

Introduction to digitally enhanced learning

DR VICKI DALE; RICHARD BEGGS; AND IKEDINACHI OGAMBA

The contributions in this chapter are themed accordingly; engaging learners online; quizzes and polling; images, audio, video and multimedia; and enhancing the virtual learning environment. Core to all chapters are the key concepts of student engagement and active learning, with their application to digital education accelerated by the Covid-19 pandemic.

Engaging learners online

The benefits of technology-enhanced learning and teaching (TELT) have been outlined as increased flexibility including a mix of synchronous and asynchronous activities, more personalised learning, support for pre-arrival induction activities, and the potential of learning analytics for monitoring and supporting students (Gordon, 2014), as well as a more engaging learning experience which meets student expectations and assists in the development of information literacies and lifelong learning skills (Adekola et al., 2017). However, real challenges exist; for example, Duranton and Mason (2012) discussed the ‘loneliness of the long distance learner’, and this sense of isolation has been identified in more recent studies in the context of remote learning during the Covid-19 pandemic (e.g. Griffiths et al., 2021). Key to countering this issue and lack of ‘teacher presence’ (Garrison et al., 1999) is student engagement. The active learning methods described in this section represent ways of engaging learners online, synchronously and asynchronously.

[Groothuijsen](#) describes the use of a remote online laboratory for experiential learning about machine control in engineering education. Using pre- and post-lab activities, the authors align activities with Kolb's experiential learning cycle, to stimulate planning, doing, reflecting and learning from the virtual lab.

An activity which can be used in synchronous or asynchronous teaching is described by [Ogamba](#); 'map pin-boarding' can be used as an ice-breaker activity, embracing the international diversity of student cohorts, or for co-creation; for example, in relation to crowd-sourcing case studies to illustrate authentic global challenges.

A variety of student engagement techniques are described by [Osituyo](#). An online quiz following a pre-lecture video enables monitoring of student engagement and performance prior to a live session. Different techniques for engaging learners in the class include multiple choice questions (MCQs) and 'Padlet summaries'.

[Di Ciolla, Nerantzi and Chatzidamianos](#) reflect on a 'block 'n' flip' approach to learning developed during the Covid19 pandemic. This is a peer-assisted, flipped learning approach to blocked teaching delivery that, through the use of a video tagging software called EVOLI, promotes active, collaborative learning, and facilitates students' engagement with each other and with the subject.

Using woodworking as an example, [Parkman](#) considers that adult learners with a specific need will engage actively with otherwise passive videos on YouTube, and encourages us to think about how to harness this motivation to learn from videos in other contexts.

Quizzes and polling

Bonwell and Eison (1991) define active learning as involving students in doing things and thinking about things they are doing. However large cohort sizes, more traditional learning environments and timetabling constraints often create barriers to achieving this.

Quizzing and polling technologies, accessed via mobile phones and tablets, can potentially transform any learning environment into an active learning space by taking advantage of the devices students have in their pockets and bags, known as bring your own device (BYOD) (Ballagas et al., 2004). Care and planning is needed around access to devices, such as working in pairs and groups to share devices (Beggs, 2016), to mitigate against the digital divide (van Dijk, 2020). In addition, continuing professional development activities are important for educators in order to acquire the technical competence required for enhancing teaching practice using BYOD-based technologies (Siani, 2017). Functionality of quizzes and polling ranges from basic multiple-choice questions (MCQs) to more complex question types, annotating diagrams and open questions from students. Students expect to use technology for their learning, but it needs to be relevant to their success (Beetham & White, 2013). These tools can also provide a platform to encourage engagement of quieter students (Khalil & Ostafichuk, 2020).

[Millmore](#) explores using Mentimeter, an anonymous polling tool to engage students in both large lecture cohorts and small group tutorials with undergraduate law students. The anonymous nature of the tool also provides a more inclusive environment encouraging all students to engage.

In his chapter, [Ogamba](#) shares his approach to playful pedagogy facilitating the flipped classroom through synchronous online quizzes via his PrepQuiz initiative that uses Kahoot. He explores how his formative, gamified approach can motivate students to complete the preparatory study needed within flipped classroom pedagogies.

Interestingly, [Richardson](#) discusses how she utilises Poll Everywhere with the ‘muddiest point’ technique to capture real-time student feedback on their own learning during large lectures.

Other tools can provide opportunities to try something different to basic polling; [Niño](#) shares her practice of using EdPuzzle, a video-based quizzing tool to integrate video-based self-assessment. According to the Jisc Digital Experience Insights report, there has

been a rise in the use of online video resources over the years (Jisc, 2021); Niño's approach not only provides video content for her students but also facilitates formative assessment and prepares them for summative assessments.

[Vasant](#) explores an alternative to online polling and quizzing tools utilising collaborative technologies such as Google Docs or Word Online to facilitate a team-based True/False quiz inspired by the popular BBC TV quiz show 'Would I Lie to You'. Leaning on the flipped classroom, his approach requires students to co-create 'lies' and one truth informed by pre-session learning. The mode of delivery can either be face-to-face or online via Teams, Zoom or a similar technology.

Multimedia

The use of different media – or multiple media (multimedia) such as images, audio and video – in learning and teaching can engage learners and promote active learning. In online or blended learning for example, the inclusion of teacher videos can enhance 'teacher presence' and 'social presence' respectively (Huang, 2020). The inclusive concept of universal design for learning (CAST, 2022) requires that teachers provide multiple means of engagement, representation, and action and expression – that educators should provide choice in how students engage with learning, and that they should also be able to demonstrate their learning in different creative ways. The latter relates to the concept of multimodal assessment (Ross et al., 2020), and as well as creating choice about how students evidence learning, this helps students develop essential graduate attributes such as digital skills and media literacy.

The use of infographic-type activities to foster active deep learning is presented by [Kozar](#). She provides ideas for enhancing student participation in flipped classroom by asking learners to create infographics of the key information from pre-session tasks,

to promote deep learning and classroom discussion during synchronous sessions. She also provides ideas for using infographics as assessment and for comparative analysis and discourse.

[Miliopoulou](#) presents the use of memes to enhance classroom engagement and learning among students. The idea is to make learning fun and active as students create and generate memes on a relevant topic of discussion using their mobile phone. This allows them to express their thoughts and demonstrate learning in various visual and creative ways.

[Jolley](#) discusses the engagement of students in group work through co-creation of podcasts to demonstrate learning in a research-inspired manner. This student-centred activity enhances active learning and enables learners to develop collaborative learning and presentation skills, and digital and reflective skills.

[Alexiou](#) discusses the integration of pre-recorded video presentations to enhance students' learning of historical and contemporary concepts and practices, and to motivate students to actively engage in classroom discussions, particularly effective in critical and contextual studies.

[Cowie](#) describes the use of a Microsoft application, FlipGrid, to create videos and engage students in creating a sense of community and interaction between teachers and students. FlipGrid can be used for traditional teaching and learning, or as part of a flipped classroom, to empower students to share their ideas and knowledge in a more personal and creative way.

An overview of the benefits of ThingLink, an educational platform for promoting a visual and interactive learning experience, is provided by [Edwards-Smith](#). The platform allows embedding various forms of content including text, images, surveys, videos, website links in one space. It can be used for engaging students on synchronous and asynchronous learning activities and for facilitating a flipped-classroom approach.

Enhancing the virtual learning environment

It is clear that the Covid-19 pandemic has had an accelerating influence on the refinement of digital education. ‘Emergency remote teaching’ (Hodges et al., 2020) was succeeded by the need to consider best pedagogical practices in the context of a temporary online pivot (Nordmann et al., 2020). Despite years of advocacy for pedagogically informed technology enhanced learning, it is only now that digital education has moved beyond the early adopters to the majority of educators who have had to leverage it out of necessity (Specht et al., 2021). Coincidentally, the increased focus on student-centred learning contributed to a rethinking of the role of the virtual learning environment (Phipps et al., 2018), and the extent to which it can fulfil student and teacher expectations either as a proxy for the physical space during remote learning, or as an extension of the campus in the context of blended learning. Using González’s (2012) taxonomy, this requires moving beyond an information focused strategy using the VLE simply as a repository for learning resources, towards a communication focused strategy to promote deep thinking, and a collaborative learning strategy for collective knowledge building.

It is in this spirit that [Roberts and Munday](#) illustrate the use of MS SharePoint integration with Teams to provide a VLE that shies away from typical use of VLEs as document repositories, to create a dynamic space for collaboration and knowledge production.

[Roberts and Munday](#) also discuss the adoption of MS Teams for virtual workshops to provide an inclusive alternative to in-person teaching, alleviating pressure on campus room provision, and incorporating third party plugins to create multimodal virtual spaces for active engagement.

Finally, [Peramunugamage](#) presents us with MOOMobiPBL – a mobile application which is a proof of concept plugin for the Moodle VLE, which facilitates problem-based learning in an online or blended context. Students work in their small groups in a shared

virtual workspace, and the system also supports self-, peer- and tutor-assessment.

Take-home message

It is clear that the thread that runs through the rich tapestry of this section is engaging learners in online and blended environments, an important pedagogical construct underpinned by active learning and ‘presence’ – principles that have been emphasised during the Covid-19 pandemic (Ahshan, 2021; Rapanta et al., 2020; Tan et al., 2020), which has accelerated developments in digital education. Regular interaction with students, opportunities for online self-assessment, engaging multimedia, and enhancing the VLE, are essential to ensuring students have a rewarding learning experience and optimised learning outcomes.

These strategies are not only transferable to different disciplines, but also to other learning technologies. For example, Ogamba suggests using a Padlet map layout; however, a Google maps tour or other geographic interactive tool would also support this activity. Similarly, the activities described by Osituyo could be facilitated using any electronic voting tool or collaborative document on a supported platform. Likewise, quizzing is not restricted to dedicated apps, and other collaborative technologies such as Google Docs and Word online can facilitate these activities. The choice of a specific technology is likely to depend not just on pedagogical/technical affordances, but also the data sharing agreements in place at individual institutions, to respect data privacy laws, and the digital accessibility features afforded by individual technologies to promote equitable participation.

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About the Authors



Dr Vicki Dale

UNIVERSITY OF GLASGOW

<https://twitter.com/vhmdale?lang=en>

Dr Vicki Dale (BSc MSc MEd PhD CMALT SFHEA) is a Senior Academic and Digital Development Adviser at the University of Glasgow with almost 30 years' experience of working in higher education. Originally a graduate of archaeology, with many subsequent years as a learning technologist, she spent a significant period of time researching veterinary education. Over the last ten years, she has focused on evaluation of e-learning, and curriculum design for online, blended and active learning across a range of disciplines and levels.



Richard Beggs

ULSTER UNIVERSITY

<https://twitter.com/rbeggsdl>

Richard works in the Centre for Higher Education Research and Practice (CHERP) and teaches on Ulster University's First Steps to Teaching and their Masters of Education (HE). He is the lead for the Learning Landscapes project in which active learning is at its core. He has worked in HE for 15 years and prior to joining CHERP worked in the University's Digital Learning department for 11 years. Richard is the chair of the ALT Active Learning Special Interest Group.

Ikedinachi Ogamba

COVENTRY UNIVERSITY

<https://twitter.com/ikeogams>

<https://www.linkedin.com/in/ikeogams/>

Ike Ogamba has a broad experience of leading the design and delivery of learning and teaching in HE and leadership and management experience in global health and development practice. He is a Senior Fellow of the HEA, with Scholarship of Teaching and Learning (SoTL) interests in design, innovation, digital education, e-learning, inclusive and authentic curriculum.