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Whitelock, D., Herodotou, C., Cross, S., Scanlon, E. (2021). Editorial. Open Voices on COVID-19: Covid challenges and opportunities driving the research agenda. *Open Learning: The Journal of Open, Distance and e-Learning*.

## Open Voices on COVID-19

### Covid challenges and opportunities driving the research agenda

#### Introduction

There have been massive disruptions in response to the COVID-19 pandemic in the world of teaching and learning with an unprecedented need for innovation and agility. Among the pressing concerns at the forefront of this pandemic are the best models and practices for e-learning at speed and within budget for areas of the sector moving to blended learning. A diverse range of responses has been observed from rapid curriculum redevelopment to upskilling teachers in designing and offering e-learning. Amongst the many challenges, teachers find themselves using teaching methods they have never used before, from synchronous lectures to sharing material and lecture recording, there is a lack of access to online tools and technology, a concern about a diminished quality of learning due to the sudden shift to e-learning, and a threat to students' well-being, achievement, and future prospects. Yet, the unexpected shift to e-learning became a unique opportunity for rethinking education and promoting innovation, through for example, the design of flexible teaching and learning programmes, a skill-focused curriculum in which problem solving, critical thinking and reflection are prominent, and the use of effective and evidence-based pedagogical approaches. The following papers were selected for this special issue and address concerns associated with blended learning, which also includes the use of Hyflex, together with students declaring that they were not convinced that their courses were suitable for online delivery. Reflecting on these papers, together with a suite of other challenges faced by the higher education community, presents an opportunity to consider the new skill sets that will be required and which theoretical frameworks will drive the forthcoming research agenda.

The first article in this issue is a case study by Pierpaolo Vittorini and Alessandra Galassi entitled 'From blended to online due to the COVID outbreak: the case study of a data science course'. This study compared the findings from cohorts of students from 'the Nursing Sciences' and the Prevention Sciences studying a data science course in a fully online course due to the COVID-19 pandemic with a previous presentation with identical groups of students where a blended pedagogical approach had been adopted.

The most surprising finding from the feedback of students following the online course was that the 'didactic quality' had improved compared to those who studied with the blended learning presentation of the course. One reason suggested for this difference was the availability of on-demand video recorded lectures. These can be viewed repeatedly and especially during revision periods. However, difficulties were experienced when monitoring students with the chosen online proctoring system and some students reported problems with an increased workload.

Another delivery approach known as HyFlex, where students are taught in a physical classroom and synchronously on-line by means of videoconferencing software, is reported in the next paper by Lucas Kohnke and Benjamin Luke Moorhouse entitled 'Adopting HyFlex in higher education in response to COVID-19: students' perspectives'. This was only a small scale exploratory study with nine postgraduate students attending a six week course and even

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with these small numbers communication difficulties were experienced by students who participated in the different delivery modes of the course. This is why the piloting of technologies which fully exploit the pedagogical model of content delivery is always recommended and although necessity is cited as ‘the mother of invention’ it often requires refinement and cooperation from all parties.

The theme of moving to digital learning is further explored in the third paper by Konrad Kulikowski, Sylwia Przytula and Lukasz Sulkowski entitled ‘Emergency forced pandemic e-learning - feedback from students for HEI management’. A much larger sample of students, 600 in total, were surveyed after they were moved to online study. These numbers facilitated the use of a more sophisticated statistical tool such as regression analysis to investigate the perceptions of e-learning with the demands of e-learning. The three variables chosen to explore the students’ perceptions of e-learning were: emotional experience with e-learning, cognitive evaluation of e-learning, and study engagement in e-learning.

78% of the students had no experience at all with distance learning and only 9% had experienced a fully online academic course. With respect to the suitability for this particular HEI management course being delivered online the student cohort was not totally convinced. Only 52% (n=320) agreed while 48% (n = 293) did not agree with the statement: *Given the specifics of your field of study, could your studies take place only in the form of distance learning?*

An interesting finding from this research is that a negative perception of e-learning was related to a belief that the university was not operating at its best during the COVID-19 outbreak but to quote the authors was ‘in chaos’. They recommend better reciprocal communication between the university and the students during the crisis period could alleviate this type of assessment of their alma mater.

The final paper is by Maria Aristeidou and Simon Cross, entitled ‘Disrupted distance learning: the impact of COVID-19 on study habits of distance learning university students’, and used an online survey with 555 undergraduate students. The researchers wanted to uncover the impact of COVID-19 on these students. Logistic regression analysis revealed that it was managing workload and a limited interaction with other students that contributed to a negative impact on study habits, which in this case was experienced by 36% of the surveyed population. Perhaps more concerning was that 505 spent less time revising their teaching materials and 445 spent less time preparing for their tutor marked assignments. This is not surprising since the UK was in lockdown with the whole family at home and parents were also supervising children’s schoolwork and adapting to the demands of home working.

All the findings from the papers in this special issue point to a need for more research into such areas as staff training to move their teaching online. Understanding how students can be better supported and feel confident in their university’s online modus operandi even in crisis conditions merits further investigation, together with student wellbeing. Not all areas of interest have been discussed by these papers and other teaching and learning issues have been foregrounded by the pandemic when curriculum has been moved on line. In the next sections, we discuss in particular issues around assessment, learning design and learning analytics and practical skills training such as access to science laboratory work.

## Assessment

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Covid has impacted assessment practice by imposing restrictions that have rendered many accepted practices difficult or impossible and presented teachers and institutions with a variety of significant assessment conundrums. Nowhere is this more clearly exemplified than by the in-person written or practice-based examination which conventionally requires co-presence of students and invigilators in one space for a limited period of time. Unlike teaching where the teacher has had a degree of flexibility to adapt their approach and learning design to an online context, the mode and form of summative assessment is often more explicitly specified in course design, approvals and quality assurance. To make changes to summative assessment may often require significantly more effort and time. For some, the key questions have been practical in nature - how to substitute physical, place-based assessment with remote assessment mediated by technology (Guangul et al., 2020), while for others the pandemic disruption presents the opportunity for initiating more fundamental changes in assessment approaches and process. In both cases, researchers may, where data are available, be able to evaluate changes made against pre-Covid performance.

Another approach has been to cancel or postpone assessment. One of the papers in this issue found that the widespread cancellation of in-person examinations at a major distance teaching university resulted in a fall in the time learners spent revising course content. Whilst the relationship between the learning that takes place whilst revising and performance in an examination or other end of module assessment is not straightforward (Cross et al., 2016), such insight indicates that there may be potential knock-on impacts of the pandemic on learners, including fewer opportunities for reflection and consolidation of learning, a reduction in motivation to complete the last learning unit, and a sense of loss at not having final closure for the course. Studying what has been gained and lost from Covid-related changes to assessments of learning may offer researchers a chance to learn more about how and why different elements of assessment matter to students and the different ways student wellbeing, anxiety and sense of achievement have been affected. Furthermore, it has yet to be seen how employers and wider society will regard the status of awards made under such altered assessment conditions.

Assessment for and as learning has perhaps fared better with many opportunities for teachers to use technology for improving the quality and value of feedback (Istemic, 2021). This may be technology-mediation that can strengthen the relationship between learner and teacher but it will reach further to the use of technology to independently support learners in self-regulated learning. For example, software that supports students in critically reflecting on draft essays (see Whitelock et al., 2018), which can improve student marks but more importantly increase their understanding of how to produce an essay with a coherent argument, may have a role in providing more consistent support to all learners although careful attention is also required to ensure the rollout of such systems do not perpetuate inequalities in assessment and feedback literacies. Likewise, digital simulations, augmented reality and virtual reality offer flexibility and greater immersion (see Wild et al., 2021 and Huang et al., 2021).

Irrespective of the changes made to summative assessment, a range of cross-cutting issues are important including academic integrity and honesty, authenticity and effectiveness, learner involvement and experience, standards and verification, and accessibility and equity. This presents an opportunity for practitioners and researchers to evaluate the limitations of previously accepted practice as well as critiquing that of emerging and often less refined or developed approaches. Those reporting clear change in evaluation practice remain in the minority according to a survey of American and European teachers (Trevisan et al., 2020)

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which may indicate that long-term practice change may not be as significant as first anticipated, that evidence of such change requires deeper investigation and may emerge more gradually, and that there remain systemic perceptions that assessment at distance is necessarily inferior.

The pandemic has also shone a stronger spotlight on the mode of assessment delivery as compared to the mode of teaching. Distance learning may still require in-person assessments whilst conventional classroom teaching may, even after the pandemic restrictions recede, involve greater digital and online assessment. Monitoring how blended assessment models develop may help also understand the significance of the shift in practice and theory resulting from the pandemic upheaval. Finally, more comparative studies are required to contrast differing regional impacts of Covid and to evaluate the situated experiences that are now being reported in regional or national case studies.

## Learning design and learning analytics

Learning design refers to the learning material and activities available to students while studying. It has been viewed as ‘a driver for learning’ as educators’ design decisions can define students’ engagement with learning and actual learning outcomes (Rienties & Toetenel, 2016). During the pandemic, we have seen several tools and approaches embedded in learning design including pre-recorded lectures, gamified quizzes, interactive exercises, real-time response systems such as clickers, identity verification tools to safeguard academic integrity and learning analytics systems to monitor student progress (Pappas & Giannakos, 2021). Yet, it is not clear which of the rather diverse learning design implementations provide high quality online teaching and learning and, as such, are not a mere temporary access to instruction due to the pandemic (Hodges et al., 2020). Insights from COVID-19 case studies point to key elements of learning design including fine-grained scaffolding, focus on feedback and assessment, enabling collaborative learning, protecting student privacy, and providing teachers with automatic solutions for producing material online (Pappas & Giannakos, 2021). A large-scale evaluation of more than one million Chinese students also showed that online provision should be tailored to the age of students in primary and secondary education (Yan et al., 2021).

Understanding how students engage with learning design, especially online, can be a ‘black box’; educators have limited interactions with students compared to face-to-face or blended teaching and thus limited insights about students’ engagement with learning material. To this respect, access to learning analytics can be crucial. Studies have shown that they can empower teachers, provide student insights otherwise not accessible (Herodotou et al., 2019) and lead to better student performance when systematically used by teachers (Herodotou et al., 2020). Learning analytics refer to the collection, analysis and reporting of data about students and their interactions in online environments (SOLAR, 2021). They provide insights about what students are doing while working remotely, whether they are facing any difficulties or engaging and progressing as expected such as when they are connected, for how long, which devices they are using, what content they are accessing, their interactions in forums and their performance in online assessments such as quizzes. In addition to that, predictive learning analytics use machine learning techniques to provide predictions about future student outcomes enabling teachers to intervene and support students before they fail.

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The pandemic has been seen as an opportunity for learning analytics ‘to shine’ (Hernández-García et al., 2020). It has put to the fore areas of interest not previously considered such as analytics reports for identifying cheating in online exams (Whitelock et al., 2020; Okada & Whitelock, 2019), sentiment analysis for capturing student stress levels online and an emphasis on ethics, security and learners’ privacy. We have also seen institutions design and visualise learning analytics for the first time in an effort to support data-informed decision making (e.g., <https://digital.bu.edu/bu-learning-analytics/>).

The Open University UK is one of the few institutions worldwide where learning design and learning analytics have become business as usual. It has developed tools and dashboards that visualise the learning design of online courses and student data such as engagement with courses, previous performance and demographics. These tools are accessible to teachers and used to inform their feedback to students and to course design teams to reflect and improve the design and activities of courses in ways that meet student needs.

## Science laboratory work

Among the many challenges for educators during the pandemic was the inability to access laboratory settings where students experience the practical work associated with their courses. In conventional universities the pandemic has required a response to provide lab work during the pandemic. At the University of Sheffield, Bishop et al. (2021) report on the way in which practical activities in computing, control, electrical and electronic engineering have been taught using ‘socially distanced in-lab sessions, remote access to in-lab equipment, take-home kits, and other online methods’ (p 1.). Interestingly an evaluation of the experience revealed that students would be willing to include some aspects of the distance delivery in the future, including the take home-kits. When the results were further examined it was clear that among the activities which were rated highly in this way, there was a shared feature contributing to this high rating, that of real time cause and effect, while group simulations and video quizzes were less effective. On the other hand Pennisi (2021) reports on some experiences in the USA, in particular the use of streaming to deliver remote field trips and also hybrid approaches where a mix of features are included e.g. smaller numbers in in-person labs augmented by virtual approaches.

In terms of support for collaborative learning and informal interaction there is a need to carefully consider how the benefits of informal interaction on field trips and the benefits of collaborative learning in group work can be preserved. It is encouraging that there are many interesting attempts to look carefully at online laboratory work developing through the pandemic.

Suggestions are being made about what is important, Guo (2020), for example, suggests that synchronous online sessions should be mandatory.

The Transformation of Access and Student Outcomes in Higher Education hub (TASO, 2021), using a ‘what works approach’ to evaluating evidence on the efficacy of different ways of online teaching, is recommending more robust Randomised Controlled Trials (RCT)-based evaluations of all aspects of online teaching and learning. However, case studies and the reports of practice are valuable ways of amassing evidence too.

The Open University UK, where all undergraduate science students study remotely, faced the problem of laboratory access from its inception in 1969 and developed a number of

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approaches to providing students studying science with access to practical experiences. Initially this involved the incorporation of a variety of media in courses. For example, radio or audiotapes, TV demonstrations of experiments and laboratory classes together with home experiment kits and in-person day schools were incorporated into the media mix for these courses. As technology enhanced learning techniques and tools became more available, these too were appropriated to help provide practical experiences (see Scanlon, 2011). The experience of the use of technology tools in this way was found to ‘promote enthusiastic engagement with science and give opportunities for participation and learning. For example, the use of simulations allowed for hands-on experimental work to take place at any time, in a playful manner and by learning through failure, exploration and experimentation. Simulations lower the barriers to participation and make it easy for people to engage with activities often viewed as determined by scientists’ (Scanlon et al., 2019, p. 135).

Some aspects of practical work were missing from this smorgasbord of activity when physical attendance at day schools or laboratories became impossible during the pandemic. For example it is difficult to replicate the sights and smells of experiments in the physical laboratory.

The openSTEM Lab (see Kukulska-Hulme et al., 2020) was developed to allow distance learners to access practical work remotely. This includes a suite of distinct labs incorporating the OpenScience Lab, the OpenScience Observatories (OSO) and the OpenEngineering Lab. Various types of experience are offered across the labs including interactive screen experiments, simulations of experiments, data collection and interpretation for citizen science activities, remote access to analytical instruments, remote control of robots, virtual reality field trips, and live labcasts that connect students and lecturers via live web streaming. The OSO, for example, provides access for students to two remotely operated optical telescopes based in Tenerife and a radio telescope based at the OU campus in Milton Keynes. The OpenEngineering Lab allows practical lab-based teaching at a distance covering engineering, electronics, control, materials and robotics.

These laboratories can be used to connect students to instrumentation, data and equipment for practical enquiries over the Internet. Whether the physical and social aspects of the laboratory activities can be sustained to allow students to acquire and practise lab-based skills is the subject of continuing research. Labcasts can allow students and lecturers to connect via web streaming. More and more virtual labs are becoming available in higher education for science and engineering (see e.g. de Jong, 2014).

Another activity that can often be inaccessible to learners (especially during the pandemic) of science and many other subjects is fieldwork. Our experience of labcasts used to connect students with field sites can be helpful here. In a recent study Grand and colleagues (2021) conducted a study of live fieldcasts in a geology course during the pandemic and found that the positive aspects in relation to accessibility were valued, while aspects of the shared experience could be considered further.

Particularly in terms of field trips, the restrictions of the COVID-19 pandemic have required very different responses from higher education communities. It is interesting to speculate whether restrictions on travel as a response to the climate emergency will have a similar long term effect on these types of pedagogical practice.

## Conclusion

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In this editorial, we reflected on how the pandemic has forced educational institutions to rapidly adjust their provision to online demands. We discussed key challenges related to the shift from physical or place-based to online assessment, access to fieldwork and practical work in laboratory settings, and effectiveness of new configurations of learning design with the addition of elements such as pre-recorded lectures and identity verification techniques. We stressed the importance of learning analytics to inform educators and institutions about learners' engagement and progress with online material and provide them with insights otherwise not accessible. We noted how the Open University UK, being an online and distance learning institution since 1969, has leveraged or developed solutions to successfully enable remote learning across undergraduate and postgraduate education. In particular, practical work in STEM has been supported through online tools and simulations featured in the award winning OpenStemLabs. Learning design helped visualise online course implementations and learning analytics catered for identifying points of difficulty and areas for improvement. Analytics opened a window to the student experience by making online students 'digitally more visible' (Herodotou, 2021). Mechanisms for monitoring teachers' feedback practices ensured fairness and promoted teachers' professional development. Automated ways of supporting students with preparing essays are a means to help students improve their skills in writing assessments (see Whitelock et al., 2017).

Despite being in a rather advantageous position, the Open University faced unique challenges. The pandemic has seen an increasing number of students registering with the Open University putting extra pressure on staff wellbeing and mental health as well as the provision of student support. Research activities have been purposively steered towards understanding and supporting those most impacted by the pandemic, focusing on issues of online learning and teaching, inequalities and health and wellbeing (<https://iet.open.ac.uk/online-learning-and-education>). All exams have been delivered as remote exams (at home). Answers were either submitted electronically or handwritten and scanned within a specified submission window. They were 'open-book' exams which means that students could consult course material and adapt to a new form of testing, which had not been experienced before. However, automatic assessment such as multiple-choice questions which can also support free text entry have been familiar forms of both formative and summative assessment during this period.

These different perspectives on the evaluation of the COVID-19 experience together with the underlying tenets of good pedagogical practice leave more questions than answers. Shaping a future research agenda requires us to consider issues of sustainability and resilience of any implementation taken forward. A recent collection of COVID-19 studies concluded with the need to promote care and community, enable professional development and support accessibility in sustainable ways (Jordan & Jones, 2021). This would align well with the climate and energy objectives for 2030 and the creation of educational systems that are resilient against future environmental shocks (European Commission, 2021). These natural disasters and governmental instability also give rise to an increase in refugees who have educational needs such as learning a new language (Xu & Buckingham, 2021). Therefore in order to meet students' needs, the ideal post-pandemic educational system should consider the role of technological innovation in both teaching and research. (Ashour, 2021). In terms of teaching, emphasis should be placed on new ways of teaching, learning and assessment, especially those approaches that have been tested and shown to be effective in enabling students' growth and development.

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The latest Innovating Pedagogy Report (Kukulska-Hulme et al., 2021) emphasizes the development of student-teacher relationships that can improve mental health and wellbeing, equity-oriented pedagogies that include consideration of unique student realities and the active involvement of students in creating their own teaching material and activities. Technologies can enrich teaching by creating immersive and collaborative learning experiences through, for example, the use of augmented and virtual reality. Automated feedback systems supported by Artificial Intelligence can enable real-time feedback at an individual level and automatic systems can suggest the mark that might be awarded with draft essays (Whitelock et al., 2015; Deeva et al., 2020) especially where teaching resources are limited, and support problem-solving and communication.

In terms of research, the processes of conducting scientific investigations and the need to access specialised equipment should be reconsidered. National and international collaborations amongst universities would enable a distributed research approach, allowing scholars to use facilities and access expertise at any geographic location and any time. Online citizen science tools (e.g., [www.nquire.org.uk](http://www.nquire.org.uk)) could direct the process of setting up an investigation when expert support is unavailable or hard to reach. Assessment has long been recognised as one of the drivers for learning (Rowntree, 1987) and we now have a new set of questions to address with a move to online summative assessments. These include: What is the future of the exam? What have we learnt about online proctoring? And, Is contract cheating the next normal? Educational technology has a role to play in any future research agenda, but a multidisciplinary approach is required from particular intellectual ecologies (Strike & Posner, 1992) if pedagogically based, sound educational technologies are to be developed to support personalised learning.

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