm interacting with my colleagues, with my instructors. I'm asking questions maybe more than the students in the classroom who are attending in person and people are responding” (Student MT21).

Takeaways

- The acoustic environment can be very different from room to room depending on the room surfaces, layout and the physical dimensions of the spaces. The hybrid installation will have to respond to the specific pedagogic requirements of each teaching space within specific acoustic characteristics.

- The AV/IT contractors require an in-depth understanding of the different pedagogic requirements for each space. Each lecturer will teach differently. How can the hybrid installation adapt to different pedagogic practices in the same physical space? The installation process will be iterative and require collaborative feedback between teaching staff and AV engineers to optimise the performance of each installation.

- The findings suggests that there are at least **three modes of pedagogic interactivity** that require different AV responses: 1. Lecture mode; 2. Discussion mode; 3. Breakout/group work mode. The capability to switch between the modes fluidly is critical to hybrid pedagogic development.

- The AV/IT Hybrid installations can be complex to operate for teaching staff. Professional development will be critical if the AV equipment are to be used effectively. A toolkit of training materials was trialed: 1. Guidance notes for use of new AV equipment and the Meeting OWL Pro; 2. Mini introductory videos; 3. Drop-in days for teaching staff to test the AV/IT equipment onsite; 4. Weekly hybrid reflection sessions to offer support, guidance on good practice and knowledge exchange for all teaching staff.

> “Some faculties have engaged effectively, detailing what they are looking to achieve and embracing the solutions the AV engineers have put forward. Others have engaged less, providing just one page of IT centric statements relating to security policies and preferences of IT suppliers without including the requirements of the academics or the students” (AV engineer).

Interactivity, connection and belonging

A number of reoccurring themes emerged from the findings that have broader implications for the formulation of recommendations and for the development of hybrid design and pedagogic practice in the future. One central theme was that teaching staff and students constantly searched for ways to increase interactivity between all participants in the hybrid space. The experiences of passive individual learning through the early days of the pandemic led to an acceleration of hybrid pedagogic development for academic and social connection mediated by new technological tools. The study showed that responsive hybrid designs and pedagogy can nurture a supportive learning environment that encourages interactivity, connection and belonging.

> “We need to think about how to establish the different types of **social norms** that govern these new types of interactions because at the moment we're still behaving as if people in the classroom are sharing a space, then there's some kind of disruption from the remote space but it’s one space” (Lecturer).
>
> “One opportunity that hybrid modes offers is to actually **bring other voices into the course**. I do that through pre-recorded conversations that I have with people from all over the world. But also we can have short guest contributions easily because they log in remotely. I think that's a real advantage” (Lecturer).

Oxford HIVE (Oxford Hub for International Virtual Education); UK's first immersive virtual meeting and presentation experience.

Lessons learnt on hybrid teaching and learning

From MT 2020 to MT 2021

In the first round of interviews, both students and teaching staff were asked to comment on their previous experiences of hybrid teaching and learning. Many of the study's teaching staff and DPhil student participants had experienced the hybrid modality during Michaelmas term 2020 with little time to prepare, thoughtfully plan hybrid pedagogies, or understand the technological capacities required for a reliable and equitable hybrid classroom experience. Additionally, none of this study's rooms had received tech upgrades to improve audio-visual experiences prior to the 2021-2022 school year.

It is no surprise, then, that all participants felt that Michaelmas 2021 was a comparatively superior hybrid teaching and learning experience, especially for those students joining remotely. The primary reasons cited for this improvement were:

1. changes to classroom design, including improvements to the AV technology, the spatial set-up, and to Microsoft Teams
2. consistent collaboration with co-teachers/TAs in many classrooms
3. an increase in the care and attention to the well-being of all students, especially those participating remotely
4. regular spaces for reflection, feedback, and knowledge-exchange on hybrid teaching and learning pitfalls and best practices.

Offering remote participation in hybrid classrooms relieved stress related to physical attendance on both teaching staff and students alike. Reasons for attending sessions remotely ranged from required self-isolation and health shielding to care-giving responsibilities, restrictively long commutes, heavy workloads, and visa barriers. Based on interview and survey data, the most commonly cited reason for remote attendance was sickness, not exclusively from COVID-19, but also from the flu, anxiety or depression, and chronic migraines, among others.

> "Everyone would come in regardless of how sick they were, like even if they had the flu. They'd have terrible colds, and they'd be giving it to everybody else in the room because, you know, it was their moment to learn. Whereas now, they don't have to. And so I think it's very sensible from a health perspective. Also for mental health, a lot of students may not be in the right place to socialize, but they can still engage in their learning" (Lecturer).

Many teaching staff mentioned that in past years, students would miss one or more sessions due to personal conflicts or illness, resulting in their loss of a significant portion of a short and critical eight-week course content arc. In relation to leveraging hybrid to mitigate this loss, one lecturer said, *"Their participation at 75% for all the classes is more valuable to me than 100% participation for only half the sessions."* Notably, many participants mentioned that attendance when sick should not be required or normalised, but welcomed if the student is feeling well enough.

Students, too, overwhelmingly valued the option to join remotely. The majority (53%) strongly agreed that the option of modality was important, and another 32 per cent agreed. Less than 10 percent of surveyed students disagreed or strongly disagreed. One student stated that *"because I'm paying to learn"*, they should have the ability to attend from anywhere, especially when health, travel, or caregiving circumstances impede physical presence in the classroom: *"Some people live a 30 minute bike ride away and so traveling for a 45 minute workshop doesn't make sense."*

Another student heralded its liberatory and equitable nature, stating that the option *"signals to me the prioritisation of having people participate and learn as opposed to a specific form of learning and physical attendance."* Many saw the option as stress-relieving in unpredictable times. Importantly, many learners saw hybrid as more inclusive of students with disabilities or specific learning needs. Overall, the flexibility of hybrid allowed learners to choose the best modality for participation based on their specific needs was valued by the majority of students and teaching staff.

> "It kind of turned around my way of thinking about meetings and other things and that I used to view as drudgery, or I used to view as, like, 'I have to like block out this time for it, otherwise I'm gonna be late' or anxieties to do with that. It's really nice—it's not unique to hybrid classrooms, but the online experience in general. I'm quite high functioning but if I tick or anything then it's like I don't need to worry as much" (Student).

Some students, however, believed that it should be *"a last resort"*, a *"plan B"* or a *"backup".* Every participant believed virtual learning to be inferior to in-person learning, and many were wary of the increased burden hybrid poses on teaching staff. Some felt hybrid delivery would fail in cohorts where student engagement and interest is lower. As such, realizing the promises of hybrid teaching learning would require long-term investment in the design of hybrid courses, classrooms, technologies, and pedagogies. At present, this investment is not unanimously supported by the teaching staff at Oxford. Some staff expressed worry that if remote attendance were a permanent option, then in-person attendance would dwindle, thus lowering the overall quality of the learning experience. Others did not believe it would result in a "*stampede out of the university*" (lecturer) and welcomed the continuation of the optionality, as long as a legitimate reason for remote attendance was provided. The lack of worry was often attributed to the pandemic-induced reinforcement of the superiority of in-person learning.

> “I think if we keep Hybrid going, we're not going to see a whole influx of everybody staying at home in their bed and just joining on. If it's interactive and engaging and immersive, if you are actively drawing people into their learning experience, if you're making sure whatever design that you have is cognitively engaging them, then I think they'll recognize that this was good, but it would be better if I was physically there” (Lecturer).

While some teaching staff believed that hybrid teaching can enhance in-person activities by making the synchronous classroom discussion richer through pre-class interaction with seminar or lecture content, others felt that the remote and in-person realms should remain separated in the long-term due to the fundamentally different pedagogical approaches each requires. To blend the two fluidly and functionally requires training and restructuring of classrooms and courses. Some teaching staff questioned the value of such pedagogical, financial, and technological investments given the relatively small number of remote student participants in MT teaching spaces. Others believed the benefits of hybrid in increasing Oxford’s resilience and inclusivity make such investments worth it: *“Even though there are cons, there are still pros that outweigh it”* (Lecturer). Students agreed that it was a *“relatively good way for students who cannot come overseas”* but that *“but there are still a lot of things that we can achieve”* underscoring the need for investments in the design and pedagogical aspects.

> “Bridging the barrier of the screen to create a cohesive, unified experience: that's what I'm aiming for. I don't think we're quite there yet" (Lecturer).

Despite the concerns mentioned above, all interviewees expressed their gratitude and enthusiasm for the flexibility, safety, and comfort that the hybrid modality affords. Despite challenges to creating equitable experiences for remote students, hybrid has succeeded in expanding access to students that a fully in-person course would not have reached: *“Even though we recognize that this level of engagement might not be the ideal, it is the most accessible. It’s worth improving that bit so that it’s even better”* (Lecturer). Such findings are aligned with the stance of the University’s wider Digital Education strategy, which endorses the investment as worthwhile for educational resilience in the face of an “ever-changing” (University of Oxford, Draft Digital Education Strategy 2022-2026, p. 5) and increasingly globalised world where unpredictability must be considered in education design and delivery.

> “The technical knowledge required for high quality delivery and increased workload upfront make this a significant resource decision for departments; but one that with the right university support or EdTech partner, and opportunity to borrow or draw upon growing expertise across broader departments or a central area, can potentially be beneficial to the department in the ever-changing world today.”(Draft Digital Education Strategy 2022-2026, University of Oxford, p. 5)

Overall, the ways in which teaching staff engaged in hybrid teaching pedagogies, their use of the technologies, and their perception of the value of hybrid were all dependent on the balance of remote and in-person students in their classrooms. Classrooms that had more consistent numbers of remote students or teaching staff saw the most growth and experimentation in their use of hybrid technologies and evolution of their teaching practice. Greater numbers of remote students meant more opportunities for small group work; as such, experimentation with small group configurations was more visible in classrooms with larger—or greater fluctuation in—remote student populations.

This finding suggests that hybrid pedagogic practice is highly variable, and the possibilities for certain practices, including unstructured discussions, small group work, or flipped classrooms, depends greatly on the number of remote students and the level of engagement of those remote learners. Many students admitted that if they were sick, they would be more likely to turn their camera off and listen to a class, rather than those connecting remotely due to visa restrictions or shielding, who wanted to be brought into the classroom space and sought entrance points into inclusion in the classroom community. Therefore, further

research into the effects of different ratios of in-person to remote students, as well as the total classroom population, would likely yield additional insights into the shifting pedagogical practices in hybrid teaching spaces.

Recommendations: before class

1. **Organise an entirely virtual experience for all students before the course begins.**

   To ensure that both teaching staff and students can match faces to names, an *entirely* virtually course hangout prior to the first in-person session is recommended. Such an event is easy to organise and helps break the silos of remote and in-person students. Friendships between the remote and in-person realms is important to creating the digital learning community that has been shown to positively impact attitudes toward digital learning (Akcil & Bastas, 2021).

If not…
"In-person students have never talked to the online classmates. There has not been an event where every student is online" (Student). "There are totally two different spaces, so for the social aspect, it's very difficult to make someone feel integrated into the group. You need to be in person to know your course mates, to know their personalities, their faces, their names" (Student).

   Without a fully online experience, many of the study's remote participants said they were unable to match faces to names in hybrid classrooms. With mask-wearing, wide-angle cameras, and zoom functions that were inconsistent, this meant that some remote students felt they did not know who their peers were for the entire term.

2. **Set up an online course community to manage learning for remote and in-person students.**

   To help remote students feel included and keep track of their commitments, the course instructor should create an engaging course hub on Canvas or Teams with an introductory welcome post and an interactive invitation for all students to present themselves. As recommended by Singh et al. (2021), this course hub–or learning management system (LMS)–could enhance the learning experience of all students through the use of announcements, the chat feature of Teams, assignment alerts, discussion questions, resource sharing, and a class calendar.

   This suggestion is supported by the Draft Digital Education Strategy 2022-2026 at Oxford, which recommends to "sustain continued development of a holistic and integrated digital learning environment" due to the significant volume of requests from students to have all of their learning materials in 'one place' (p.13).

If not…
"There were emails that I missed because of the quantity of emails that said, for example, 'this workshop is cancelled' and I was sitting and waiting and emailing. That part was really messy. I was expecting one platform where I can go and see what's happening, go in, and then it will be easy." (Remote student)

   Remote students in the study reported missing events during induction week that they did not know were happening. Many also reported confusion due to an overwhelming number of emails, inaccuracies in online class scheduling, missing virtual hangout links for events, and an absence of introduction posts from the professor and fellow peers. In multiple interviews, remote students suggested a fully virtual hang-out, as they could not identify faces to voices in the panoramic view of the teaching space provided by the OWL technology or wide-angle cameras.

   The study's sample saw successful examples of such a community developed on Teams, in which a course chat also served as a hub for scheduling notifications, pre-session work, post-session

recordings, and pre-/during/post-session conversations and sharing of materials. The ability to tag posts in Teams as announcements, questions, or 'urgent' –among others–offers much potential for its functioning as a centralised location for the affordances of virtual learning to show their merits. The use of Teams in such a way should be established by teaching staff at the beginning of the course to avoid confusion for learners who may not regularly check their Teams streams if they typically attend in person.

3. Teaching staff should arrive to the teaching space early to make sure all technology is working and set up to their needs.

The way the furniture, lights, cameras, screens, microphones, and other technology are laid out in the space all have strong implications on the inclusion and learning experience of both remote and in-person students, and on the ease of the lecturer to engage in their desired pedagogical practices. Therefore, it is strongly recommended that the teaching space is appropriately set up before teaching begins, ideally 15 to 30 minutes before the start of class.

Chairs and desks may need to be moved to create a U-shape or traditional rows, shades may need to be shut for projector clarity, and screens may need to be positioned in coordination with the classroom cameras. The teacher should log onto Teams early to assess the remote students' view and audio quality, ensuring that all mics are working properly. Remote Teaching Assistants and/or students, when possible, should also log in at least 5 minutes before class to call attention to AV/IT problems before the class period begins.

If not…
"We did try and move the screen so we could see [the remote students] but other people (i.e. those teaching other sessions) kept moving it back. It would require a lot of time. I would already be going about half an hour early to move all the furniture and there were often challenges with the set-up, in the way that other people had left the screens and things. It wasn't reliable. You always needed extra time before each session. Sometimes young needed 15 minutes, but other times you needed 30 or so" (Lecturer). "I think the most important part is how prepared instructor is. We rely on the instructor to take extra time to set everything up" (Student).

Many participants mentioned that classes often lost the first five to ten minutes due to technological issues that could have been solved before the class began by logging on early to Teams and ensuring proper functioning of the audio/visual equipment. There were class periods in which the technology failed entirely, and remote students missed the entire course, without the option to watch a recording later. If preparatory actions are taken before the class period begins, then any issues can be addressed swiftly by IT staff without cutting into valuable class time.

Some students reported that class cameras were set up facing the windows, meaning that bodies and faces were cast in shadow. Additionally, some classrooms had a lecture camera in a different spot than the screen on which remote students were projected, meaning that the teacher could not make eye contact with remote students to try to engage them.

4. Set the tone from Week 0 that remote students are a part of class and deserve an equitable experience.

It is of vital importance that all instructors set the tone at the beginning of term that remote students are as deserving of quality, inclusive learning experiences as in-person students. For many, the decision to be remote was made because of health, child-care, work, and/or logistical concerns. Therefore, given that Oxford has offered hybrid courses—and may continue to offer this learning modality in the future—there is a need for a paradigm shift on the part of teaching staff to see the development of hybrid pedagogies as an area of long-term professional investment.

The social inclusion of online students *"depends on how conscious the in-person group people are"* (Student) of the importance of socially engaging the remote students. *"We were trying to make sure that [our remote peer] feels that he belongs in our group through things like WhatsApp and Facebook chats."* These actions can be motivated by the course instructor and encouraged through Teams discussion capabilities.

If not…

"Some of the lecturers really try hard to fully ensure everyone, including those online, get the full experience. They seem to recognize and accept this type of engagement as a fully valid and valuable learning experience. However, one lecturer stated on several occasions that remote students should make every effort to attend in person classes and that they did not allow any remote attendance for their own students. This showed a lack of understanding about the nature of this hybrid course and need for inclusivity" (Student).

Without unified investment on the part of all staff to treat remote students as if they are actively a part of the classroom, then in-person students are unlikely to personally engage remote students and risk mirroring a lecturer's neglect of the online realm. This can result in remote students being forgotten or wrongfully perceived as less engaged or invested.

Some students reported feeling confused about their professors' varying policies around remote attendance. Some professors required written health reasons for remote attendance before class while others did not set conditions for remote attendance, allowing students to join without pre-warning for any reason. In one cohort, this type of flexible attendance policy did not decrease in-person attendance from other years. In fact, some teaching staff felt their overall attendance was higher due to the ability to join class periods even when sick, when travelling, or when running late.

Recommendations: during class

1. **Remain attentive to remote student engagement and actively bring them into the teaching space with the help of a remote teacher (if applicable).**

   Reading body language, or *"reading the room"* was repeatedly mentioned as a barrier to the fluid involvement of remote students in seminars. Many remote students felt that their contributions put a stop to the natural flow of conversation in the teaching space. Many expressed difficulties in knowing how or when to interject in class conversations.

   Some remote students appreciated active methods of teachers to keep them engaged in class, for example through direct questioning. Others, however, appreciated the option of keeping their cameras off and using the 'raise hand' function. To assess the diversity of student needs when connecting remotely, teaching staff should remain attentive throughout the class to the presence of remote student voice and should attempt to create as much space as possible for their comfortable interjections.

   The study sample found that assistance from a remote Teaching Assistant greatly supported the engagement of remote students. Regular encouragement from a remote teacher via the Teams chat to remind remote students to actively contribute minimised the discomfort of interjection from the online realm. *"When something is put in the chat, the professor responds immediately. There was a TA in the class who was helping raise attention to the chat right away and who directed the camera to specific speakers"* (student, survey).

If not…
"It was difficult to speak because it always felt like you were out of turn, which resulted in everyone keeping mum, which didn't make the class as interactive as it is in a physical space" (Student). "Sometimes the in-class people would talk over each other and that doesn't leave us space or time for us to raise our hands. It kind of feels awkward to just jump into that conversation if you just turn on your mic. I feel like for in person people, they can do that—they can just cut in and make their contributions but, I don't know if that's acceptable for us to do that" (Student).

   Without active methods of engagement, such as cold-calling, direct questioning, or a remote TA advocate, students attending remotely often felt either disengaged in class discussion or uncomfortable interjecting. Given remote student attendance was, overall, lower than in-person student attendance, some remote students preferred keeping their cameras off, for their faces would be largely projected on screens in class, inviting greater gaze of their face and actions than students attending masked in person.

   As such, it is important to remain attentive to the preferences of individual students. While some students appreciated the extra attention they received and the opportunity to consistently speak first or raise their questions, others felt that inversely resulted in their preferential treatment and they felt uncomfortable being consistently in the class spotlight.

2. **To facilitate dynamic class discussions, synthesise in-person student contributions and add structured discussion breaks when possible.**

   To alleviate discomfort facilitating fluid class discussion across remote and in-person realms, structured discussion breaks were noted as a possible best practice:

   "If somebody is preparing hybrid teaching from scratch, building in regular discussion breaks after 20 or 30 minutes–where the students know the questions in advance so they can do some thinking and preparation–makes the discussions go smoothly if it's an interactive class" (Lecturer).

To ensure equitable experiences of class discussions, teaching staff should also be aware of the volume level of specific speakers. Volume and clarity are further distorted by masks, and multiple remote students during Round 1 interviews stated they missed about half of student contributions in the physical space.

However, over the course of the term, students seemed to express fewer issues with audio. Round 2 interview data indicate that remote students grew accustomed to an imperfect audio experience in which not all aspects of every class discussion were audible. Teaching staff also grew accustomed to asking remote students if they had heard comments from quiet in-person speakers. Some teachers, by default, began to synthesise or repeat student comments from the physical teaching space, which remote students found helpful.

If not…

"The audio is clear for lecturers, but it's not clear for students in the classroom" (Student).

"Very difficult to hear what is being said in the seminar room, due to bad mics and everyone wearing masks. Easier to hear other online participants" (Student).

"The experience has been satisfactory. It would be better to improve the audio technology so that the rest of the students who are physically in the classroom can be better heard" (Student).

One of the major critiques of the remote student experience, supported by both interview and survey data, was the weakness of audio in picking up classroom discussions. Some students felt that the audio imperfections led to inequitable classroom experiences, with a student survey response citing *"several periods of not being able to understand what is being said through masks"* as a reason for feeling excluded as a remote student.

3. Leverage the role of a remote Teaching Assistant (TA) to provide social and pedagogical support in the hybrid teaching space.

Every teacher and student in courses with Teaching Assistants strongly affirmed the value of the position. Co-teaching across realms (i.e., if lecturer is in person, TA is remote; or if lecturer is remote, TA is in person) offers myriad benefits to both teaching and learning experiences, from both technical, socioemotional, and academic perspectives.

"If it's a tutor who's a bit wary and uncertain about Hybrid, [the co-teacher] is a really crucial role. If the tech gets complicated, there's somebody there. If somebody hasn't practised doing it, you can get into a bit of a tangle. So there's all sorts of reasons for being there. It's to provide a sort of moral support, to provide tech support there and then, rather than having to run off and get a technician, and to monitor hands up if they're not able to do that. Especially when you're sharing slides, it's not always that easy to do, so it is helpful to have that second person there" (Lecturer).

In teaching spaces with remote teachers, AV/IT issues were flagged by the remote teacher who interjected immediately to voice the need for repetition or clarification of in-person comments. A student later cited this as a reason for the superiority of the in person experience, saying, *"I don't have to wait for the assistant to tell the professor that I want to say something. I just say it. I just raise my hand and participate in the class and, that way, I think that I'm learning better [in person]"* (student). This quote underscores the importance of having a remote teacher to advocate for remote student needs and make space for their voices. As conversations between remote students were made difficult due to the projection of their conversations throughout the classroom, remote teaching staff could also facilitate small conversations in the Teams chat.

If not…

"From a teaching perspective, when you're trying to not just lecture to students, but to engage in conversation and discussion, it was very hard for me to maintain eyes on everybody. So having [Teaching Assistant] there to interject was particularly helpful. She was online and so she would interrupt for them" (Lecturer).

"For health reasons, I could only teach this year by co-teaching remotely. The biggest pedagogical challenge is building and sustaining relationships that cut across the screen. We teach with one of the tutors connecting remotely alongside the remote students and one of the tutors being physically in the classroom and that interaction between the tutors actually models interaction across the screens" (Lecturer).

In sum, a remote student confidently said that the virtual learning experience *"all depends on the assistant. The professors are very busy doing many things at the same time, so it's a good idea to have an assistant there–it all depends on them."*

4. Break into small groups to increase student engagement and relationship-building.

Many remote students reported feeling reticent to 'interrupt' or 'interject' during large group discussions due to the difficulty of reading the body language of the classroom, picking up on side conversations, or feeling awkward to interrupt the flow of a class. Therefore, many found that opportunities to discuss in small groups were extremely helpful to encourage their active engagement.

Although participants had mixed opinions on the efficacy of small group work in hybrid settings, the practice was positively perceived overall. Based on both interview and survey data, small group work ("*Small group discussions"*, "*Opportunities for discussion and in particular break out rooms*" and "*group activities for remote students*", for example) were frequently cited to show how teaching staff made an effort to include remote students: *"breaking out to different groups so that everyone can have a chance to talk about their ideas in the small break-out room"* (student, survey).

In the study's sample, one lecturer spoke of positive affordances of hybrid small group work: *"To see the remote person be the centre of attention was really interesting. It shows that they're not side-lined, they're not a second group, they're just participating through a separate route"* (Lecturer).

Case study: Varied pedagogical approaches to hybrid small group work

"The only problem is from a technological point of view, with sound. But it was manageable, and we had a big enough room and we spread out. I didn't send anyone outside the room, which was the recommendation from other colleagues. If possible, just send the groups outside so the sound doesn't make a difference. But I used a number of key devices, including my own. I would call someone in on my laptop and drop it into a group. The experience that people report back from that is pretty positive on the whole" (Lecturer).

A student from the survey supports the lecturer's claim, saying that hybrid group work made them feel included as a remote student: *"I felt included in the lesson because for group discussions I was contacted on a separate Teams call by another member in my group and I could contribute ideas."*

However, other teaching staff felt that the technology was too 'clunky' to fluidly facilitate hybrid groups with just one or two remote students. Hybrid small group work demanded adequate space to separate to ensure high quality audio. To avoid background noise for remote students, some small groups would seek a separate teaching space to call in a remote student. As Teams did not allow breakout rooms, separate teams calls needed to be started and stopped to create the small groups, which could cause confusion about when to return to the primary Teams teaching space. Teaching

staff expressed some difficulty with providing clear directions on muting the classroom or individual speakers and activating/disactivating cameras. Given these spatial and organizational complexities, some felt that hybrid small group was not yet “organically possible”:

> “For activities and all the student driven engagement, I found it very difficult, especially for the remote students, because it's just not organically possible to. If it's a small group still doable. Like if you're a group of four, we can take the student on Teams and do it. But if it's like seven students or 10 students, it's very tricky” (Student).

The above quote illustrates the relationship between the ratios of in-person and online students and the pedagogic practices that were regularly attempted during Michaelmas 2021. The technical complexity and spatial demands of hybrid small group work meant that many teaching staff preferred to conduct small group work in separate realms, especially if their remote student population was small and irregular. Overall, remote students expressed enjoyment of this as well: *“For group discussions, they let myself and other online students discuss together and muted us on their end so we had some privacy”* (Student, survey). However, even this simpler configuration was not always seamless, due to lack of clarity of when to mute and unmute, when to turn cameras on or off, or even neglect of the online realm through lesser professor engagement.

> “We tried a hybrid model for small group work, so that the [remote] person was working with people in the room because I thought that was really important. But to be honest, it was a bit of a hassle in the sense of organisation. It just interrupted, it didn't enhance. If the student had been stuck away the whole time, it would have been a completely different thing, but not for what we had in our course” (Lecturer).

The study showed that hybrid group discussions are positively perceived outside of formal learning activities, often with less organisational hassle on the part of the teaching staff. Remote students often felt that they did not know the in-person students because they did not have many opportunities to work with them, and that if *all* students (remote and in-person) could have a non-formal discussion space, that *"would make things much easier."* To overcome this, some students suggested to *"leave everything on at break time so we can chat."*

If not…

- “For small group activities, face-to-face students always worked with other face-to-face students, and remote students always worked with other remote students. This meant that I got to know my face-to-face peers much better than my online peers. If this could be overcome, I think the hybrid learning space would be greatly improved” (Student).
- "I'm always doing small group with other remote. You lose the interaction with the classroom students and because of that. We tend to only interact digitally or physically, not at a mesh of the two” (Student).
- “I also felt a distance between the online group and the in-person group. It was difficult to communicate with them and made me feel as though we were separate and almost in competition at times” (Student).

54% of surveyed students did not agree that friendships could be made between remote students and in-person students. The complexity of group work across the boundary of the screen contributes to these results, and ‘silos’ of remote and in-person students was repeatedly referenced throughout interviews. Small group work was seen conversely as either a method of reinforcing these silos or to bring down the boundaries between realms. Due to the perceived technical complexity or spatial needs of successfully facilitating mixed small groups of in-person and remote students, most lecturers in the study separated small groups by modality of participation. This enabled relationship-building between groups of remote students and groups of in-person students, yet friendships between the two realms were seen as difficult by most.

As evidenced by the perspectives above, the range of pedagogical uses of space and technology to facilitate small group work was one of the study's most complex and diverse findings. Given the variability in practice dependent on the space, ratios of students, comfort of teaching staff with the technology, and engagement of the learners, Phase II of the study will further explore the many iterations of small group work in hybrid space.

Recommendations: after class

1. **Check in with remote students immediately after the session for feedback.**

   After a session ends, the instructor should stay on with the remote students for five or ten minutes to elicit quick reactions regarding the quality of their experiences from an academic, audio-visual, and social standpoint. Students should be asked if they missed any in-person student comments or if they need additional support for any reason.

   > "Professors provided so much help. They keep reaching out before and after class and asking 'is everything ok? Please let us know' for feedback… When something is put in the chat, the professor responds immediately. There was a TA in the class who was helping raise attention to the chat right away and who directed the camera to specific speakers" (Student).

   In one of the study's samples, these check-ins were a regular component of every session. The lecturer taught remotely, and all remote students were invited to stay connected at the end of the class period to give immediate feedback and recommendations for further improvement. This led all remote students to feel heard, and it allowed the lecturer. Additionally, the in-person TA would join these sessions to implement immediate improvements to their practice in order to better support the fluid merging of the in-person and remote realms.

   Many technical (audio/visual) issues were not brought to the attention of teaching staff until HyTeL interview sessions. Numerous students expressed their gratitude for the opportunity to raise issues about their course experiences. Some felt uncomfortable bringing up such technical issues during the class period itself for fear of disrupting the flow of the discussion or lecture.

   If not…

   "I felt like an afterthought. Our professors are so used to talking to students in the classroom, so they can just kind of ignore us. And then they say 'finally can we hear some voices of students online' and we find that we are ignored by them and cannot get feedback from classmates" (Student).

2. **Engage in professional development by observing fellow staff or attending hybrid teaching reflection sessions.**

   There is a need for a paradigm shift on the part of teaching staff to see the development of hybrid pedagogies as an area of long-term professional investment.

   > "If we really want to expand capacities throughout the university, I think we need to start looking at each other's practice. That's what we're lacking… Most people, unless you've been forced to do hybrid teaching, you haven't experienced hybrid teaching. The hybrid base is a bit complicated, but it's nothing ground-breaking when you actually get doing it, people just need to see it happening" (Lecturer).

   Although a majority of students felt their teachers demonstrated improvement in their use of hybrid technologies throughout the term, interview data shows that most teachers felt they learned by doing. Hybrid learning is new to most, and thus most teachers have not experienced it as learners nor the opportunity to see it happening. Without such opportunities to learn from each other and observe the teaching practice of others, teaching staff cannot build their own pedagogy through emulating others.

If not…

“We need a new lecturer training system about how to activate all students, whether you are sitting in the classroom or online, and how to promote communication between students. I feel apart from the students in the classroom. I feel a little bit undesirable” (Student).

“In terms of the technical aspects, [the professors] have not been good… Most of the professors are not conversant with tech things. Every week we have different people” (Student).

“Some of them are doing it better than others. By the time some of them realize we have to mute/un-mute, it's already been thirty seconds. Most of the time they end up forgetting there are students online. They need to remember there are students online. Sometimes you have to remind them” (Student).

The way forward

This report has been complied with the data analysed in the HyTeL evaluation during MT21. Due to programme of hybrid installations completed for MT21 at the University of Oxford, the case studies selected for this study were all from small and medium sized teaching groups with postgraduate students only. While we believe these cases to be applicable more broadly, more research will be needed to understand the perceptions of hybrid teaching and learning for large group teaching (100+) and for undergraduate students.

How did staff engage in hybrid teaching pedagogies?

The study showed a wide range of approaches and capabilities regarding the hybrid pedagogical development. Overall, between MT 2020 and MT 2021, there was a notable shift in the pedagogical and technological comfort teaching staff demonstrated in hybrid teaching spaces. Creative approaches to small group work, leveraging the chat to expand and enhance in-person activities, developing co-teaching practices, and regularly seeking student feedback were just some of the many positive changes noted in the study. To support such hybrid pedagogical development, responsive engagement from Teaching Assistants, AV technical design teams, and local IT support are highly recommended.

How can technology be embedded in teaching spaces to support these pedagogies?

On the whole, hybrid technology is costly, new, and is catching up with the needs of evolving approaches to hybrid pedagogy. Engagement with technology in teaching spaces is needed pre- and post-implementation. Involved and interdisciplinary engagement between teaching staff and IT/AV support services is recommended from the initial design stage. To enable interactive teaching methods that meet diverse learner needs, a holistic and collaborative approach is needed after implementation to ensure that teaching staff and learners are properly trained and supported to understand and engage in the space.

How did students respond to hybrid teaching approaches?

Student experiences of hybrid teaching were dependent on the technology (and comfort with this technology) at both the source (physical teaching space) and receiving end (remote learner space). Specific learner attributes also influenced the perceived value and importance of hybrid; health, childcare, travel, previous experience with digital learning, and other learner-specific considerations impacted learners' responses to hybrid teaching. Overall, over 80% of participating students learned remotely in hybrid teaching spaces during MT, and an even greater portion regarded the hybrid option as important. By the end of the term, a majority of learners felt their experiences had improved over the term, with a dramatic improvement from the hybrid teaching of 2020. The pedagogic shift in practice over time is reflected in changing student perceptions of the quality of hybrid learning.

What is the role of social learning with the hybrid context?

Although the academic experiences greatly improved over the term, most students still felt that social learning was not equitable in the hybrid space. The study's data show that social learning is an integral part of one's perception of the quality of hybrid teaching. Learners and teachers alike desired teaching spaces that were interactive, engaging, and where a sense of connection and community between remote and in-person students was strong. For many, the motivation to further improve hybrid teaching and learning is motivated by the desire to create the best student experience possible by helping *all* students—whether remote or in-person—feel like they are part of the Oxford community.

The findings from this study suggest that building a sense of belonging is a central pursuit of hybrid pedagogy and should inform future professional development opportunities for teaching staff (See Recommendations 9 and 10). Hybrid pedagogic practice is variable, and the possibilities for certain

practices—such as small group, student-centred work—depend on the number of remote students and the level of engagement of the remote learners. Classrooms with only one or two consistently remote students employed hybrid technologies and pedagogies differently than those with fluctuating numbers of remote students. This indicates that hybrid pedagogic practice for large group sizes would be different from small and medium group sizes, and likely more demanding for the technical designs and specifications.

More research is critical to be able to fully understand the specific needs of undergraduate students in the hybrid learning space and how these differ from postgraduate students. Additional research is also needed to understand the relationship between investment in hybrid and investment in other digital learning modalities. This study will support the university's future digital strategy and build resilience, expand access, and support flexible and interactive learning for all students.

Resources

Akcil, U., & Bastas, M. (2021). Examination of university students' attitudes towards e-learning during the COVID-19 pandemic process and the relationship of digital citizenship. Contemporary Educational Technology, 13(1), ep291. https://doi.org/10.30935/cedtech/9341

Broadband Commission. (2021). Connecting Learning Spaces: Possibilities for Hybrid Learning [online]. Available at: https://broadbandcommission.org/wp-content/uploads/dlm_uploads/2021/09/Digital-Learning-Report-Broadband-Commission.pdf

Bonderud, D. (2021). What Role Will Hybrid Learning Play in the Future of K–12 Education? In *EdTech: Focus on K-12.* CDW.

Goodyear, P. (2020). Design and co-configuration for hybrid learning: Theorising the practices of learning space design. Br J Educ Technol, 51: 1045-1060. https://doi.org/10.1111/bjet.12925

McKinsey and UNESCO. (2020). COVID-19 response – Hybrid learning as a key element in ensuring continued learning [online]. Available at: https://www.mckinsey. com/~/media/McKinsey/About per cent20Us/COVID per cent20Response per cent20Centre/Overview/COVID-19 per cent20Education per cent20Response per cent20Toolkit/202010_UNESCO-McKinsey per cent20Response per cent20Toolkit_ Hybrid per cent20learning_VF.pdf

Singh, J., Steele, K., & Singh, L. (2021). Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for COVID-19, Post Vaccine, & Post-Pandemic World. Journal of Educational Technology Systems, 50(2), 140–171. https://doi.org/10.1177/00472395211047865

World Bank. 2021. What is Hybrid Learning? How can countries get it right? [online]. Available at: https://blogs.worldbank.org/education/ what-hybrid-learning-how-can-countriesget-it-right