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LEARNING ANYTHING EVERYWHERE BUT HOW?

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Advances in Online and Distance Education:
Selected Papers from the RIDE 2024 Conference

Editors:
Stylianos Hatzipanagos and Norbert Pachler

Editorial Team:
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Stylianos Hatzipanagos
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Norbert Pachler
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Introduction

I am pleased to present the first issue of the CODE occasional papers. This publication presents selected papers from the 18th International Research in Distance Education and e-Learning (RIDE) conference, organised by the Centre for Online and Distance Education. The conference was held in a hybrid format at Senate House, University of London, on 14–15 March 2024. The theme, 'Learning: anything, everywhere, but how?' explored factors contributing to successful distance learning.

This conference is the flagship event of the Centre for Online and Distance Education, and this special issue has allowed us to capture and disseminate some of the key events of this conference for future educators and scholars to build upon this work.

As the Centre Director, I had the great pleasure of viewing these papers at the conference, and I can now commend them to you. I'd like to take this opportunity to thank the editorial team for bringing together this issue and the University of London for its continued support for CODE.

Linda Amrane-Cooper

Director Centre for Online and Distance Education

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Editorial

The RIDE 2024 conference proceedings showcase a diverse selection of studies and insights from recent advancements in distance and online education. This editorial provides an overview of the selected papers, aligned with the themes under which the papers were presented at the conference.

Section 1: Designing for belonging and wellbeing

The importance of fostering a sense of belonging in online and distance education is addressed by **Akanbiemu** and **Ayoko**, both from the National Open University of Nigeria. Akanbiemu proposes a framework based on Communities of Practice and Transactional Distance Theory to address isolation among learners with a focus on inclusive course design, timely feedback and peer interaction. His approach aims to strengthen student engagement. Ayoko explores the high dropout rates common in Open Distance and e-Learning programmes, highlighting that feelings of alienation contribute significantly to student attrition. His paper underscores the importance of supportive policies and interventions to counter dropout rates and he claims that fostering belonging not only enhances retention but also reduces societal costs associated with dropout. **Cornock**'s case study from the University of Leeds complements these perspectives by examining accessibility through a systems-thinking approach, emphasising that accessibility standards alone are not enough to ensure equitable learning for students with special needs. This approach reveals hidden challenges and shows the value of a holistic view of course design to achieve inclusive and accessible learning experiences.

Section 2: Emerging pedagogies and methods for fostering collaboration

The need for effective collaboration tools is explored in **Lando** and **Bowdler**'s evaluation of Microsoft Teams Spaces at City, University of London. They acknowledge the potential of a tool such as Teams Spaces to facilitate collaboration, however they argue that it requires additional support for users to maximise its potential. Their findings suggest that improving digital literacy and support for both students and staff is critical to enhancing engagement and fostering a collaborative learning environment.

Section 3: Emerging pedagogies and methods for professional learning

In this section, **de Paeztron**'s ethnographic study focuses on the design of temporal structures in online part-time courses. Her research on an MBA programme reveals challenges in balancing synchronous and asynchronous interactions, where synchronous 'prime time' is often privileged over flexible learning schedules. Her study highlights the importance of thoughtfully designing time structures in online courses to support diverse learner needs and optimise engagement in asynchronous interactions. **Gorak-Stolinska** and **Bednarska** from the London School of Hygiene & Tropical Medicine address the challenge of teaching practical laboratory skills online. Using multimedia tools such as videos, quizzes and podcasts, they aim to replicate hands-on lab experiences essential for biomedical sciences disciplines. Their study shows that these interactive elements help students grasp complex concepts and support knowledge retention, although barriers such as digital poverty affect students in under-resourced regions.

Section 4: Researching pedagogies and methodologies

The paper by **Page** and **Sackey** presents initial findings from a project analysing the use of collaborative learning activities on fully online master's degree programmes at the University of York. This work on better understanding the nature and levels of collaborative learning on these programmes was undertaken in order to enhance internal module maintenance and development processes and strengthen opportunities for collaborative learning with applicability to provision at other institutions.

Section 5: Emerging practices and methodologies

In their paper, **Ball** and **Averna-Joint** discuss the use of digital Reusable Learning Objects with a specific focus on behaviour management that are embedded in a wider digital community of practice in the training of teachers for the University of Warwick's fully online international programme leading to qualified teacher status. Two particular issues emerge from the discussion: accessibility and student engagement.

Section 6: Internationalisation and transnational education

In her paper, **Golding** rightly highlights the fact that postgraduate research supervision tends to be an underdeveloped aspect of teaching. The study analyses a series of collaborative workshops for experienced supervisors from across the UK and a number of countries of sub-Saharan Africa, with a focus on formative peer review based on the UK Council for Graduate Education's accreditation framework for experienced doctoral supervisors. The findings, *inter alia*, stress the need for context-responsive and culturally sensitive facilitation.

The final paper in this volume, by **Sareen** and **Mandal**, deals with the issue of the digital divide in higher education blended learning across the global North and South. The discussion is based on a systematic literature review and finds that often in the global South resource considerations can get in the way of a focus on digital competences and other issues in the available literature.

The insights in this collection of RIDE 2024 papers offer guidance for building more inclusive, accessible and impactful online learning environments. Addressing themes such as fostering belonging, enhancing collaboration, supporting professional learning, refining pedagogical practices and advancing internationalisation, these papers highlight the critical role of inclusive and context-sensitive strategies. They explore frameworks to address learner isolation and dropout rates, propose solutions for improving accessibility and the digital divide, and engage in debates on temporal structures, collaborative tools and digital resources.

Stylianos Hatzipanagos and Norbert Pachler

CODE Fellows

Section 1: Designing for belonging and wellbeing

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Cultivating a culture of belonging: strategies for Open Distance and e-Learning institutions

Adetola A. Akanbiemu, PhD

National Open University of Nigeria

Correspondence email: aadewojo@noun.edu.ng

Abstract

Open Distance and e-Learning (ODeL) institutions face the challenge of creating a sense of belonging and community among their diverse and dispersed learners, who may experience isolation, alienation and marginalisation in their online learning environments. This paper explores the concept of belonging and its implications for ODeL institutions, and proposes a framework of strategies to foster a culture of belonging and engagement among ODeL learners, based on the literature and best practices from various contexts. The paper adopts a conceptual and analytical approach, drawing on Communities of Practice (CoPs) and Transactional Distance Theory, as well as empirical studies to enhance belonging and engagement among learners. The paper suggests corresponding strategies for ODeL institutions to cultivate a culture of belonging, such as: designing inclusive and interactive courses, providing personalised and timely feedback, facilitating peer-to-peer collaboration and support and promoting intercultural awareness and sensitivity. The paper concludes that cultivating a culture of belonging is essential for ODeL institutions to achieve their educational goals and to enhance the quality of the online learning experience for their learners.

Keywords: Culture, Belonging, Wellbeing, ODeL, ODeL Institutions

Introduction

Open Distance and e-Learning (ODeL) institutions have become integral components of the modern educational landscape, offering flexible and accessible learning opportunities to a diverse range of students. However, the nature of remote learning can present unique challenges, including feelings of isolation, disconnection and a lack of belonging among learners. In traditional brick-and-mortar educational settings, the physical presence of a campus, face-to-face interactions and a sense of community contribute significantly to a student's sense of belonging. In contrast, ODeL institutions rely on virtual platforms, asynchronous communication and remote engagement, making it essential to explore and implement strategies that cultivate a culture of belonging in these settings.

A culture of belonging in education is of paramount importance as it significantly impacts student success, retention and overall wellbeing. Research has shown that a sense of belonging in a learning environment positively influences student performance and reduces attrition (Fink et al., 2020). This is particularly crucial in online education, where meaningful group and peer interactions are essential for promoting a sense of belonging among learners (Peacock et al., 2020). Additionally, the significance of belonging in enhancing student learning, engagement and retention has been emphasised, highlighting its pertinence in educational settings (Lipsedge and Mulrooney, 2022). Belonging ultimately helps students develop relationships and motivates them to be more successful in both academic and life contexts throughout their education (Williams et al., 2021). In the context of online education, interactions, a culture of learning, and support have been

recognised as important themes for promoting a sense of belonging (Miller-Young et al., 2021). Moreover, a sense of belonging has been linked to students' self-esteem and inspiration, highlighting its significance in driving student success and wellbeing (Suan and Magallanes, 2020).

The culture of belonging holds significant importance in the context of ODeL institutions. As higher education institutions have increasingly adopted ODeL as an alternative strategy, it has become imperative to understand the impact of this shift on student learning interactions and their sense of belonging (Durodolu et al., 2022; Zamora et al., 2022). Research has shown that a sense of belonging is crucial for academic success and retention in any learning environment, including distance education settings (Sokolowich et al., 2022; Lim et al., 2022). Furthermore, the success of e-learning implementation is contingent upon understanding technological, financial and institutional, educator and student barriers, emphasising the need to address issues of equity related to the sense of belonging in the online learning context (Elshaer and Sobaih, 2022; Toland et al., 2022).

The significance of the culture of belonging is further underscored by the impact of the recent acceptance of ODeL, which has accelerated the adoption of e-learning in educational institutions (Durodolu et al., 2022; Ali et al., 2022). Studies have highlighted the challenges faced by students, such as lower levels of self-efficacy and higher academic anxiety in the context of online classes, emphasising the need to create an inclusive and supportive learning environment to foster a sense of belonging (Green, 2022; Toit-Brits, 2022; Blignaut et al., 2022). Moreover, literature emphasised the need for personalised feedback, teacher presence and the establishment of a relationship-rich education environment to promote and sustain a sense of belonging among students engaged in e-learning (Lim et al., 2022; Toit-Brits, 2022; Blignaut et al., 2022).

In ODeL institutions, cultivating a culture of belonging among students, faculty and staff presents a significant challenge. Despite the benefits of flexible learning modalities, such as accessibility and convenience, there exists a pressing need to address the sense of isolation and disconnection often experienced by individuals within these educational settings. The lack of physical presence on campus, the limited face-to-face interaction and the diverse student demographics further compound this issue, making it imperative to identify and implement effective strategies to foster a supportive and inclusive learning environment.

Objectives

This study aimed to investigate and explore strategies for cultivating a culture of belonging among students in ODeL institutions. The specific objectives were to:

- identify existing challenges and barriers that hinder a sense of belonging in ODeL environments
- suggest strategies to foster a sense of belonging among ODeL students.

Theoretical foundation for culture of belonging in education

Communities of Practice (CoPs): CoPs are groups of individuals who share a common interest or profession and engage in collective learning through sharing experiences and best practices (Scheepers and Berg, 2023). CoPs in ODeL institutions cultivate belonging by enabling collaboration, knowledge sharing and community building. Utilising CoPs, institutions enhance engagement, fostering supportive networks where learners connect, share insights and collaborate, enriching the interactive learning experience and promoting belonging (Mphahlele and Makokotlela, 2020). CoP can serve as a mechanism for personalised support and mentorship in ODeL settings. By establishing CoPs focused on specific subject areas or learning objectives, institutions can provide tailored support to students, addressing their

individual needs and enhancing their sense of belonging within the academic community (Quiñones et al., 2021). This personalised approach to learning support can contribute to increased student satisfaction and academic success in ODeL programmes (Amin and Piaralal, 2020). CoPs play a vital role in promoting inclusivity and diversity within ODeL institutions, which can foster a culture of respect, understanding and collaboration among learners from different backgrounds (Magare et al., 2022).

Understanding belonging in ODeL

Culture of belonging refers to the creation of an inclusive and supportive environment where individuals feel connected, accepted and valued within a particular group or community (Fernández et al., 2023). This concept is fundamental in various contexts, including higher education, workplace settings and social communities. The culture of belonging encompasses the promotion of diversity, equity and inclusion, where individuals from diverse backgrounds feel a sense of acceptance and connectedness. Research has highlighted the significance of belonging in influencing individuals' motivation, wellbeing and academic or professional outcomes (Fernández et al., 2023). It is emphasised that a culture of belonging is a fundamental human need, and its importance remains strong even in virtual or remote environments (Bennett and McWhorter, 2021). The concept of belonging is multifaceted and can be influenced by various factors, including gender, socioeconomic background and cultural diversity (Fernández et al., 2023). Furthermore, the development of a culture of belonging requires intentional efforts to create an environment where individuals feel welcomed and supported, particularly in educational institutions and workplace settings (Covarrubias, 2023).

In the context of higher education, fostering a culture of belonging is essential for student success, wellbeing and academic engagement. It involves creating an environment where students feel connected to the academic community, supported by their peers and educators and included in the learning process (Morán-Soto et al., 2022). The lack of development of a sense of belonging in specific groups, such as engineering students during the COVID-19 pandemic, underscores the challenges in maintaining a culture of belonging in virtual learning environments (Morán-Soto et al., 2022). The concept of belonging extends beyond individual experiences and encompasses shared elements within a community or group (Bansal, 2022). It involves creating a sense of attachment, cohesion and shared identity, which contributes to a supportive and inclusive environment. Additionally, the role of cultural and intergenerational belonging has been explored in the context of immigrant communities, highlighting the complex dynamics of belonging within diverse cultural contexts (Albert, 2021). The adaptability to sudden transitions to online learning during the COVID-19 pandemic has highlighted the positive reactions and learning adaptability of students who reported greater feelings of belonging and mattering (Besser and Zeigler-Hill, 2022). Williams et al. (2021) explored the impact of belonging on student success and emphasised the role of instructors' choices in course design, technology use, mentoring and other aspects of distance learning in fostering a sense of belonging.

Challenges specific to ODeL institutions in fostering a sense of belonging

The challenges specific to ODeL institutions in fostering a sense of belonging are multifaceted and require careful consideration. However, challenges arise in creating an environment that promotes a sense of belonging through intentional and orchestrated efforts, especially for minority and disadvantaged students. This is particularly relevant in the context of ODeL institutions, where students may face additional barriers to developing a sense of belonging due to the remote nature of their learning environment (Aries et al., 2022).

The challenges to belonging that many students contend with, include feeling intimidated by renowned professors, can be exacerbated in ODeL settings. The ability to foster a college environment that promotes a sense of belonging through personalised interactions and intentional support becomes more complex in the virtual space. Additionally, attending a minority-serving institution has been found to foster a strong sense of belonging for minority students, highlighting the importance of inclusive institutional environments. ODeL institutions face the challenge of creating inclusive virtual spaces that provide a sense of belonging for students from diverse backgrounds. The disruption caused by the pandemic has necessitated a re-evaluation of strategies to foster belonging in remote learning environments.

Strategies for cultivating a culture of belonging

Strategies for cultivating a culture of belonging in virtual learning environments are essential for promoting student engagement, wellbeing and academic success. They include:

- Promote inclusivity: Ensure that all students, regardless of background or circumstances, feel valued and included in the learning community. This can involve implementing policies and practices that actively embrace diversity and create a welcoming environment for students from various cultural, socio-economic and academic backgrounds (Lim et al., 2022).
- Enhance communication: Enhance communication by fostering transparent channels among students, faculty and staff. Encourage dialogue via forums and meetings to address concerns and build connections in the ODeL community. Provide tailored support services, including advising and technical assistance, ensuring accessibility and responsiveness to individual student needs throughout their academic journey (Toit-Brits, 2022).
- Facilitate peer interaction: Create opportunities for peer interaction and collaboration through virtual study groups, online forums and group projects. Encourage students to connect with their peers, exchange ideas and support each other in their academic pursuits.
- Empower student leadership: Empower students by fostering leadership roles and involvement in decision-making processes. Provide opportunities for representation in governance and student organisations to enhance ownership and belonging. Celebrate achievements of students, faculty and staff by highlighting success stories and showcasing work to cultivate pride and accomplishment in the learning community.
- Promote continuous improvement: Continuously evaluate and refine institutional policies, practices and programmes to better meet the evolving needs of ODeL students. Solicit feedback from students and stakeholders and use data-driven approaches to identify areas for improvement and implement effective solutions.
- Build community engagement: Encourage ODeL students to engage with the broader community through service-learning initiatives, volunteer opportunities and collaborative projects. Foster partnerships with local organisations, businesses and community leaders to create meaningful learning experiences and promote civic engagement (Brown, 2023).

By implementing these strategies, ODeL institutions can create a supportive and inclusive learning environment where all students feel a sense of belonging and are empowered to succeed academically and personally. However, essentially, students' sense of belonging in online courses can be fostered by two critical elements perceivable by students in the learning environment: teacher presence and interactive course design (Fiock, 2020; Peacock et al., 2020; Stone and Springer, 2019).

Conclusion

Fostering a culture of belonging in virtual learning environments, particularly in ODeL institutions, is essential. As education transitions to digital realms, the emotional and psychological aspects of learning gain significance. A culture of belonging promotes inclusivity, support and enrichment, transcending physical barriers and contributing to learners' holistic development. In virtual learning, belonging is a prerequisite for effective education, transforming distance into proximity and isolation into community. Students feeling a sense of belonging are more engaged, seek support and persevere through challenges. Faculty and staff play a crucial role in shaping this culture, guiding and mentoring students to create a supportive learning ecosystem. Cultivating belonging is not merely an aspiration but a cornerstone for building thriving virtual learning communities.

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Student dropout in the context of administration of Open, Distance and e-Learning

Victor Olugbenga Ayoko

Department of Educational Foundations, Faculty of Education, National Open University of Nigeria

Correspondence email: victorayoko@gmail.com

Abstract

Despite the growth of Open Distance and e-Learning (ODeL) and its potential benefits, studies have shown that the rate of dropout in open and distance learning systems is higher than dropout in conventional learning environments due to issues such as belongingness and wellbeing. This paper sourced relevant data from both print and online resources. The research looks at issues historically and holistically by addressing specific scenarios that give details on the why, when, how and what of dropout. This paper reviewed previous studies from relevant literature from Google Scholar and Semantic Scholar to highlight the factors in student dropout, especially in ODeL programmes. The findings claim that learners who drop out of the educational system generally create wasted energy for learners, institutions and society in terms of lost time, effort and money. The study suggests that policymakers, researchers, developmental partners and educational agencies should formulate policies that will discourage student dropout, with a focus on ODeL institutions.

Keywords: Dropout, Distance, e-Learning, Institutional, Open

Introduction

Open Distance and e-Learning (ODeL) are modern ways of learning that allow students to study within their own space and time, without being physically present, using information and communication technology (ICT) and artificial intelligence of things (AIoT) as a medium of study. Despite the digital transformations in the field of ODeL, there is agreement among scholars that it has a high attrition rate due to many challenges related to individual, institutional and instructional issues (Musingafi, Mapuranga, Chiwanza and Shupikai, 2015).

Dropout of the ODeL system may be defined as a situation where learners either drop out of the system totally before completing their learning process or become inactive – not interacting with the programme facilitators or the system but remaining registered as students over a longer period than expected. Studies have shown that the rate of dropout in open and distance learning systems is higher than dropout in conventional learning environments (Boston and Ice, 2011).

According to Pedro and Scott (n.d.), the reasons given by online students for dropping out of the programme were not very different from those typically given by dropouts from traditional face-to-face programmes. For the dropout students, the much-proclaimed adage of 'learning anytime, anywhere' or 'work and learn' does not seem to apply. To decrease the rate of dropout in ODeL institutions, researchers must investigate the factors and agents that contribute to the rate of student dropout, the implications of dropping out and the way forward. The objective of this paper is to highlight the factors that impede the completion rate in ODeL and the ways forward. It is expected that the content of this paper will help to improve the completion rate of the

Open Education System and guide the other institutions offering open and distance education programmes towards better learning environments and increased retention rates.

Methodology

This paper sourced secondary data from both print and online resources from Google Scholar and Semantic Scholar. It reviews relevant literature on the barriers of student completion in ODeL institutions and the potential implications of dropping out by arranging data into themes and looking at issues historically and holistically.

Findings

Implications of dropping out

Learners who drop out of the educational system generally create wasted energy for learners, institutions and society in terms of lost time, effort and money (Willing and Johnson, 2004).

Financial wastage: This is a significant implication associated with dropout: students who do not complete their studies will already have had significant amounts of money invested in their education.

Time wastage: Time that could be used for other productive endeavours is wasted.

Economic wastage: A high dropout rate is additionally a huge economic waste.

Discussion

Concept of student dropout in ODeL institutions

Dropping out of the ODeL system may be defined as a situation where learners either drop out of the system totally before completing their learning process or become inactive – not interacting with the programme facilitators or the system but remaining registered as students over a longer period than expected.

Jordan et al. (1994) noted that factors within the educational environment, known as 'push-out factors', and within the concerned students, known as 'pull-out factors', contribute to dropout. However, Watt and Roessingh (1994) further noted that there are factors that are neither within the educational environment nor the concerned students, known as 'fallout factors'. The causative agent is the main difference between the dropout factors. Figure 1 shows the various factors that may push, pull or fall a student out of the school system.

Theoretical framework

Two theories provide a comprehensive theoretical framework that might explain why students drop out of ODeL institutions. They are Tinto's (1987) Student Departure Theory and Bean and Metzner's (1993) Student Non-Tradition Attrition Theory.

Tinto's (1987) theory explains the longitudinal and interactive processes that force students to voluntarily drop out of the institution before completion of the programme of study. He posited that students are active in the integration process within the institution, and both student and institutional actions determine the school environment. Social and academic integration affects whether students are committed to completing their schooling or whether they drop out. Improper integration into social or academic life at the institution could contribute to withdrawal from the school system.

Bean and Metzner's (1985) theory asserts that students' perceptions of their educational experiences are formed by their interaction with academic advisors and their course schedules, and that academic outcomes such as grades can contribute to the integration process. They also noted that external factors beyond institutional control could affect a student's devotion to studies, and available resources can impact satisfaction, commitment and academic persistence.

In the ODeL context, the educational environment must create an interactive platform that will encourage student-centred learning, and policies that will be student-friendly academically, financially and socially.

The learning environment must consider learners' ways of life and responsibilities, in contrast to the instructor control and the coverage of academic content emphasised in much conventional, didactic teaching (Cannon, 2000).

Barriers to completion, belongingness and wellbeing in ODeL institutions

The barriers to belongingness and wellbeing in ODeL were classified by Cross (1981) under three headings: situational, dispositional and institutional. Garland (1992) took the situational, dispositional and institutional factors first identified by Cross (1981), and added epistemological factors. This study was further expanded by Schilke (2001), who added technological factors, stating that distance education as studied by Garland (1992) was primarily paper-based correspondence and did not include technological delivery innovations, such as computers and the internet. Dropping out is not a single event but a process. The contributing factors of dropout interact gradually over many years before the student finally disengages. Figure 1 shows the various barriers that can lead to dropping out of ODeL institutions.

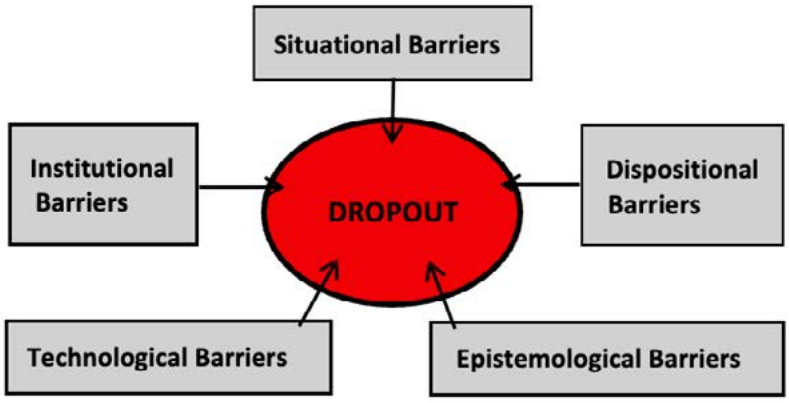

Figure 1: Conceptual model of barriers to completion in ODeL institutions.

Critical predictors that could explain dropout have recently become an important research interest among education professionals (Itzhaki, Itzhaky and Yablon, 2018).

Institutional barriers

These are barriers resulting from the policies, methods and practices of educational institutions which exclude, discriminate, discourage or push out certain types of learners from completing their education. According to Carroll et al. (2009), these barriers are also known as push-out factors. According to Jordan et al. (1994), the agent of the push-out factor is the educational environment. The student is pushed out due to adverse conditions within the educational environment that did not encourage the student's belongingness and wellbeing.

a. Leadership styles of some centre directors

   The leadership approach displayed by some academic directors is not motivating but discouraging. Leadership style has an impact because it sets the tone for the school climate and culture. Students' belongingness and wellbeing are affected negatively by negative climate and culture caused by some administrators, which leads to eventual dropout.

b. Inadequate funding and facilities

   The failure of ODeL institutions to retain students can be due to inadequate funds and educational facilities. Poor morale caused by inadequate teaching and learning facilities can easily push students to drop out. Inadequate funding for the provision of instructional and physical facilities affected the administration of ODeL in the global south. The available funds determine the quality of the educational outcome.

c. Poor communication from the facilitator/instructor

   As observed by Müller (2008), poor communication between the student and the institution leads to unawareness of the study requirements and unpreparedness before enrolment. ODeL can be isolating for learners, and lack of regular contact with the institution is an important barrier that can influence a student's decision to withdraw from a course of study.

d. Inadequate, cumbersome and difficult instructional materials

   Packham et al. (2004) indicated a cumbersome and highly difficult index of instructional materials and inflexible course design as a barrier to student academic completion in distance education. Similarly, Street (2010) stated that course-related factors were effective on dropout from the system.

e. Lack of course facilitators and project supervisors

   Another institutional factor found to influence student decisions to withdraw from the course of study is a lack of academic support (Fozdar and Kumar, 2007). A lack of facilitators or project supervisors discourages the students and they may be pushed out of the system.

Dispositional barriers

Dispositional barriers are related to students' confidence, values, perceptions, attitudes and beliefs. They inhibit and discourage the participation and interest of the learner in formal learning activities. These barriers are also known as pull-out factors (Jordan et al., 1994). Dispositional barriers include:

a. Personal beliefs

   Conscious and unconscious negative preconceptions or beliefs about ODeL are another factor discouraging to a sense of wellbeing and belongingness among students. For example, students often think that a policy adopted by the institution or the regulating government education agency is not favourable and may decide to stay away from the institution because of their personal expectations.

b. Attitude

   Attitudes, skills and characteristics such as autonomy, time management, ability to meet deadlines, self-regulation and discipline possessed by students before enrolling in the system are among the factors observed in the decision to drop out.

c. Anxiety

   Students' emotions may be negatively impacted due to inexperience in utilising the internet for learning. This leads to a lack of confidence, and eventually to fear, on the part of students who are not accustomed to the electronic environment (O'Regan, 2003).

d. Perception

   Some students have the perception that the degrees obtained from ODeL institutions are substandard because of the quasi-separation of the teachers and learners in space and time.

e. Low motivation

   Motivation is an internal or external force that drives the decision of an individual to continue or stop a process. Students could lose motivation to complete due to factors such as a demanding workload and social isolation, which can be discouraging and could make the learner feel that their presence or absence from the course is not noticed by the school authority.

Situational barriers

Situational factors are those areas related to individual circumstances at a particular time, such as family commitments, employment, health challenges, unfavourable learning environment or limited learning facilities.

a. Work/business commitments

   Job commitments and expectations do change over time. The current job requirements may not support the ODeL programme because it may be too hard to work full time and be a student in an ODeL due to time restrictions. The work–school conflict caused by the increase in workload was also indicated among environmental factors causing learners to drop out of the school system.

b. Family responsibilities

   According to Aydin et al. (2019), increasing responsibilities in family life affected time management, particularly among female learners in ODeL programmes. The two main reasons for online learners to drop out of the educational system were increases in personal/family or employment responsibilities.

c. Financial constraints

   An important factor to consider when applying for ODeL programmes is finance. Currently, these programmes lack government scholarships or bursaries. Students who need to work and study usually have limited time to concentrate on their studies and may eventually have to drop out of their studies (Watson et al., 2008).

d. Poor learning environment and inadequate learning facilities

   An unfavourable learning environment automatically hinders the wellbeing and learning outcomes of students. These constraints are catalysts for dropping out. In addition, a lack of learning devices such as mobile phones or computers can make studies in ODeL institutions impossible or impeded. This has negative impacts on the sense of belongingness and wellbeing of the affected students.

Technological barriers

The medium of education delivery in ODeL is through the use of ICT and AI. Technological barriers are those which relate to the mode of delivery in open distance learning. They include problems such as inadequate computer access, poor interactive platforms, irregular access to the internet and issues with hardware and software.

a. Technological glitches

   This is caused by poor internet connectivity and coverage. This sometimes discourages learners and facilitators. Glitches caused by computer software or hardware may cause some learners to drop out due to frustrations. According to Street (2010) and Müller (2008),

technological glitches, such as poor internet connectivity, not having access to the necessary hardware/software and being uncomfortable with the online learning technology have been identified as contributing to student withdrawal.

b. Lack of ICT and virtual interactive skills

For any ODeL student to become successful, they must be skilled in the use of appropriate computer hardware and software for attempting online interactive facilitation, online assessments and group discussion forums. Yukselturk, Ozekes and Türel (2014) observed that online technologies competencies, online learning readiness and previous online experience are the most important variables in predicting dropout.

c. Lack of technical preparation and support

Müller (2008) observed that the provision of technical support to students has the potential to influence student persistence in ODeL programmes. Students do not usually have much training or competence in the use of ICT before they venture into ODeL. This lack of technical preparation affects their progress in their studies and eventual dropout.

d. The technology overwhelmed the content syndrome

In a situation where the content is overtaken by too much technology, the learner becomes overwhelmed with the technology to the detriment of the lessons (content) to be learnt. The overuse of technology may frustrate students and this may lead to dropout.

Epistemological barriers

Epistemological barriers are concerned with the comprehension of the study (course) materials, which may be influenced by the level of experience or prior knowledge and conceptual framework of the student. When a student's conceptual framework is not in tandem with the content of the course, it limits their ability to understand and their interest in the study (Roberts, 2004).

a. Relevance of course materials

Roberts (2004) identified barriers that can influence the withdrawal of the student when an epistemological gap occurs between the student's expectations and the course content, or when the course content lacks personal expectations. Street (2010) also opined that the perception of course relevancy can influence student withdrawal.

b. Communication styles and sense of community

The communication style of a course is a positive influencer of student retention within a course of study (Rovai, 2003). A sense of community belongingness is related to student satisfaction. Students whose expectations are not met in the educational system are more likely to withdraw from studies (Woodley, 2004).

The interrelationships between barriers causing dropout from ODeL institutions

Situational barriers may influence and be influenced by institutional barriers (e.g. student's financial problem and institutional financial demand) and dispositional barriers (e.g. changes in health status or employment crisis may have negative effects on the student's motivation or confidence.

Institutional barriers may influence technological barriers (e.g. platform used may affect software/hardware requirements and accessibility) and epistemological barriers (e.g. course design affecting communication styles).

Epistemological barriers may influence dispositional barriers (e.g. lack of prior knowledge impacting upon zeal, or poor perception of the relevance of the study to personal ambition impacting upon motivation).

Technological barriers may influence situational barriers (e.g. software or hardware requirements may affect a student's financial situation).

Conclusion

The reasons for dropping out of a distance education course or programme are often due to combined factors which can be complex.

This paper suggests that:

- ODeL administrators need to build a strong community of learners because only a strong educational system–students–community relationship can produce successful ODeL students who will persist to graduation.
- Adequate and competent ICT staff should be posted to each study centre to assist in ICT and AI-related installation, maintenance and usage.

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Applying systems thinking to digital accessibility and online education: a case study

Matt Cornock
University of Leeds
Correspondence email: m.cornock@leeds.ac.uk

Abstract

This practice-based case study uses the example of developing a new postgraduate online degree programme in disability studies to explore the influence and impacts of cross-institutional functions on the accessibility of the student experience. Insights from specialist user testing demonstrated how adhering to digital accessibility standards alone, without consideration of learner context and pedagogy, can lead to potential challenges in how disabled students could experience the course. Applying the lens of systems thinking along with disabled user testing surfaced underlying issues that neither a technical accessibility or inclusive pedagogical approach alone would have identified. The application of systems thinking in design-led online education is relatively unexplored, yet this case study shows how complexity inherent in educational systems can be embraced through an understanding of relationships and impacts across an institution to enable accessible online education.

Keywords: Online Education, Accessibility, Inclusive Learning Design, Systems Thinking

Introduction

The design and provision of fully online degree programmes promises increased access to education for disabled students (Betts et al., 2013). In the online environment, the use of digital assistive technologies, standards-compliant learning platforms and accessible learning materials holds potential for all students to access, participate and achieve course learning outcomes. Yet, it cannot be assumed that in providing an educational programme online all students have equitable access, and inclusivity and digital accessibility need explicit design and strategy (Ish-Horowicz et al., 2023).

Many approaches to digital accessibility come from a perspective of technical compliance, typically adherence to the Web Content Accessibility Guidelines (WCAG) (W3C, 2023). However, digital accessibility in online education is also determined by learning activities and the learning context. In many ways, accessibility in online education is the consideration of both the technical aspects of the use of learning technologies and the pedagogical aspects of the designed learning experience. These connected approaches for accessibility can be represented with standards, frameworks and approaches, such as those illustrated in Figure 1 and explored below.

Connected approaches for accessibility

Figure 1: Connecting technical and pedagogical approaches for accessibility in education.

The WCAG standards provide a compliance basis for technical accessibility. However, even within the standards definition, it is recognised that meeting all WCAG criteria is not possible in all circumstances and not all digital accessibility needs may be met (W3C, 2023). Further, WCAG is applicable to all forms of digital content online, not just those for educational purposes, and hence arguably insufficient to fully define accessibility for education.

Universal Design for Learning (UDL) begins to bridge the gap between technical and pedagogical accessibility. The approach is grounded in educational neuroscience, an understanding of how learning works and learner motivation, though includes some of the technical guidelines found in WCAG. It is described as a learner-centred framework, rather than a set of technical standards, and this definition accommodates the varied nature of education, which differs by subject, educational level, learner and educator (Cai and Robinson, 2021). Indeed, underpinning UDL is an acceptance of the variation in learners and the intention to provide flexibility and choice through design (CAST, 2018).

Inclusive learning design offers a conceptual model for 'design that considers the full range of human diversity with its complexity' addressing limitations of UDL where individual adjustments may still have to be made (Rossi, 2023, p.xix). Therefore, it is a values-driven approach that aims to address not just known disabilities and digital accessibility, but broader inclusivity aspects of education. This is critical in the context of student disability, where disclosure of needs may not occur (Lee et al., 2021), and furthers the argument that such disclosure should not be required to allow for independent and equitable access of education. Further, in enabling independence, inclusive practices offer learner self-efficacy, a key factor in student success in the online education context (Lee et al., 2021).

Connecting these three approaches together in practice is complex and requires cross-functional collaboration, with learning technologists, learning designers and academic expertise. Within higher education institutions there are further aspects to consider, such as learning platforms, provision of disability services, IT infrastructure and course administration. Therefore, accessibility requires cross-functional strategic collaboration across the institution (Bett et al., 2013).

Case study

To explore how the three accessibility approaches above and institutional context interplay, the following case study comes from the development of a fully online postgraduate degree programme in disability studies. The academic programme team, in collaboration with specialist online learning designers, defined key pedagogical choices for inclusive and accessible online learning, particularly with the view of the programme attracting a diverse cohort of disabled students. These decisions represent the pedagogical values for accessible online education and connect with some of the principles present in UDL and inclusive learning design. They are summarised as:

- To be inclusive and global.
- Allow choice over format of assessment (e.g. written or video).
- Provide flexibility in the choice of learning content to align to individual context (e.g. selection of case studies relating to different audiences for the programme).
- Provide for both synchronous and asynchronous interaction.
- Bridge discipline and online pedagogy, and teaching at postgraduate level.

From a technical implementation perspective, learning technologists on the programme development team brought in depth knowledge of WCAG standards to the creation of materials and quality assurance processes. To

complement internal capabilities, and conscious of the potential breadth of disabilities this specific programme would support, the programme team selected and commissioned an external user testing service (appointed through a competitive quote process). Through this process the programme team explored both functionally being able to complete learning activities and the authentic human experience of the online course.

Methodology

One module was developed in draft within the learning environment (Blackboard Learn Ultra) with typical assets and activities learners would experience on the programme, including written academic material, discussion boards and multimedia.

The user testing methods and protocols were defined by the external service, based on their extensive experience of working with disabled users and specialist knowledge of accessibility testing. The testing sessions were run remotely via Zoom, facilitated by a specialist at the external service, attended by one of the learning designers and recorded for the wider programme development team to access later for reference. All user testers were paid for their time.

There were five testers, of which four were on desktop computers and one on a mobile phone device. Testers were first asked about their disability, the strategies and technology they use to navigate the online world and the challenges they tend to experience. They were then set a series of tasks based on activities learners would undertake. Testers' behaviours were observed and their attitudes and experiences surfaced through exploratory, real-time questioning.

An adapted case study approach (Yin, 2009) has been adopted to investigate the findings of user testing within the detailed context of the degree programme and institution.

Findings

An internal report provided by the user testing service to the programme team provided many assurances over the technical and pedagogical aspects of accessible online education, based on the user experience (WebUsability, 2023). However, in witnessing the experiences of being a disabled student within the fully online learning environment, the programme team observed how accessibility requires more than technical compliance. The comprehensive detail of the user testing is not explored in this case study. Three vignettes of learner experience from the internal report on user testing, reproduced here with permission, provide further insights for discussion.

Vignette 1. 'Testers who did not realise these links were accordions, double clicked on them, causing them to expand and collapse quickly without them noticing. Testers did not understand how the different sections fitted together. It was not clear which accordion was a subsection of which heading.'

Vignette 2. 'Testers did not find it completely straightforward to locate the section where they could submit an assignment – the section label did not seem to be clear for this task. Testers were unclear why this section had so many nested accordion levels – it felt unnecessary and added complexity to the page.'

Vignette 3. 'The transition from the relatively simple design of [Blackboard] to [Custom Interactive] was often a surprise for testers – it took them a moment to adjust to the new presentation. They also expected page elements to operate in the same way, which impacted how they engaged with these resources. For example, one tester was hesitant to engage with the radio buttons on the branching exercise as he had grown used to ignoring the progress radio buttons on the module dashboard.'

While the platform was mainly technically accessible, the implementation of courses within platform constraints introduced barriers as a result of commonly-used design choices over structure and navigation. For example, how sub-sections in navigation were not easily identifiable via assistive technologies and how the range of learning tools in use led to frequent changes in user interface and language. Although some of these concerns may be expressed as usability issues, they become an accessibility issue when considering the additional barriers disabled students have to overcome in navigating online spaces and completing tasks, in some cases with assistive technology.

Additional time, high levels of concentration and sometimes additional physical exertion are required when using assistive technology to navigate the learning space, interpret the user interface and then complete the educational activity. As some of the user testing showed, this is exacerbated by the limited scope of view disabled users experience through assistive technologies that can only focus on one part of the screen, present visual information verbally (or not at all), or assume particular behaviours are common across platforms. For disabled students, navigation, structure and the sequencing of learning activities have a high impact on the accessibility of the learning experience.

Discussion

Even with full technical compliance, adherence to UDL and a highly inclusive learning design approach, disabled students experience online programmes within an institutional context that is defined by decisions made by a range of stakeholders. The prime examples here are choices of processes and platforms, often determined at institutional level, but very much beholden to platform providers' priorities for accessibility. Tamim (2020) proposed that systems thinking offers a way to understand the relationships in online education settings, in doing so this brings the broader context of the system into the responsibility and awareness of all institutional services involved. The components of the online education system may be processes such as enrolment, graduation and assessment, and the typical services such as marketing, student support, course development, teaching, finance, student support, IT and administration.

A key concept is that change in one component or sub-system can have an impact on the system overall (Darzentas and Darzentas, 2014). As applied examples in online education systems, a change in library ebook availability has a consequence for the course design, or the method and speed of application processes impacts on the speed of disability service assessments and provision of support to disabled students prior to first assessment. In both cases, the student experiences the consequences of decisions or changes, but would not necessarily know the system relationships causing them (Figure 2).

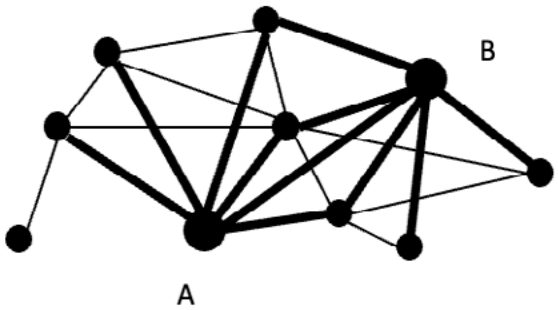

Figure 2: Visual representation of a system, including identification of sub-systems (A and B) with relationships across the system which may not be visible to all stakeholders.

From processes to relationships

The following example, taken from the user testing tasks, looks at how a learner completes a very common online activity of reading a journal article and contributing to a text-based asynchronous discussion board. Figure 3 illustrates the steps that would be taken by the learner to complete this activity, with each box representing an application or web page they have to engage with.

The example starts with the URL to the virtual learning environment (VLE) (in a web browser), the first interface encountered is single sign-on (SSO) login, which then requires use of two-factor authentication (2FA) as an app on the students' mobile phone, before access to the VLE homepage is granted. Then, a series of links are followed to different pages in order to locate the activity, journal article file (PDF) on a publisher's website, before loading this on a suitable PDF reader and returning to the VLE to complete the discussion board activity (which itself may have additional links, instructions and contributions from other learners to navigate).

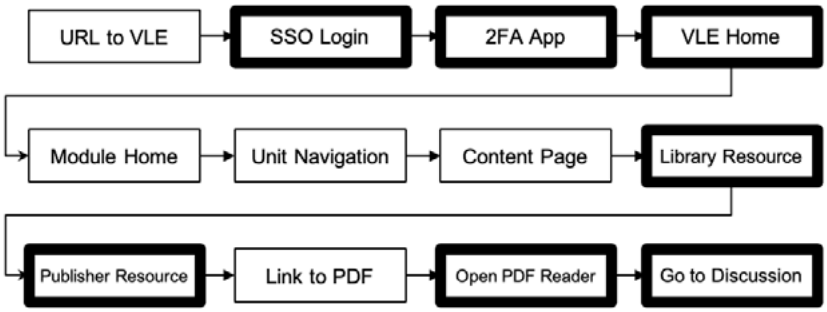

Figure 3: Process of completing a reading learning activity (bold boxes show each change of user interface).

If we consider a visually-impaired student using a text-to-speech screen reader to interpret each page, there are seven times that the navigation, language, location of links and expected behaviours will change and must be understood verbally rather than visually. While each of these platforms may indeed be compliant to digital accessibility standards, by situating these in a sequence of activity and understanding the user experience of this sequence, challenges, if not barriers, for disabled students are surfaced. Yet, it is unlikely that in the design of the activity all these components were considered.

Figure 4 shifts from process to a view of the relationships and potential influence of decisions that have been made by sub-systems on the learner experience. For example, the choice that SSO removes a login step when switching between the VLE and library resource, and how publishing copyright systems require access via third-party sites instead of PDF uploads to the VLE. Further, that the learning resource is in a separate space from the location of the learning activity, which is the discussion board, requiring high dependency on instructional design and clear navigation. Showing these relationships indicates points where decision-making and collaboration across institutional functions, and design decisions, can impact the accessibility of the learning experience.

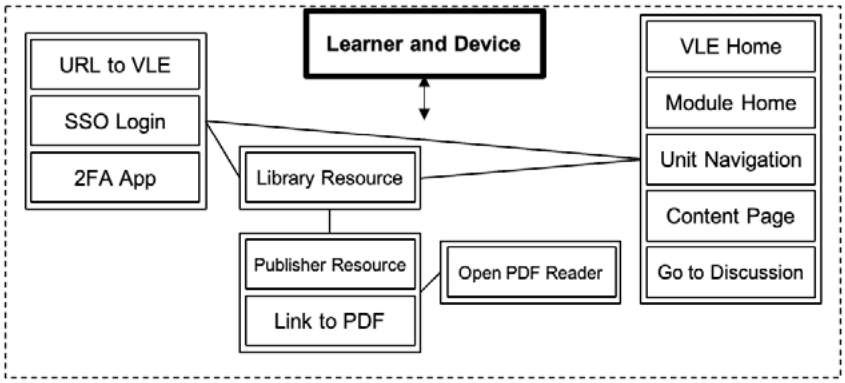

Figure 4: Relationships between sub-systems, with learner and device in the system view.

Complexity in systems

In addition to the existing organisational and user experience complexity, the human element adds further complexity to the system due to the unknowns outside the control of the institution. This is represented by the inclusion of the learner (and their devices) as a system component. How flexible the system is to adjust to the variability of the learner (changes in one sub-system) influences the ability of the system to meet desired outcomes (Darzentas and Darzentas, 2014).

Checkland's (1981; 1999) positioning of systems defined by human relationships, with a purpose of change of practice and developing a learning system, resonates with the aims of improving accessibility and inclusivity by having an adaptive educational system. Further, systems thinking methodologies can enable and enhance change processes in higher education institutions (Gregory, 2008), which will be particularly required for cross-functional strategically-led accessible online education (Warren and Churchill, 2022; Bett et al., 2013).

At course development level, programme teams therefore need a deep understanding of how they are influenced by, and can influence, relationships between student needs, disability services, teaching practices and technical services. There is a strong case for retaining complexity, and consciously engaging with complexity, in order to improve design thinking and allow for flexibility and adaptability in systems (Darzentas and Darzentas, 2014). The implication is that designing-out complexity creates a system that is not inclusive and impacts accessibility.

Conclusion

This case study has explored how technical and pedagogical perspectives of accessibility alone are not sufficient to capture the experience of disabled students within online education environments. It adopted a theoretical lens – systems thinking (Checkland, 1981) – to interpret findings which allowed exploration of the relationships within online education teams and the wider institutional context. Bringing together expertise across technical and pedagogical accessibility and drawing on experiences from user testing aid in surfacing the accessibility impacts of designed learning experiences, with multiple viewpoints of the online educational system.

In educational systems, it is critical that the learner is considered as part of the system model, enabling the experience and relationships of the learner to be integrated and accommodated. How institutions design online education, the infrastructure, processes, support and experience of online education, has to allow for flexibility and a responsiveness to individual needs, while still enabling the system as a whole to function. This is complex. However,

as explored above, engaging in user testing, design and systems thinking enables representations of experiences and models to refine and improve. While this case study is limited in the scope of a single programme, as a first step in applying systems thinking to accessibility and inclusive learning, it invites further research, to include authentic user testing, to explore systemic challenges common within and across institutions.

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Section 2: Emerging pedagogies and methods for fostering collaboration

Notes

An evaluation of 0365 Teams sites for active learning

Elisabetta Lando and Rae Bowdler

Correspondence email: elisabetta.lando@city.ac.uk and rae.bowdler@city.ac.uk

Abstract

This evaluation examines the experiences of staff and students using Microsoft Teams Spaces for learning and teaching at City, University of London from 2020 to 2022, following the shift to online due to the pandemic. While Teams Spaces was generally well-received, several challenges were identified, including student engagement, participation, administrative processes and the need for additional training and support. The findings aim to provide insights for enhancing the use of Teams Spaces, with a focus on improving current practices, supporting the growth of hybrid and online programmes and addressing the digital literacy needs of both students and staff.

Keywords: Teams Spaces, Learning Teaching, Staff Students, User-Friendly, Engagement Collaboration, Support Training Participation Office 365 Integration Flexibility, WhatsApp, Administrative, Processes, Online Learning, Professional Development

Purpose

During the pandemic, Teams emerged as an effective tool for creating supportive online communities, particularly among staff.[1] It was an opportunity to leverage the capabilities of an online platform, and related technology, to foster a collaborative approach and build a community of practice (Lave and Wenger, 1998). The Communities of Practice (CoPs) theory is also based on the social constructivism idea that learning happens within social and collaborative settings, like an apprentice acquiring knowledge and skills by actively participating in a community to develop their practice.

In September 2020, City, University of London recognised the potential of Teams for student community building and learning and so created Teams sites for every active module, particularly to support group work, collaboration and communication. These sites were intended to complement the university's virtual learning environment, Moodle. Staff and students were automatically enrolled, yet the sites were not visible to students until activated by an academic team owner. However, we found that gathering data on the activation and consequent use of Teams for teaching and learning was limited, and the provision of Teams for students' learning appears to have been underutilised, possibly due to academic team owners choosing to solely use Moodle rather than complicate matters with another virtual space. Therefore, though this is a small-scale evaluation, because of the small number of modules activated, we still hope to gain a qualitative understanding of Teams usage. The outputs of this report will hopefully be used to build on and inform support for the use of Teams sites, and other similar virtual spaces, for teaching and learning moving forward.

Approach

From May 2022 to July 2022, the University's Learning Enhancement and Development (LEaD) unit submitted an ethics application for this work; ethics approval was subsequently granted by the LEaD research ethics committee.

[1] City IT Teams community site has over 800 users, Learning and Teaching community site has over 500 users. Accessed 27 August 2024.

Following approval in July 2022, programme module leaders from all schools were invited to participate in an hour-long interview, specifically on the proviso that they had activated their Teams sites. As previously mentioned, not many had done so.

Participant selection: Only 10 module leaders responded to the invitation. However, two had to be discounted as they hadn't activated their Teams sites. We finalised eight staff members in total. Additionally, we included two staff who taught extracurricular modules using a Teams site. Although these modules weren't linked specifically to a Moodle module, their experience on Teams sites was relevant, and we decided to include their experiences as case studies. We recognise that these case studies won't be included in any further external dissemination work. The selection of participants was based on their active use of Teams sites, ensuring that the feedback was relevant and informed by practical experience.

Appropriateness of selection basis: The selection basis was deemed appropriate as it focused on individuals who had first-hand experience with Teams sites, thereby providing valuable insights into its usage and effectiveness. By including both module leaders and extracurricular staff, we aimed to capture a diverse range of experiences and perspectives.

Interview and focus group questions: The interview questions for staff were designed to explore various aspects of their experience with Teams sites, including ease of use, types of learning and teaching activities conducted, associated tools used and challenges faced. Examples of questions asked include:

- How have you integrated Teams sites into your teaching practices?
- What types of learning and teaching activities did you develop using Teams sites?
- What challenges have you encountered while using Teams sites?
- How did you support student engagement and collaboration on Teams sites?

For the student focus groups, the questions were aimed at understanding their interaction with Teams sites, the support they received, and any difficulties they faced. Examples of questions include:

- How do you use Teams sites for your coursework and group activities?
- What features of Teams sites do you find most useful?
- Have you faced any technical issues while using Teams sites?
- How do you feel about the support provided by your lecturers on Teams sites?

This detailed approach with the questions was in order to ensure that the data collected was comprehensive and covered various dimensions of the use of Teams sites for learning and teaching.

Summary of participants

In summary, we conducted interviews with eight staff members from various schools, including Law, Health, Business, Engineering and MA in Academic Practice.

In addition, 12 students participated in the focus groups. We provided several time slots and allowed students to choose their availability. Most focus group slots included students from the same discipline, with a few exceptions where students had to join a different group due to scheduling conflicts.

Analysis

Common themes emerged within the participants' responses. The order of themes does not reflect their level of importance. These are listed below in summary and key highlights have been included in this section.

Highlights from the interview responses – Staff

Theme	Comments
User-friendliness	Many of the staff found Teams sites to be user-friendly, intuitive with a simple interface that integrates with the Office 365 tools.
Teams app	The additional benefit of a Teams app was deemed by staff to be particularly useful for students who worked on their phones. The app allowed students to access their learning from any location.
Group work	Staff found it easier to get students into smaller groups and particularly liked the breakout room function in Teams meetings.
Learning activities	A few lecturers saw teaching on Teams as an opportunity to redesign their learning activities. Teaching strategies incorporated flipped learning and synchronous teaching. Just-in-time support and group-led activities were also used to help students engage online.
Active learning	Using Teams sites for active learning was deemed, by both staff and students, to be a good thing. However, staff did not know where to turn for support, especially around engagement and collaborative strategies to support students.
Engagement	The significance of lecturers being able to confidently support and facilitate group activities meant that students felt more engaged.
Collaborative activities	A few lecturers used several types of collaborative activities such as peer review, break-out rooms, online quizzes, chat functions, and group presentations.
Ease of use	A small sample of the lecturers noted that they found Teams easy to use. However, staff found it difficult to support and encourage students to make use of integrated tools within Teams.
Student participation	The main takeaway for increasing student participation and collaboration was to build interactive sessions and conduct group assessments. It was thought that it would be helpful to encourage the interactive aspects of Office 365 tools within Teams sites.

Theme	Comments
Additional tools	There were several positive replies when asked about the use of other tools within Teams. This response included current and future use of additional tools that integrate with Teams sites. Tools such as Flipgrid, streaming videos, Visio, group chat, shared documents, OneDrive, polling, presentation and Office 365 tools.
Administrative processes	There was a mixed response in terms of administrative processes. The administration of large groups of students was challenging and was commented on by several lecturers. Yet, some advantages included efficiency and being able to expand student numbers globally as well as facilitating external and internal specialists.
Communication challenges	Lack of communication among student groups on Teams was a challenge for some lecturers, who believed that this was due in part to students' use of WhatsApp.
Digital literacy	There was some frustration from lecturers about their students not being able to grasp basic digital literacy skills, for example, clarity over participation in the online space and communication and collaboration with each other.

Highlights from the focus group responses – Students

Theme	Comments
Integration with Moodle	Students suggested that the integration between Teams and Moodle could be further improved to support group work.
Staff utilisation	There was a mixed response from students around an understanding among staff about how to fully utilise the potential of Teams Spaces. For example, staff not fully exploiting the collaborative potential of working on a common resource in Teams Spaces. This suggests a need for training to help staff better understand and use the platform's features and functionality.

Theme	Comments
Engagement	Some students expressed disappointment at the lack of engagement and ineffective use of Teams by some lecturers. On the other hand, some students felt that their lecturers used Teams sites with confidence and managed the discussion flow appropriately, which in turn gave them more confidence in using the tools.
Participation	The lack of participation and engagement of other students was something that students themselves also found difficult to deal with.
Communication Tools	In the main, WhatsApp was heavily used for communication, although one likely reason students continue to use WhatsApp may be that they are not aware that they can set up private study groups in Teams that are not visible to others, including lecturers.
Flexibility	With respect to flexibility, students, overall, were positive about Teams being utilised in a non-hierarchical way and enjoyed coming together in groups to learn.
Office 365 tools	A few Office 365 tools were mentioned, such as sharing documents using OneDrive and SharePoint and the calendar app.
Technical issues	The issue of technical problems was mentioned repeatedly by students. Students complained of the internet crashing and of time lags. Issues also seemed to occur more often if other tools were being used.
Personalised learning	Some students commented that Teams sites were utilised well by some tutors to give them a more personalised learning experience.

Key findings

Integration

Overall, in this evaluation, Teams sites was deemed to be a useful learning and teaching platform by all the staff members interviewed. An important finding that lecturers talked about was that teaching on Teams was an opportunity to redesign learning activities. In summary, one of the main recommendations in this section would be to help support programme teaching teams, where possible to review their curriculum content and design, to meet the needs of flexible online learning and teaching on Teams and other online platforms.

Most of the lecturers in this evaluation noted that Teams sites was user-friendly but some said that the learning experience would be better if

other tools were also used in a more dynamic way. However, often lecturers didn't seem to know to whom to turn for further guidance. This was felt to be needed particularly around engagement and collaborative strategies to support students:

'I would love someone to come along with a manual of tricks and tips… particularly in classroom interactive work. The basics are the basics. You got videos up, you got your notes up, you got your shared documents, you got your class materials and the breakout rooms well, what else do you need? The only exciting thing would be collaborative things, whether poll everywhere or whatever else one can do. It's about using it as more dynamically as a collaborative tool than we do now.'

Further comments ranged from not finding a tool working, to not knowing how to access support.

Student groups and collaboration

One of the strengths of using Teams sites, and its different functionalities, is that it can help to provide students with a scaffolding approach in order to help them achieve a learning goal or complete a task. This is because interaction and collaboration, with both peers and teachers, can help in breaking down complex concepts or tasks into manageable steps as well as provide guidance and resources to help students progress (Martin and Tapp, 2019).

Some lecturers did make some use of different collaborative activities in Teams sites, including break-out rooms, online quizzes, chat functions and group presentations. Yet, lack of communication among student groups on Teams proved to be a challenge with lecturers believing that this was due in part to students' use of WhatsApp outside of the course.

One possible reason why students continue to heavily use WhatsApp may simply be that they are not aware that they can set up private study groups in Teams that are not visible to others, including lecturers. As this student says:

'If we were able to, like, make our own teams like a private team for ourselves… secure option where I share my folder with my group, and we only have access to that. So, you're looking at a secure space to work with your study group without others being able to come in and look at what you're doing.'

Though one student mentioned that her group used Teams Spaces to meet up and saw it as an obvious place to continue a conversation:

'…we arranged our own groups in the lunch break out time…We would create other Teams meeting because we found that had been easier to use.'

Flexibility

Teams sites was seen as successful because of its flexibility and the availability of a Teams app, which allowed students to access learning from any location. The ability to access the learning materials and activities from anywhere was viewed as a success by many, as indicated by the comments below.

'To be located abroad or you can be an in-person located in London. We mix you up. It's a powerful corporate collaboration tool that can be used for teaching and you know what's not to like?'

Technical issues

There was a range of difficulties for the lecturers in using Teams sites. The administration of large groups of students was challenging and was noted by several lecturers.

Digital skills and employability

There was some frustration from lecturers about their students not being able to grasp basic digital literacy. For example, lecturers mentioned students

not being able to 'share screens' or 'check where the chat was' or 'view the PowerPoint slides'. It was even more frustrating for lecturers who had assumed that students would have developed these basic digital skills in their first year at university.

Using Teams effectively is in itself an employability skill as many corporate organisations use it. Teams includes features such as real-time collaboration, document sharing and threaded conversations to create an ecosystem that facilitates not only communication but also active collaboration. One of the focuses here would be on supporting students in moving from conceptual knowledge to a space where they could apply skills in tangible ways. This is mentioned by Evans (2022) who wrote about her own students, who used Microsoft Teams Spaces for their learning, and who subsequently talked in their job interviews about the skills that they had gained in their use of the online space.

Recommendations

It is evident from the study that Teams sites has the potential to provide another space for teaching and learning that can, if used well, enable students to work collaboratively. One of Teams sites' main strengths is its capacity to support active learning, particularly in relation to group work. To harness its potential, there should be a clear strategy around integration and shared good practice with Moodle and other Office 365 tools.

The findings point to the following recommendations that we believe can help to shape approaches to support staff and students in this work:

Staff

- Redesign the overall learning experience for students when using Teams Spaces, including assessments. However, this is part of a bigger picture around developing effective learning design.
- Provide guidance that meetings should be held in Teams channels, rather than in separate meetings. This will support students interacting within the Teams Space and accessing resources – which is not always possible with other meetings.
- Develop a community of practice that provides just-in-time guidance and training for lecturers. This community should be user-led.
- Teams Spaces should be introduced into all staff induction programmes.
- It is evident that staff are eager to use Office 365 tools, but they often feel overwhelmed and don't know where to begin. Therefore, provide guidance around which tools would be most relevant to their work.

Students

- Provide guidance to students on how to set up their own private team groups in a safe and inclusive way. This is a key recommendation.
- Teams Spaces should be introduced into all student induction programmes.
- Actively promote student digital advisers to support students' digital skills; for example, with the use of Office 365 tools that are integrated in Teams Spaces.

Lessons learned

Our recruitment process could have been more flexible, allowing the research team to recruit more widely. We were limited in our reach to get a more varied sample of staff and students. For example, it would have been useful to speak to staff that had chosen not to use Teams sites to understand their reasons for doing so.

Given the fact that Teams sites were specifically linked to Moodle Modules, we learned afterwards that extracurricular modules that had been delivered via Teams sites had proved to be very effective. Due to ethics, we will only be able to use those modules as case studies. We would suggest using a broader recruitment campaign in the future considering modules not wholly connected to Moodle modules.

If our data collection was wider, it would have been useful to collect student data via a survey as we believe we might have reached a wider sample in all schools.

The transcript corrections took a long time – important to consider the need to have third-party support with transcription.

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Section 3: Emerging pedagogies and methods for professional learning

Notes

‘Time *is* of the utmost importance to them’: An ethnographic exploration of time design in online part-time courses

Olivia de Paeztron

ESMT Berlin

Correspondence email: olivia.depaeztron@cantab.net

Abstract

This paper presents findings from a research project investigating how course design teams at an international business school perceive and navigate the challenges of designing time for both teachers and students of an online MBA programme. This qualitative study was conducted for the MSc in Digital Education dissertation at the University of Edinburgh, and employs ethnographic methods to look beyond design frameworks to explore and identify temporal structures that shape course design and delivery. A sociomaterial sensibility (Thompson, 2012) informs the project, in which participant observation and fieldwork are combined with semi-structured interviews with design team members and teaching assistants.

Thematic analysis of data identifies a number of challenges for course design teams, including: a paradox in attempts to quantify and represent time for online learning and teaching; successfully pacing a course, with related risks of privileging synchronicity as ‘prime time’ and ‘the only chance to meet’, rather than exploring opportunities for asynchronous interactions; and questions on how to collaborate effectively as course provision scales up. This paper focuses discussion on the first two challenges and concludes with recommendations for further research.

Keywords: Online Education, Course Design, Temporal Structures, Sociomateriality, Ethnographic Methods, Asynchronous Learning, Synchronous Learning, Virtual Learning Environment

Introduction

Online part-time education promises convenience and flexibility, allowing learners to incorporate study into their busy lives. In higher education, faculty may collaborate with learning designers to produce course designs appropriate for part-time and online settings. Yet time has been described as a ‘hidden dimension’ of online education (Capdeferro, Romero and Barberà, 2014) even as calls for ‘anytime, anywhere’ learning and flexibility have been troubled (Houlden and Veletsianos, 2019; Sheail, 2018a, 2018b) and a conception of ‘quality time’ in education requires elaboration (Romero and Barberà, 2011; Sheail, 2018b). Classroom timetabling is often ‘the primary spatial-temporal organizing device’ (Siân Bayne et al., 2020, p. 142) of educational institutions; practices of students and staff involved in non-campus-based programmes are potentially less visible than those which align with the institution’s dominant temporal order (Sheail, 2018a). More broadly in higher education, there is increasing interest in theorising time’s role in the academy, ‘as it increasingly has become a marker of worthiness, among faculty, students, administrators, and staff’ (Shahjahan, 2018, p. 1).

This research project, investigating how course design teams perceive and navigate the challenges of designing time for online part-time courses, took place at an international business school in Germany as it launched its first fully-online MBA programme. With 90 per cent asynchronous and 10 per cent synchronous learning provided via a virtual learning environment (VLE), there is no campus-based teaching; each faculty’s class time is reduced to two

online 90-minute sessions; teaching assistants (TAs) provide a weekly virtual office hour. The task for the school was to adapt synchronous interaction in existing online courses to new course structures, while maintaining the quality expected from MBA programmes. As a member of the learning design team, and a part-time online student in the University of Edinburgh's MSc in Digital Education, I was curious how colleagues would approach this task.

Methodology

My research questions were concerned with how participants 'interpret and make sense of their world' (Hammersley, 2012); ethnographic methods seemed appropriate for looking beyond design frameworks to course designers' perspectives in a particular institutional context, to explore how organisational structures help or hinder forays into online learning and teaching. Since circumstances did not allow for a full-time immersive ethnography, the project is better described as a qualitative study employing ethnographic methods.

This project also draws on temporal structuring and sociomateriality to enable a practice-based understanding and a sensibility towards how human and non-human actors assemble to form educational practice (Lamb and Ross, 2021). Habib and Johanneson (2020) suggest sociomateriality is an appropriate framework for research that spans educational, technological and organisational aspects. In earlier work, Orlikowski and Yates (2002) emphasise that time shapes and is shaped by actions of members of a community, requiring researchers to attend to elements of both clock-based and event-based time, through which 'time is made meaningful and consequential in organizational life' (p. 695).

Participants for this study comprised all those working on the online programme's design and delivery. Ethical approval granted by the University of Edinburgh enabled fieldwork to begin in January 2022. I began by observing consenting colleagues during online meetings. Field notes served as a basis for critical reflection (Maharaj, 2016) and provided guidance on relevant questions for interviews (Albury, 2014). Most interview participants had experience as part-time online students, including two TAs who were school alumni.

Pseudonym	Role	Notes
Maria	Learning Designer	Works with Daniel
Paul	Learning Designer	Works with Helena
Daniel	Faculty	Works with Maria
Helena	Faculty	Works with Paul
Majid	Teaching Assistant	Graduate of full-time MBA programme, works with Daniel
Tim	Teaching Assistant	Graduate of blended MBA programme
Sascha	Senior Manager	

Table 1: List of interview participants.

Data collected for the research include interview recordings and transcripts, field notes, screenshots of the VLE, and internal documents. Thematic analysis employing both inductive and deductive coding (Braun and Clarke, 2006) generated a richer array of themes than can be addressed within the scope of this paper, so I present three main findings.

Findings

Challenge 1: Quantifying and estimating time

Displaying estimated timings in the VLE seems very influential in how course teams think about the time for learning. Faculty and learning designers mentioned challenges regarding how to accurately estimate timings for activities, how to respond if they are found to be inaccurate and how to set and communicate expectations around those time estimates to the students.

Examination of the VLE provides context for these findings. The VLE provides a modular structure for courses; a week's session is indicated by one 'tile'. Clicking on a tile brings the visitor to a second level containing several 'screens' for the session (Figure 1). At the bottom of each tile is a time indication; the time for that screen is entered manually by learning designers. These numbers are then automatically summed up to the total for a session and displayed at the session level (e.g. '7 hours 30 minutes').

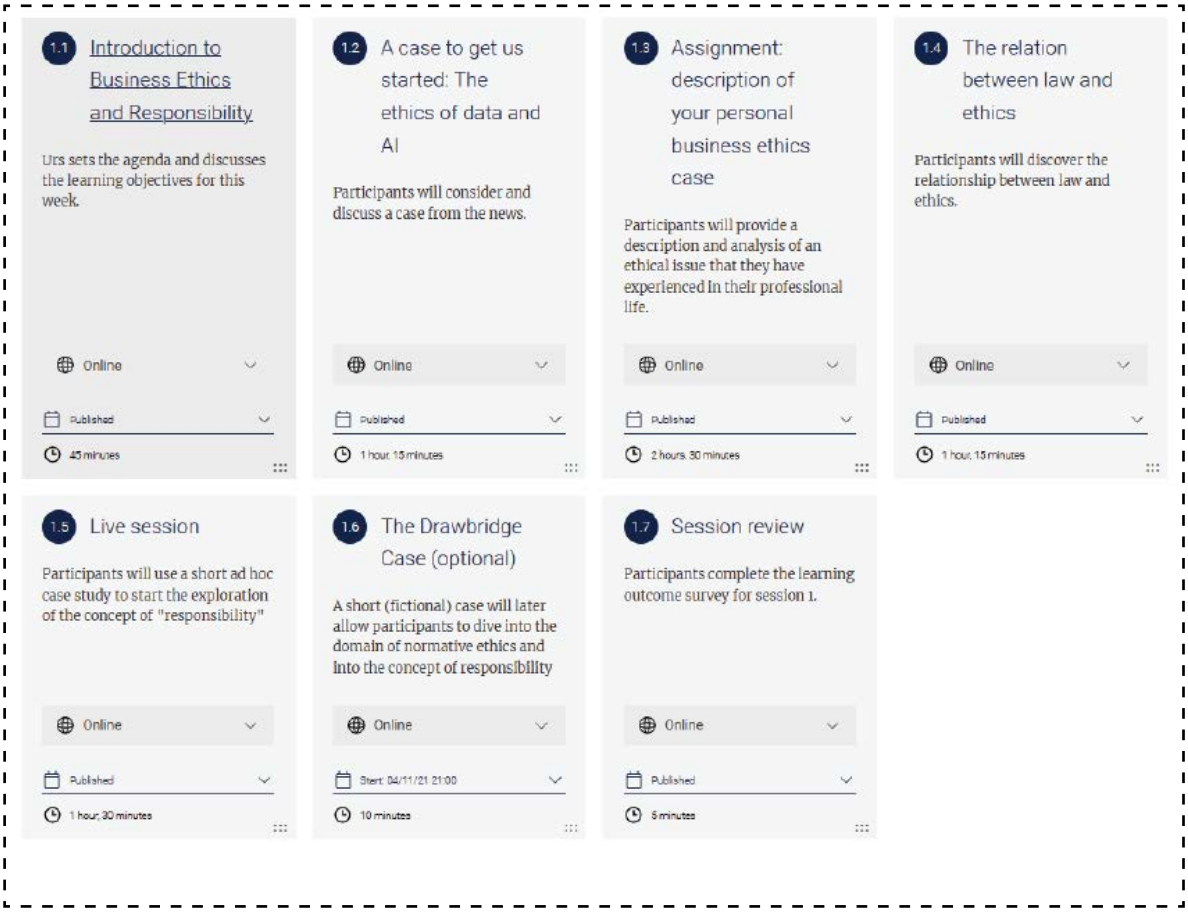

Figure 1: Screenshot of a session in the VLE; estimated time to complete each screen is displayed at the bottom of each tile.

Each screen contains materials and interactive activities, to be completed within a week. On the final screen of each session, students are invited to self-assess their progress on session learning outcomes, and to provide feedback on the materials and whether estimated timings were accurate (see Figure 2).

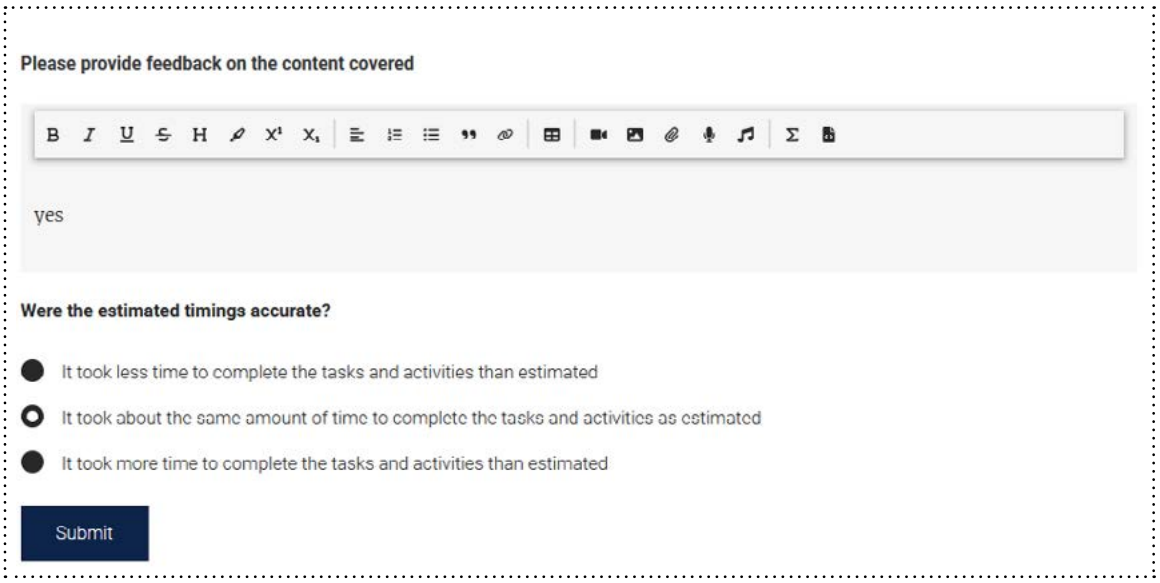

Figure 2. Question in the VLE regarding estimated timings for a session.

The responses are aggregated and displayed to staff as a bar chart (Figure 3).

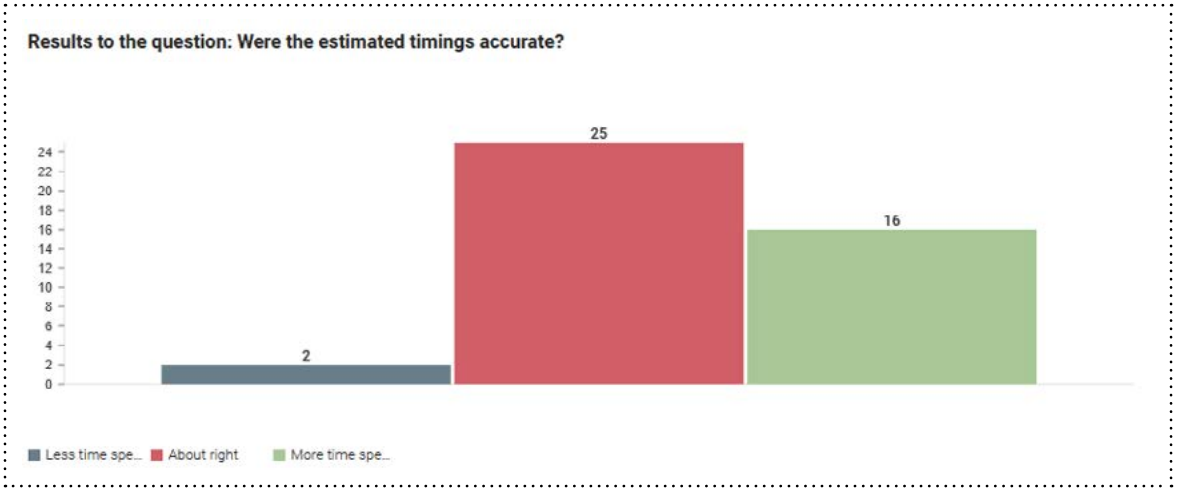

Figure 3: Bar chart in the VLE showing aggregated results of the estimated timings question.

These estimates can feature in marketing part-time education and students' decision to enrol: Maria commented that she had neglected to sign up for courses where time estimates seemed unfeasible. Daniel reported that students use the estimated timings to decide which screen to work on at a particular point; a TA corroborated this, and sums up the effect of inaccurate time estimates:

'I also, in my own cohort, felt frustration from students when [estimated timings] were not right…Because you either feel you're stupid, because you need so much more time, or you feel like it hasn't been put together carefully, and either way it's something that is not making you happy.' (Tim)

Interviewees had differing attitudes on how to respond to feedback on estimated timings, but I noticed shared ideas within design teams. Daniel recommends students watch videos on double speed, measure their reading time against the estimated time, and learn to accelerate. He worked with Maria to reorder the screens of sessions, so that time for revisiting forums is moved to the end of the session, and to solicit more granular feedback on exactly which screens took extra time.

Helena and Paul worked on reframing their own and students' attitudes to the timing question (which, Paul points out, isn't asked of courses delivered face-to-face). Paul mentions moving away from quantifying students' time

to creating more supportive instructional text, to boost students' 'emotional confidence about the ability to tackle the material'. Helena initially hoped all students would rate estimated timings as accurate 'so you just see this red bar coming up in the middle [see Figure 3]…then I realised actually, this is not only unrealistic but it's also perhaps undesirable' since, in any modality, some students just will take more time. She reassures participants about this through newsfeed posts: 'it's not sufficient to just put a number there on each screen or one session, you have to keep on reminding the participants through live communication about that'.

While timings for students are clearly displayed, timings for teaching are invisible in the VLE. Tim contrasts his experience as an online student with his view that 'the TA work is not really well-supported through [VLE] functions'. Searching elsewhere for ways that online teaching time **is** made visible, some field notes stood out:

> Director: We have a compensation model based on number of ECTS…What is this [course] 1 ECTS?
> Manager: 15 hours.
> Director: Yeah so delivery costs per ECTS is low.

> Colleague: How involved is a faculty in an online course. How busy should we assume they are? Would they have to spend a couple of hours per week? Can they do it on top of other teaching loads?
> Manager: They get 75 per cent teaching points.
> Faculty: But it varies with the TA.

Conceptualising time chronometrically, in terms of hours and minutes, enables equivalence with other numerical values such as course credits and teaching points. Helena mentioned needing to 'build in slack' time for responding to unplanned student contact; TA employment contracts mention expected hours; and one TA mentioned he 'mentally clocks an hour a day'; yet teaching staff reported they do not keep track. Only Daniel had a rule-of-thumb for quantifying his asynchronous teaching time, allocating three hours per week to reading and reacting to students' submissions and discussion on the VLE, adding: 'there are things that come on top of it, live classes etc., but this is roughly where I cut it off because I also can get lost'.

Challenge 2: A/synchronicity and pacing

A noticeable theme across the data concerns the value of synchronous sessions and, conversely, challenges related to teaching and learning asynchronously. Colleagues referred to synchronous sessions as 'prime time', 'touch points', 'the only chance to meet', and asynchronous online experience was often contrasted with it negatively; of particular concern to several interviewees were the delays and disconnections when asking and answering questions in asynchronous formats. In making such comparisons, interviewees draw on their own educational experiences, not only with entirely face-to-face courses, but also with the previous, blended versions of the courses that have now been adapted for more asynchronous delivery.

To navigate these challenges of asynchronicity and pacing, faculty again emphasised communicating tips and expectations to students. Both TAs referred to the need for students to proactively select their own pace and what materials they complete. Daniel is also reluctant to time-restrict activities, 'because there are all kinds of good reasons to fall behind and then speed a bit ahead'.

Challenge 3: Iteration, collaboration, and scaling up

Rather than discussing the programme as new, interviewees referred to whether it was the first/second/third/fourth time they had worked on the course. They had learned from student feedback, iterated and improved their courses, and discussed the value of building and evolving their collaboration over time.

It became apparent during observations and interviews that teams were planning activities as much for imagined future TAs as they were designing for part-time distance students. The phrase 'the TA will do it' popped up in discussions of grading, monitoring and encouraging students on the platform, and supporting faculty with webinar software. Faculty and TAs varied on whether they saw collaboration as 'a clear division of labour' (Daniel) or something 'fluid' (Majid) and 'organic' (Helena). Helena mentioned 'startup costs' of establishing collaboration with TAs, and Majid noted that through the iterations 'the face time [with faculty] has come down'. Given an absence of a consistent approach to representing TA work in course documents, the shifting and unfolding collaboration between designers, faculty and teaching assistants raises questions about how to build resilient knowledge-sharing practices as the programme scales up.

Discussion

Quantifying time for learning generates a paradox: on one hand, it appears an important guide for students to carve out study time, or even sign up in the first place; on the other, 'clock time' (Salmon, 2013) spent on learning is not equivalent to learning taking place. To learn, one must act in some way; time passing is not enough – as Paul also identified, 'time isn't actually a quality of the product we design'. A sociomaterial perspective enables consideration of the role that estimated timings play in the online learning assemblage and research which 'interviews' the VLE (Adams and Thompson, 2011) could shed further light on this. In asking students whether estimated timings were accurate, the VLE draws attention to 'clock time', risking conflation of what is measurable with what's important; a risk that has also been mentioned by Eynon (2015) in wider discussion of the datafication of learning. I wonder whether specifying a time **range** (e.g. '60–90 minutes') would lessen the focus and anxiety around time estimates – but this is not currently possible on the VLE.

The concept of dominant temporal structures helps to explain why asynchronous teaching is so challenging; it is at odds with many of the school's practices based on synchronous teaching. When face-to-face synchronous classes are taken as the benchmark, moving to blended and then to entirely online delivery feels like progressive downgrades away from the ideal, not just from a familiar to a lesser-known modality, about which it would make sense to explore 'educational opportunities' and 'positive possibilities for course design' (Sheail, 2018a). Bayne, Gallagher and Lamb (2014) use the term 'campus envy' (p. 577) when discussing the privileging of presence and 'the bounded space of the campus' by some distance students. Although 'synchronous session envy' is a less pithy phrase, it may help explain the finding that several interviewees view synchronous teaching as more manageable, beneficial and connecting for students and teaching staff, and serve as a helpful concept when discussing ways to navigate asynchronous teaching.

Furthermore, in designating software platforms for online course delivery as virtual learning environments (VLEs) it is easy to overlook that they are also VTEs (virtual teaching environments), and while the estimated time required for learning may be presented in a VLE, the time requirements for online teaching, particularly asynchronous activity, can indeed be a hidden dimension of online education. Teaching points are how the school represents workload, as well as remuneration. Looking at the '75 per cent for online teaching', it is hard to disagree with the warning that academics may prefer to spend 'their valuable time' on research 'if institutions do not reflect the importance of e-learning in their performance appraisal mechanisms and in their workload allocation frameworks' (Martins and Nunes, 2016, p. 14). Formulating successful workload allocation frameworks for technology-enhanced teaching is challenging (Tynan, Ryan and Lamont-Mills, 2015); yet a failure to recognise the workload involved may inhibit faculty uptake (Gregory

and Lodge, 2015) and there is a need to establish consistency of expectations for online course experience (McHugh, Taub, Gafo and Baumgarthuber, 2020). Making estimated teaching time explicit, however, risks the same issue as estimating times for learning; that reviewing whether the estimate is accurate becomes a false proxy for whether time spent teaching online has been effective.

Conclusion

In exploring how design work for an entirely online programme interacts with broader institutional temporal structures for teaching and learning, I identified challenges related to: conceptualising and representing time for learning quantitatively, which risks a focus on 'time spent' over 'lessons learnt'; familiarity and comfort with synchronicity, which risks disguising potential for asynchronous 'ways to meet', even as students also challenge and stretch the pace of a course; and tension between the current collaborative practices of course design teams and the need to scale up course provision. Colleagues navigate some of these challenges together, reworking course designs and builds in the VLE; for others, solutions are less clear, hinging upon TAs as emerging actors in course provision, and/or working against dominant temporal structures of the institution.

The scope of this study is necessarily limited; a similar study conducted at a different point in time or in another context might have generated different findings, and students' perspectives are missing here. While I do not argue for broad generalisability of these results, I have endeavoured to show why online education providers may usefully investigate institutional conceptualisations of time and time-related challenges for both students and staff.

This project's findings suggest several avenues for further research and implications for practice, such as: how we talk about time with students at induction, and with teaching teams at design and module kick-offs; whether we keep using estimated timings or consider deleting them or specifying a range instead; and how designers of online learning might better represent the time for online **teaching** in their designs. What effect would representing such timings in a VLE have, and would it generate a shift towards referring to 'VLTEs' instead? Stefaniak (2021) has argued for ethnography in instructional design as a way of gaining rich understanding of learners' circumstances which can be incorporated into improved designs; I would argue with Law that ethnography also 'lets us see the relative messiness of practice' (Law, 2004, p. 18) and this is helpful for understanding the contexts in which course design teams operate, particularly with regard to whose time we are (not) designing.

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Evaluation of interactive online technologies used to teach laboratory skills on a distance learning (DL) programme using a value creation framework

Patricia Gorak-Stolinska and Natalia G. Bednarska

Faculty of Infectious and Tropical Diseases London School of Hygiene & Tropical Medicine

The authors contributed equally to this work.

Correspondence email: patricia.gorak-stolinska@lshtm.ac.uk

Abstract

One of the major disadvantages of online taught biomedical courses is the inability to acquire practical laboratory skills. In an attempt to address this, study materials for a module of the MSc Infectious Disease at LSHTM were enhanced with interactive and digital design elements such as interactive procedural videos, podcasts and quizzes using H5P (a plugin that enables creation, sharing and reuse of HTML5 content), to allow immersive learning. The aim of this study was to assess the impact of these multimedia and interactive activities on student engagement, overall experience and progression. This retrospective cohort study included data from students registered on the Bacterial Infections module between years 2019 and 2023, allowing us to compare grades pre- and post-introduction of interactive learning technologies in the 2021–22 academic year. Outcomes were analysed utilising both qualitative and quantitative data, collected from multiple sources including student databases, module evaluations and feedback surveys. An adapted value creation framework was used to analyse a learning journey survey and one-to-one interview data, to determine the perceived value that the interactive activities created for students. Overall, student responses confirmed that H5P enhancements helped to reduce the intrinsic cognitive load of the course through well-structured teaching materials which connected the complex ideas and concepts into a logical and easy to follow journey. The learning journey survey also indicated how students utilised the interactive activities, including navigation of the study material, as a framework for study, to improve and enrich their notes, but mainly for recall of knowledge and revision. Furthermore, the majority of students who had used the interactions reported a positive experience and were of the opinion that interactive activities should be made more widely available in the programme. Analysis of the cohort assessment data showed no difference in mean value of assessment grades between cohorts; however, the distribution of grades was affected by digital enhancements, with higher frequency of grades over 3.3 and lower counts of grades 0. In addition, we were also able to look at the digital poverty score assigned to students on the basis of their location during the study period. We demonstrated that digital poverty score was inversely proportional to grade point achieved in summative assessment.

Keywords: Distance Learning, Online Learning, Laboratory Skills, Value Creation, Student Engagement, Experience and Progression, Digital Poverty, Digital Divide

Introduction

In the past decade, the transformational shift towards online learning at a distance has allowed students from around the globe to gather in the same virtual space to pursue learning. Nevertheless, distance learning (DL) has

restrictions on how the subject matter can be taught and which methods are most effective. The growth in technology and availability of virtual tools allows not only optimised design of online learning platforms, but also improves ways to obtain feedback from students, allowing bi-directional communication. To get a better insight into what is the best future direction for DL pedagogy, it is important to evaluate developments, innovations and progress in this field. Placing the student at the centre of evaluation frameworks to ensure development of teaching strategies are effective has revolutionised DL pedagogic approaches (Lane et al., 2019) and ensures that learners have better opportunities to choose what to study and also learn how and why; this allows the students to be actively involved in their own learning, take responsibility for their education and play an active role in decision-making.

One of the major disadvantages of online taught biomedical courses is the inability to acquire practical laboratory skills. To bridge the gap between the technical aspects of a course and theory, interactive laboratory videos have been shown to be a viable method of learning (Chen, 2022) and the use of interactive videos has shown cognitive benefits leading to more effective learning (Schwan and Riempp, 2004). We have enhanced a DL bacteriology module with various interactive, multimedia design elements to teach laboratory skills. These have included the use of instructional videos, online quizzes of various types (e.g. flash cards, filling in the blanks and question banks), all presented using virtual H5P content. By utilising H5P, we are continuing the trend where this tool is used for teaching of laboratory skills in fields such as chemistry, biological sciences and engineering, alongside wet lab teaching or as standalone teaching, particularly during the COVID-19 pandemic (Unsworth and Posner, 2022; Cresswell, Loughlin, Coster and Green, 2019; Jiang, Ansari, Sivakumar and McCarthy, 2022). However, there is limited research into the effectiveness of H5P for online learning at tertiary level (Jacob and Centofanti, 2024).

H5P was selected with the main aim to help students achieve module learning outcomes while reducing extraneous cognitive load by tailoring information needed to complete the module successfully. Cognitive load theory states that our working memory can sustain only small fractions of information at one time, therefore the instructional methods should avoid overloading it in order to maximise focus and learning (Sweller, 1988; Tindall-Ford, Agostinho and Sweller, 2020). We have built the H5P sessions in such a way as to decrease the amount of extra information and divide the learning outcomes of the session into smaller, easy-to-follow sub-sections, building on existing knowledge and increasing the level of complexity without overwhelming the students with novel information. Also, as per previous research done on the optimal length of the instructional videos (Fishman, 2023; UAB, 2024), we have built the activities to fit within the frame of 15 minutes to ensure maximal engagement and retention. Moreover, our materials were designed considering the 'three C's of learning': that is Control, Challenge and Commitment, as previously described by Dror and Harnad (2008). The H5P activities allow students to control their pace of learning, flipping back and replaying parts of the information. The quizzes and progression bar for each task aim to give control and involvement, both critical in maximising student engagement. Through retrieving information from the long-term memory via quizzes, visual aids and discussions, students could bring crucial information to working memory and assimilate new information to build upon what they already knew (Baddeley and Hitch, 1974). Furthermore, retrieval practice has shown to strengthen learners' retention of the information (Wenger, Thompson and Bartling, 1980). Therefore, our multimedia learning enhancements were built upon the concept of cognitive load theory, wherein visual/pictorial channel and auditory/verbal-processing channels were balanced to attain the best information retention (Brame, 2016). Furthermore, the module content was designed to promote visual and verbal learning styles to ensure efficient stimulation of the long-term memory (Chandler and Sweller, 1992).

As much as interactive and multimedia design elements were introduced to improve learning outcomes, it is important to note that any technology may create certain inequalities – in this case, particularly in the ability to access the materials or work with the interactive features. The digital alliance has characterised 'the inability to interact with the online world fully, when, where, and how an individual needs to' as 'digital poverty' (Alliance, 2024). Digital poverty intersects with wider social inequalities. This is of particular concern in education, where digital poverty creates participation and access barriers for students who are already significantly disadvantaged. Other terms used to describe that disparity include 'information inequality' or 'information gap' (Holmes and Burgess, 2022).

Therefore, this study aimed to determine the effectiveness of teaching laboratory skills using interactive and digital design elements utilising H5P. We aimed to do this by measuring effectiveness as how successful students are at achieving their desired outcomes after undertaking this module. We measured grades, student experience and engagement. We assessed accessibility and digital poverty by exploring the accessibility of the interactive design elements by students in different settings using digital poverty indices and summative assessment grades.

In summary, grades for both assessed assignments and examinations from the full cohorts were compared from before and after introduction of the learning technology enhanced materials.

Student experience of using the interactive and digital design elements was determined with data from the module evaluation surveys and from student feedback surveys. Student engagement was measured in a learning journey survey and in one-to-one interviews using a value creation framework. We have determined accessibility of the digital design elements by looking at the impact of digital poverty on performance and engagement with assessments.

Methodology

Ethical approval

Ethical approval was granted by the London School of Hygiene & Tropical Medicine Ethics Committee (approval ref. no. 29563). A waiver of consent was obtained to anonymously analyse the summative assessment grades for the whole study cohort.

Study population

A retrospective cohort study of students of a bacteriology module of the LSHTM MSc Infectious Diseases (by distance learning) was carried out to evaluate learning technologies used to teach laboratory skills between 2019 and 2023. Eligible students from the pre-technology cohort (A) (academic years 2019–20 and 2020–21; n= 195) and the post-technology cohort (B) (academic years 2021–23 and 2022–23; n = 215) were invited to take part by email. Both cohorts studied the same curriculum and content, cohort B had access to the same study materials as cohort A plus access to the interactive study materials. The interactive study materials included instructional videos, hands-on recorded laboratory procedural videos, visually interactive H5P slides, podcasts by experts in the field, Panopto lectures, quizzes, games. Both cohorts undertook the same assignment tasks, both cohorts had online, open book, take home examinations of a 2-hour 15 mins duration, however, the students in academic year 2022–23 had examinations with a 4-hour submission window (download/upload time frame) while all other cohort years had examinations with a 24-hour submission window. Consent was obtained from both cohort A and B to access their student records, learning journey survey and one-to-one interview data, using a JISC online survey form.

Impact of learning technologies on assessment outcomes

The full cohort data was analysed (using STATA 18 and SPSS statistical software) using one sample t-test to compare assignment grades and examination marks in the two cohorts.

Digital poverty

Two digital poverty measures were used to obtain information on digital poverty: the first score based on population coverage (on the basis of the data obtained from https://internetpoverty.io/), and second based on an innovative metric for evaluating international variations in access to digital data, a digital poverty index (DPI). DPI score is based on internet speeds, numbers of computer owners and internet users, mobile phone ownership and network coverage, as well as provision of higher education. DPI is also used for monitoring Sustainable Development Goals (Leidig and Teeuw, 2015). While these scores are excellent tools to give a proxy estimation of the level of digital poverty at a national level, they do not offer lower geographic resolution. We have measured the association of digital poverty scores with exam performance and assignment performance using 2-tailed Pearson correlation (SPSS software). No personal information from students (apart of country of residence) were collected, therefore the score was approximated to the national level of digital poverty.

Student experience survey

An anonymous, online Moodle-based survey was used to evaluate student feedback on their experience with the delivery of the module content using the learning technologies. Data was also collected from the annual, anonymous, module evaluation survey. Data was coded according to response and quantified using SPSS software.

Student engagement

Student engagement was assessed by appraising the student 'learning journey', using a survey hosted on the JISC online survey platform and one-to-one interviews based on questions adapted from the cycles of value creation of the 'Wenger-Trayner' Value Creation framework (Patel, Leck, McCormick, Kennedy and Parsley, 2019; Wenger-Trayner, Trayner and Laat, 2011) (Table 1).

Cycle 1 – Immediate Value What happened during participation	Were you aware of the interactive study materials? Did you make use of the interactive study materials for your learning? Did you use the information in the interactive study material?
Cycle 2 – Potential Value What changed as a result	Do you think the interactive activities helped you learn better or faster? Please explain your answer. How did you initially use the learning in the interactive study material? What do you think the interactive study materials were trying to convey?

Cycle 3 – Applied Value What difference has participation made	Did the interactive study resources help you recall facts about the content more easily? Did the interactive resources help you understand the content better? Did you apply anything your learnt from the interactive study material in your day-to-day job or elsewhere? How did you apply the learning from the interactive study materials?
Cycle 4 – Realised Value Is there evidence of sustained difference or self-ability	Do you think the interactive study resources gave you new insight into the topic? Do you think the interactive study resources gave you more confidence to enter for assessment?
Cycle 5 – Reframed/ Transformative Value Has understating of what matters changed	Did you change your practice after using the interactive study resources? Were there any positive or negative outcomes of using the interactive study resources? Is there anything else you wish to add?

Table 1: Adapted value creation framework for the online survey.

One-to-one semi-structured interviews were carried out using Microsoft Teams and data was collected using the adapted value creations framework. Guided questions are detailed in Table 2. Questions asked participants to reflect on their learning journey using learning technologies and responses mapped and scored according to positive sentiment and to the five cycles of the value creation framework by two independent interviewers.

Cycles	Semi-Structured Interview Guiding Questions
Cycle 1 Immediate Value	What happened and what was your experience? • Significant events • How did you participate • Feelings • Relevance • Which activities • Most influential activities
Cycle 2 Potential Value	What have these activities produced? • How have you changed • Acquisition of new skills/knowledge • Perspective change • Inspiration • Confidence • Isolation • Access to resources • New tools/skills etc. • Access to documents • View of learning • Opportunities
Cycle 3 Applied Value	What difference has it made to your practice/life/context? • Use of product • Application of skills • Use of tools • Implementation of ideas
Cycle 4 Realized value	What difference has it made to your ability to achieve what matters to you or stakeholders? • Performance • Time saved • Success • Effect of implementation • Measures of performance • Attainment
Cycle 5 Reframed (transformative) value	Has it changed your understanding or definition of what matters? • Reflection in what matters • Understanding of what matters • Change in practice • New understanding

Table 2: Adapted value creation framework guided questions for semi-structured interviews.

Findings

Student experience

The Moodle survey showed that the new platform improved students' perception of their 'understanding' of the module and that students enjoyed interactive revision through quizzes. Figure 1 shows that over 80 per cent of students expressed desire for live online sessions with tutors. When asked if they use a hard copy of materials or rely only on Moodle, 50 per cent of students said they liked to use both types of material.

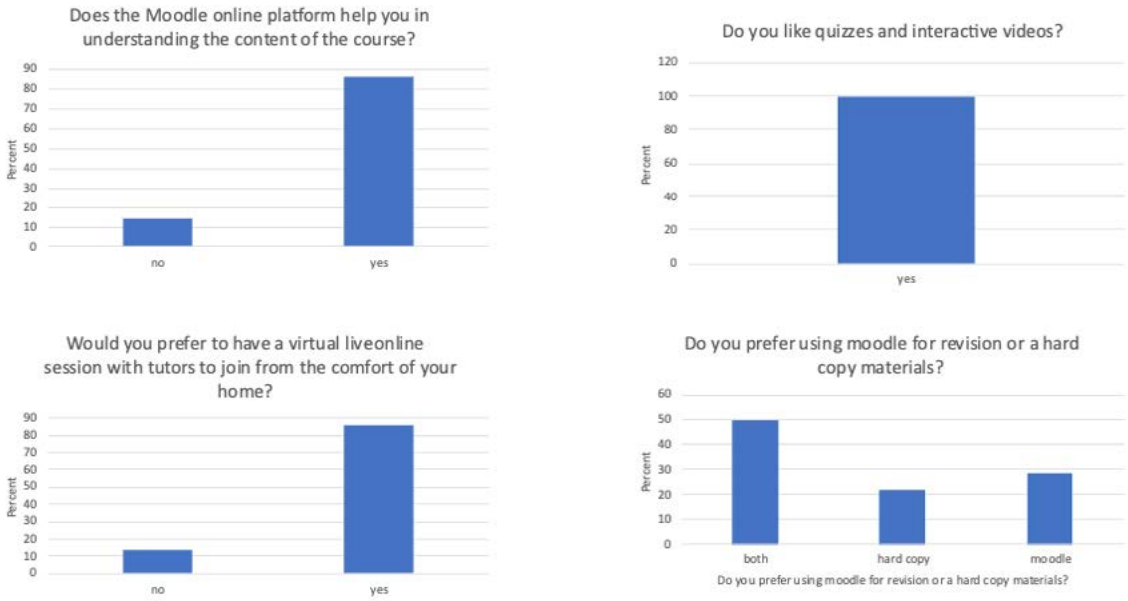

Figure 1: Moodle survey data assessing student experience of using the interactive and digital design elements.

Student performance

We then looked at the effect of enrichment of the module with digital design on assessment marks. Figure 2 shows no difference in mean value of assessment marks between cohort A (n=116, mean=3.543, SD=0.919, Lower 95% CI=3.36, Upper 95% CI=3.72) (pre) and cohort B (n=130, mean=3.538, SD=1.135, Lower 95% CI=3.34, Upper 95% CI=3.74) (post).

Similarly with examination grades, t-test shows no significant difference between means of examination grades between cohort A (n=127, mean=3.44, SD=0.979, Upper 95% CI=3.266, Lower 95% CI=3.61) and cohort B (n=121, mean=3.45, SD=0.931, Upper 95% CI=3.30 and Lower 95% CI=3.64). However, distribution of grades is affected by digital enhancements, with higher frequency of grades over 3.3 and lower counts of 0 grades.

There were 98 (45.8 per cent) students in cohort A who did not undertake the assignment task, while in cohort B 84 (39.3 per cent) students did not attempt it. Exam: cohort A 40.7 per cent who did not attempt and cohort B 43.5 per cent.

The digital poverty index and scores were assigned to each student by using their location during the study period as a proxy. Pearson correlation showed a significant negative impact of digital poverty on students' exam performance (Table 3). Moreover, the digital poverty scores using two independent sources showed similar results, which is reassuring, showing both are relevant and interconnected measures.

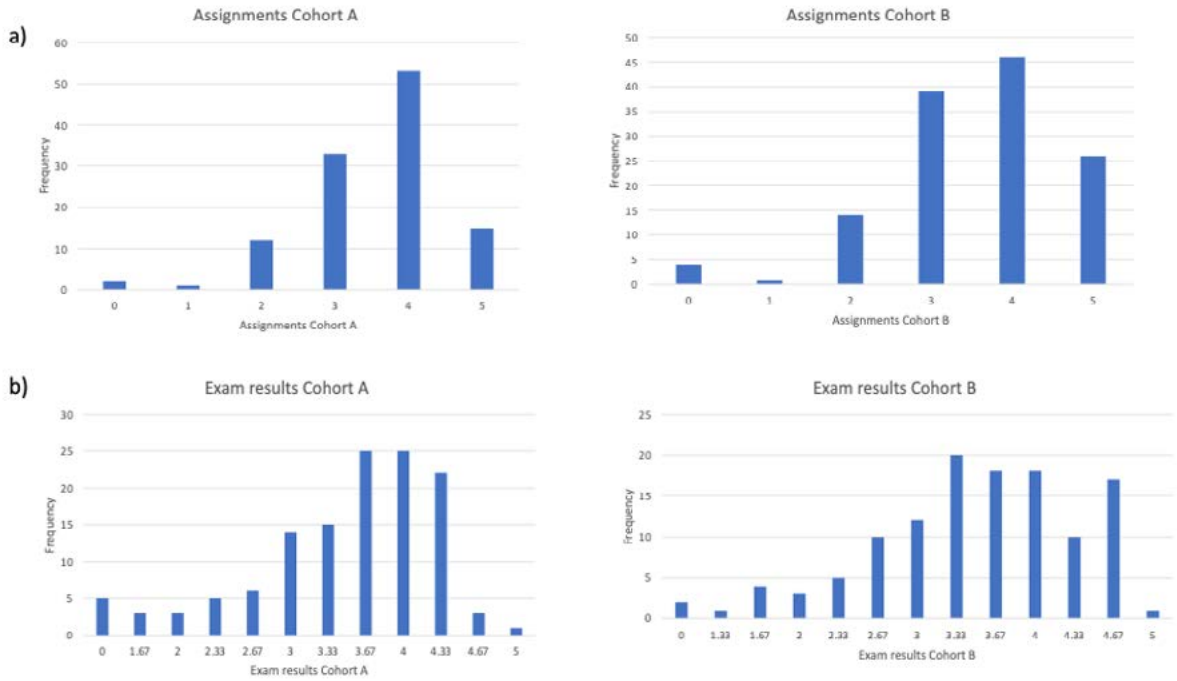

Figure 2: Student outcomes distribution plots before (Cohort A) and after (Cohort B) introduction of digital learning technologies. Panel (a) shows students' assignments marks and panel (b) students' examination grades.

Correlations

		digital poverty score based on population coverage	exam	AA	DPI
digital poverty score based on population coverage	Pearson Correlation	1	-.590*	.000	.556*
	Sig. (2-tailed)		.043	1.000	.049
	N	14	12	12	13
exam	Pearson Correlation	-.590*	1	-.083	-.214
	Sig. (2-tailed)	.043		.787	.503
	N	12	13	13	12
AA	Pearson Correlation	.000	-.083	1	-.551
	Sig. (2-tailed)	1.000	.787		.064
	N	12	13	13	12
DPI	Pearson Correlation	.556*	-.214	-.551	1
	Sig. (2-tailed)	.049	.503	.064	
	N	13	12	12	14

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3: Pearson 2-tail correlation between digital poverty and students' assessment grades. AA stands for assignment assessment and exam for examination marks.

Student engagement

Student learning journey

Sixteen students consented to participate in the study, nine completed the learning journey survey and four agreed to take part in one-to-one interviews.

Figure 3 shows scores for positive sentiment for the learning journey survey, across the five cycles of the value creation model. The majority of students were able to identify the immediate value of the learning, with 85 per cent being aware of the interactive learning technologies, able to name elements: 'Padlet, interactive quizzes, videos, Panopto videos and H5P activities'. Seventy four percent were able to report positively on the potential value of the learning technologies and themes such as enabling visualisation of microorganisms, motivation, real world scenarios, easy explanations of course

content and value in the change of pace. Students reporting 'learning' in the applied value cycle were fewer, at 58 per cent, but students were still able to report 'applied knowledge' in the following areas: in exams, fuelled curiosity, aspirations for RD study, utilising knowledge in other modules, focused study and helped recall. The 'realised value' reported was at 66 per cent, with positive sentiments such as new insights, more confidence and the videos were helpful being reported. The 'reframed value' reported in the survey was the lowest scored cycle (44 per cent) with less positive sentiment reported (i.e. the interactive materials were important for revision).

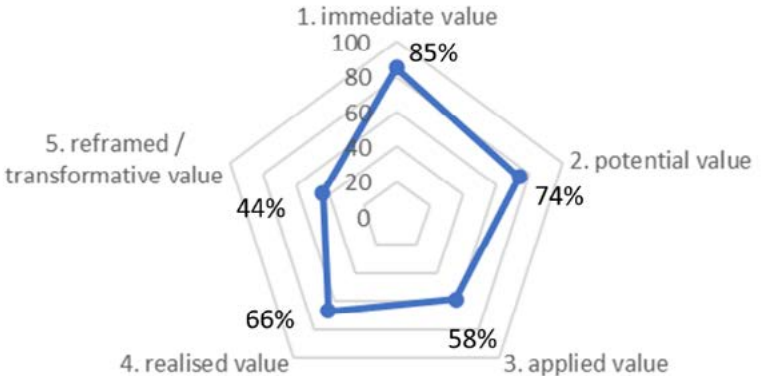

Figure 3: Radar plot showing the value creation reported in the learning journey survey across the 5 cycles of the model.

Figure 4 shows the scores for positive sentiment for four interviewees across the five cycles of the value creation framework. The plots are interpreted in conjunction with the themes raised by individual interviewees (Table 4).

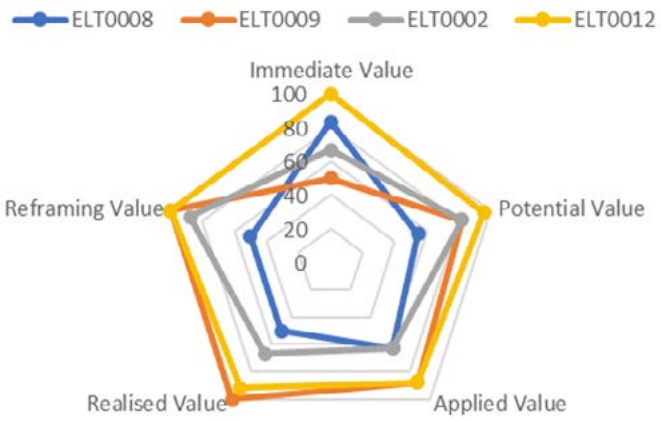

Figure 4: Radar plot showing the value creation reported during the learning journey narratives (one-to-one interviews) across the five cycles of the model.

One interviewee was from the 'pre' cohort (ELT0012) and three were from the 'post' cohort. The majority of students were aware of interactive materials, ELT0012 was only aware of the recorded lectures but they scored highly as they expressed positive sentiment about the technology used for interactions. Two students (ELT0002 and ELT0009) scored highly by reporting potential value for the interactions and a third (ELT0012) scored highly by reporting positive sentiment around the library resources and sense of community. One student (ELT0008) was realistic about the potential value and this was context based and did help the student recognise their need to seek out hands on training. All the interviewees reported positive sentiment to the applied value questions, reporting being 'confident' or 'mindful' of how they were applying their knowledge and skills. The reported value was mainly positive with better performance in exams and at work. One student (ELT0012) reported only on additional interactions with tutors. Reporting of

'transformative value' was very individualised, ranging from the view of online learning becoming more negative, to students gaining confidence to set up laboratories or contribute to national policy decision making.

Participate number	**ELT0002**	**ELT0008**	**ELT0009**	**ELT0012**
Cycle 1 **Immediate Value**	Flexibility, recorded lectures, didn't use interactive materials, preferred traditional paper-based materials	Aware of full range of interactive activities, flash cards, quizzes, interactive videos, a useful tool to reinforce learning, a good way to summarise, utilised all.	Aware of quizzes and videos, however, internet access was difficult so used a combination of materials on Moodle and the print study guide and favoured reading, interesting challenging and relevant	Appreciated recorded lectures, easy to follow and detailed, used Moodle materials in professional life, researched how the software used to deliver the module could be applied to her own setting
Cycle 2 **Potential Value**	Appreciated the value of online materials for isolated communities and offered new opportunities. Access to library resources. Aspirations for further research degree study	Motivation to seek out further hands-on training for laboratory skills, as time moves on skills and knowledge acquired is waning, online laboratory skills no substitute for the real thing	Acquired new knowledge of diagnostics and interventions and previously utilised conventional methods but now incorporating molecular methods, already working in a lab but gained confidence, networking and community	Was able to build upon skills and knowledge gained, library was a good resource, felt part of a larger community
Cycle 3 **applied value**	Became a more confident teacher, saw potential for curriculum development with the exam board	More mindful of collection and transport of samples and was able to communicate this to colleagues	Used the knowledge gained in their job, techniques introduced, trained new staff	Everything learnt was transferrable to professional role, enhanced teaching and entrepreneurship
Cycle 4 **Realised Value**	Awareness, maintain enthusiasm, informed understanding of the world	Time saving and a little better performance at work	Utilised during the exam period, afforded the student with the opportunity to work in a (Ramage, 2001) civil service laboratory, achieved their job targets, financial targets and implemented new schemes, improved organisational and time management skills	Access to tutors, opportunities for formative feedback, creating opportunity
Cycle 5 **Reframed/ Transformative Value**	Considered applying some technology in own organisation, greater understanding of issues of global importance such as climate change and allocation of resources in low resourced settings	Recognition that knowledge can be translated into confidence and this impacts skills, though useful online skills training is no substitute for hands-on training	Can see the bigger picture, global impacts, decided to go paperless and was instrumental in introducing molecular genetics to the HIV diagnostics guidelines in their country	Knowledge transfer, implementation of SOPS, value of print outs, aspiration to build own lab.

Table 4: Themes raised by participants in learning journey narratives; one-to-one interviews.

Discussion

The results of this study show that while there was no significant difference in the mean examination or assignment grades between the cohorts, digital enhancements did have an influence on frequency of higher grades and lower numbers of fail grades. There is a known 'no significant difference phenomenon' observed in learning technology studies which has been ostensibly attributed to differences being wrongly attributed to the media employed rather than instructional design method (Ramage, 2001). Here, in this study, we have tried to ensure that methods of instruction are broadly similar with an 'intended learning outcomes (ILOs), content, activity and test' format. Where students are provided with a set of ILOs, subject content to meet the ILOs, an activity to reinforce that content and then tested on the content with self-assessment questions. The digitally enhanced materials use broadly the same model and the content of the study materials used by both cohorts was the same. However, we were unable to control for other differences in the cohorts, such as personal circumstances. However, we know that cohort A were studying around the time of COVID-19 lockdowns, which may have had an influence on assessment performance, though we were unable to quantify this. We did observe that more students from cohort B attempted assessment and access to the digital design elements may have increased their confidence, as this was reported in student responses in the learning journey survey and one-to-one interviews. The fact that not all students attempted assessment did affect our ability to determine student progression and completion rates as there were still a large number of students who had not finished the module.

Our study shows that digital enhancements of laboratory skills elements of the bacteriology module have reported value for DL students. Students reported that these enhancements reinforce their learning; for example, they reported using them for examination preparation. This observation supported our findings regarding improved examination performance and an increase in the proportion of students attempting assessment. Students reported more confidence in attempting assessment and the use of interactive laboratory videos as an alternative way to teach improves student perception of self-confidence, which is supported in the literature (Chen, 2022). Schwan and Riempp (2004) demonstrated that there are cognitive benefits and increased efficiency to using interactive materials for learning, perhaps due to students controlling the pace of learning.

By utilising H5P, we are contributing to the literature on use of this technology for teaching laboratory skills. The COVID-19 pandemic has highlighted the changing education landscape and researchers are interrogating H5P and its use as an effective digital design tool (Díaz-Rodas, 2024), particularly in laboratory training (Girmay, Yliniemi, Nieminen, Linnera and Karttunen, 2024).

Module evaluation surveys revealed that the majority of students (50 per cent) use Moodle revision resources in addition to hard copy materials. Students expressed their learning experience with H5P quizzes as a preferable way to reinforce their learning after each session. The Moodle feedback survey also underlines the shift in students' perception of DL – 80 per cent of surveyed students were pro live sessions with tutors – therefore DL creates new demands on teaching staff.

Though the number of students completing the learning journey survey and the one-to-one interviews was small, the data collected provided valid and important insights into student engagement with the interactive study materials and the positive value assigned by students to these design elements. Eighty-five per cent of students completing the learning journey survey reported engagement with the interactive study materials by expressing positive sentiment in response to the cycle 1 questions (immediate value). Engagement for the responders went beyond immediate value and students expressed a high level of positive sentiment to cycle 2 questions (potential value) and moderate positive sentiment to cycle 3 (applied) and

4 (realised) questions, with a lower positive sentiment score for cycle 5 (reframed/transformative value) questions.

The one-to-one interviews gave more insight into the sentiment expressed in the learning journey survey where individual variation in responses was evident, reflecting individual student learning styles and preferences which students reported during the interviews. The three students from cohort B were able to name the full range of different types of digital design elements provided (e.g. interactive lectures, activities, flashcards, quizzes, etc.), while the cohort A student only identified Moodle, recorded lectures and tutor feedback on assignments but perceived these as interactive, which is noteworthy as the term 'interactive' can be interpreted in a number of ways.

We need to acknowledge that digital poverty is an important issue to ensure equality in DL. Our preliminary data confirms that digital poverty may negatively influence students' assessment performance. Therefore, there is a need for further investigation, aimed at reducing disparities. The major limitation of assigning a digital poverty score based on the country of residence is that it does not take into consideration personal circumstances, therefore it is worth investigating this through additional survey questions. Nevertheless, it is clear that some countries are equipped in better digital infrastructure with high-speed internet, while others are still developing their capacity. For that reason, ensuring that all students are equally able to profit from DL technological advances is vital. A more comprehensive assessment of digital poverty could help identify specific barriers faced by students, allowing educators and institutions to tailor support more effectively. For instance, understanding whether students have access to reliable devices, quiet study environments or technical support can guide interventions to mitigate disadvantages.

Conclusion

Interactive and digital design elements, delivered via H5P, had a positive impact on exam results and assignment marks, with a shift to higher grade point frequency, though no significant difference on the mean grades was observed.

Students reported more confidence in attempting assessment with a higher proportion of students attempting in-course assignments. However, this study was not able to pinpoint which elements were most successful in this.

We conclude that interactive and multimedia design elements have a positive impact on knowledge recall and this is supported by grade distributions towards the higher end of the scale for examinations, and in high levels of positive sentiment reported in student responses to the learning journey survey and in one-to-one interviews.

Online laboratory skills training is of value, as reported by our students, although it is no substitute for hands on experience and does not offer the opportunity to develop motor skills.

Digital poverty within our cohort needs to be examined further as there are consequences for online-only course delivery. Furthermore, while student performance is not the only measure of success in this context, preliminary data suggesting a significant negative correlation between digital poverty and lower grades is an important finding as it raises a crucial point about the intersection of digital poverty and educational equity, especially in the context of DL. The recognition that digital poverty can adversely affect students' assessment performance is significant. It highlights the need for a more nuanced understanding of how access to technology varies not only by country but also by individual circumstances, such as socio-economic status, family support and local infrastructure. Ultimately, addressing digital poverty is essential not just for improving assessment performance but for fostering a more equitable educational landscape. By prioritising this issue and implementing strategic solutions, we can help bridge the digital divide and empower all students to thrive in distance learning environments.

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Notes

Section 4: Researching pedagogies and methodologies

Notes

The IRF discourse framework: A tool for analysing collaborative online learning

Nathan Page[1] and Dinah Sackey[2]

[1] University of York, Digital Education Team

[2] University of York, Digital Education Team/School of Business and Society

Correspondence email: n.page@york.ac.uk

Abstract

This paper defines a method of measuring the levels of collaborative learning (CL) in asynchronous online learning contexts. The method draws on the IRF (Initiation, Response, Feedback) discourse pattern which was identified in classroom discourse by Walsh (2002). When that pattern dominates in online learning and teaching discourse, it effectively means that peers are not interacting with each other and therefore not learning collaboratively. Taking this as a starting point for our method, we reviewed student responses to collaborative learning activities and categorised them according to whether they received no response, tutor-only responses (as per IRF) or responses including peers. The results demonstrate a wide variety of CL levels across three online modules, leading to important questions about which aspects of online design and delivery across the modules could lead to the discrepancy. The IRF method therefore provides a useful overview from which to spark conversations, practice enhancements and further enquiries into asynchronous online collaborative learning.

Keywords: Asynchronous Online Learning, Collaborative Learning, Discourse Analysis

Introduction

In this paper we define a method for identifying levels of collaborative learning within asynchronous online modules or programmes and show our initial results. We are calling this the IRF Method (standing for Initiation, Response, Feedback) as it draws on the IRF discourse pattern identified by Walsh (2002) which is explained in the next section.

Initially, it is important to define what we mean by collaborative learning (CL), why it is important for our educational context and identify the gap which the IRF method can help to address. We define online CL in asynchronous learning spaces to include interactions with peers (fellow students) as opposed to learning processes which take place alone or only in interaction with tutors. Whereas Laurillard (2013) distinguishes between 'discussions' and 'collaborations' (with the latter defined by collaborative work on some kind of artefact or output), our term is looser, encompassing discussions as a form of CL.

CL is positioned centrally in well-established models of online learning design for higher education, such as Garrison and Anderson (2017) and Laurillard (2013), and practice recommendations suggested by Salmon (2013). The need to learn from peers is a de facto position in higher education (encompassing in-person, blended and fully online modes), and a strong rationale for its requirement can be found in the wider literature in online pedagogy, for example in recommendations from JISC reports (see JISC, 2022; JISC, 2023). We know that online learners can experience high 'transactional distance' (Moore, 1997), highlighting the need to connect with others as they learn. Online CL naturally leads to expanded learning opportunities, active as opposed to passive learning and sense of community, belonging and motivation relative to online courses (see Dalsgaard and Ryberg, 2023).

At the University of York, we run a series of fully online master's degree programmes via the Canvas virtual learning environment. CL is a significant feature of the learning design, based on applications of the models referred to above (most notably the ABC model of learning design, deriving from Laurillard, 2013). We build Collaborative Learning Activities (CLAs) into all of our online modules, currently this is exclusively via discussion board or Padlet activities to enable asynchronous CL.

Examples of commonly used CLAs for our learning context include:

- Discussions for learner self-introductions, typically asking for information on their professional contexts and linking to the module topic.
- Discussions where students are guided to apply theoretical frameworks to their own professional contexts (or some other context, whether pre-defined or open choice) and draw conclusions.
- Guided discussions on a topic, for example the ethics of artificial intelligence, typically based around learners posting their responses to pre-defined questions.
- A task to produce and share an individual output of some kind – e.g. sharing their response to a task or an artefact of some kind (e.g. a video presentation) – then provide comments/feedback on the outputs of peers. A design decision would be made on whether tutors also feedback in the same space along with peers.
- Use of a pre-defined case study to spark discussion (usually based on discussing interpretations of the case or applications of theory to it).

Other types of CLA have been used, including role plays, however most of the CLAs used would fit into one of the five types above. Although our frequent use of CLAs as design practice is well established, it is essential to keep it under review by carrying out evaluation and enhancement activities. In the York Online context, we see varying levels of engagement and participation in CLAs, which we need to investigate relative to local conditions. These include the variation in design and tutoring approaches by different members of staff and the fact that our student cohorts change quickly (due to short, eight-week terms running consecutively, which students can join or not in a flexible fashion), which has an impact on the cohesion of our learning communities. These local factors are in addition to significant wider issues identified in the literature, for example the notion of 'legitimate non-participation' in CLAs (De Wilde, 2019) and questions over whether students value online CL (Brown and Baume, 2023).

As part of a wider research project into online CL at York, the IRF method has been developed and applied to a small sample of data. The method is particularly useful for providing an overview of the amount of CL that takes place in an online module's collaborative learning spaces, as compared to how much learning takes place with tutors only or when student posts result in no comments from or interactions with either students or tutors. At York, we previously had no established method to provide an overview of online CL levels. IRF represents a new evaluative tool which can assist with training, raising awareness, evaluation and redevelopment practices in online pedagogy.

Methodology

We identified a sample of three online modules which ran in consecutive terms for the same fully online master's degree programme in management. All featured approximately 130 students, 12 of which studied all three of the modules.

We counted the number of CLAs per module, and the number of student responses to the CLA tasks. The responses were then categorised in the following way (colours are supplied here for reference to the figures in the next section):

- Type 1 (brown): these student responses received no replies from either tutors or other students
- Type 2 (light blue): these student responses received one reply from the tutor
- Type 3 (dark blue): these student responses received a tutor reply, then a longer interaction between the same student and the tutor took place
- Type 4 (light green): these student responses received replies from both the tutor and other students
- Type 5 (dark green): these student responses received replies from peers only

Types 4 and 5 represent collaborative learning whereas types 2 and 3 represent 'tutor feedback only', which is important but not collaborative by our definition. 'Tutor feedback only' equates to Walsh's (2002) IRF – Initiation, Response, Feedback – pattern in educational discourse. In a language learning context, Walsh (2002) found IRF to be a frequent discourse pattern in verbal exchanges involving teachers and students. In classroom exchanges a language teacher commonly 'initiates' (by, for example, asking a question), the student 'responds' and then the teacher gives 'feedback' on that response.

The IRF pattern (online and text based, as opposed to verbal) is present in our data set if we take:

- the 'initiation' to be the task instructions
- the 'response' to be a student post responding to the task and
- the 'feedback' to be where the tutor made a reply to the student's post.

Closely matching Walsh's perspective on IRF for his context of study, there are some obvious benefits to this pattern where it exists in fully online learning (especially where the receipt of tutor feedback is clearly the goal of the activity) but some clear limitations if/when IRF is the dominant pattern across the CLAs in a module. If either IRF (types 2 and 3 above) or 'no response' (type 1) are dominant then by definition collaborative learning is limited – meaning a problem for online learning in our context, given the rationale for its importance stated above.

This was the motivation for categorising student CLA task responses as per the types above. Essentially, we were looking for how often learning interactions 'went beyond' IRF in our data set to become collaborative learning, and this is what the charts in the next section show. Whereas mapping and counting interactions in CL spaces has been widely used as a method in online pedagogy research (e.g. Heckman and Annabi, 2005), the categorisation offered by this method (IRF versus CL) is a novel approach which generates useful, clear data for measuring online CL.

Findings

Figures 1–3 show the application of our IRF method to three separate online modules. The horizontal axis shows the number of CLAs within each module, ranging from 6 to 15 in this sample. The vertical axis shows the number of task responses to those CLAs: task responses range from as low as 5 in some CLAs to the upper 70s for others. The colours within the stacked bar charts represent the different types of learning interactions as defined in the previous section. In brief: the brown colour indicates no reply to a student's task response, the blue colours indicate tutor-only replies and the green colours indicate replies including peers (i.e. collaborative learning). A summary of the key findings is included after the charts.

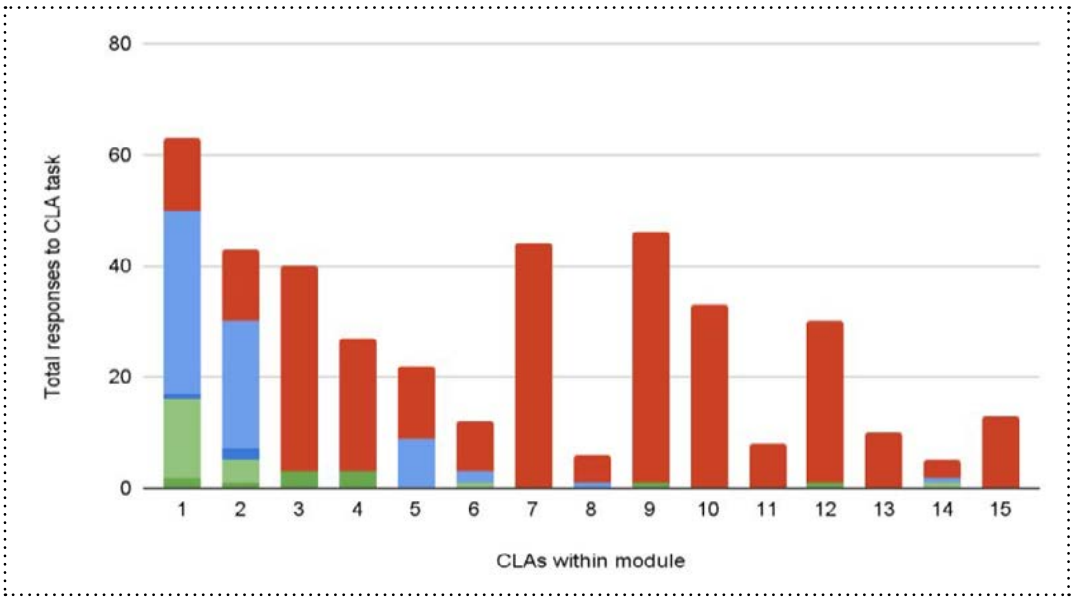

Figure 1: IRF Analysis of Module A.

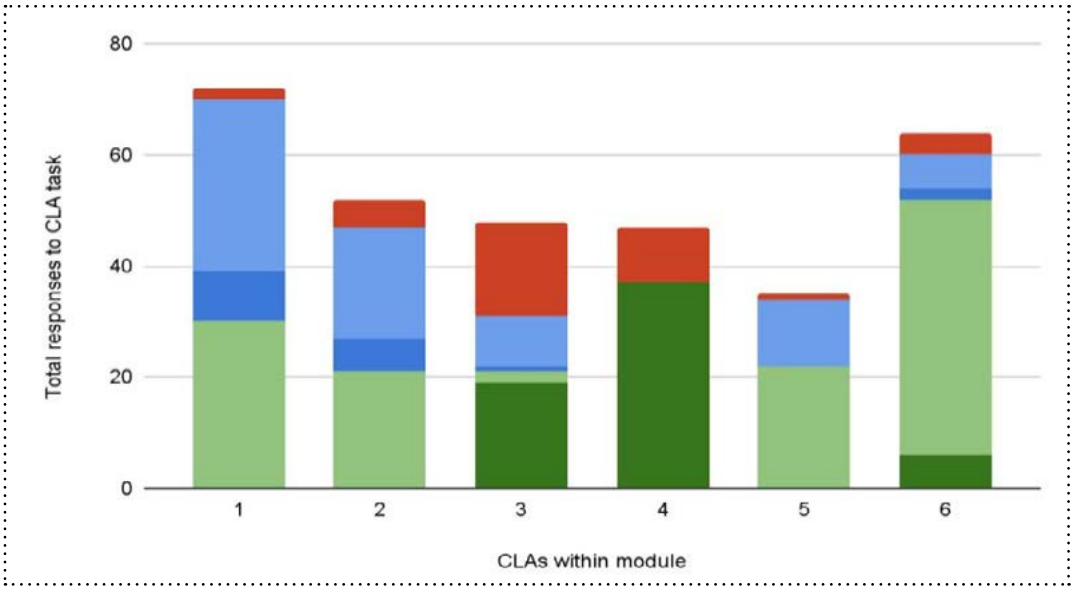

Figure 2: IRF Analysis of Module B.

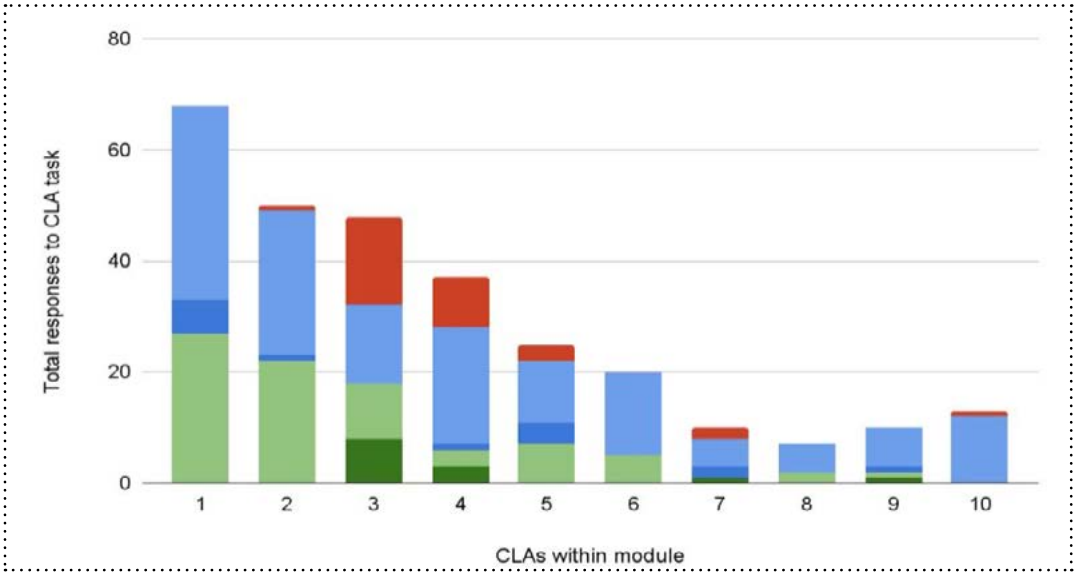

Figure 3: IRF Analysis of Module C.

As can be seen in the charts above, this IRF analysis shows a wide variation between the modules in levels of participation (the height of bars), collaborative learning (green segments of bars), tutor-only responses (blue segments) and zero direct responses (brown segments). Module B has high levels of participation across its CLAs and a very high proportion of collaborative learning within them, relative to the other modules. Participation levels in modules A and C start high and then taper off for later CLAs. We can define module A as being characterised mainly by individual student posts with no direct responses from tutors or peers, whereas module C has IRF or 'tutor only' responses as its dominant interaction pattern (although it does also have more collaborative learning than module A).

Discussion

The findings shown above are significant for our evaluation of asynchronous online CL in our context. We did not expect to see such a wide variation in levels of CL when we first set out to apply this method. This shows a fundamental benefit of applying the method – it allows for an overview of CL which sparks further discussion and investigation. This is above and beyond what simple participation figures show (i.e. total numbers of posts within CL spaces without identifying the type of interactions taking place).

Given the perceived importance of CL in online learning (Dalsgaard and Ryberg, 2023) – even when viewed through the critical lens that it should not be adopted unquestionably (De Wilde, 2019; Brown and Baume, 2023) – it is important to note that similar online modules within the same programme context can produce such different results in terms of the levels of CL. Our initial research indicates that the following aspects of design and delivery could be significant drivers of higher CL:

- Tutoring Practice: tutor responsiveness and style of responding, tutor attempts to foster learning communities and direct encouragement of CL.
- Design Practice: engaging types of CLA (the nature of the learning and what students are being asked to do), using the right tool for the job (Padlet versus discussion boards), not including too many CLAs, CLAs designed with clear purpose and interesting/clear task instructions, CLAs as open-ended and suited to peer interaction, clarity on how to interact with peers, careful use (and clear flagging) of some peer-only CLAs, direct links between CLAs and assessments.

We have not yet performed a full analysis of the three modules relative to these factors. Readers may be particularly interested in Module B as it produced such relatively high levels of CL. Our initial analysis shows that the module performed well in all of the design and delivery areas mentioned above. For example, we noted high levels of responsiveness from tutors, a relatively low total number of CLAs (and definitely not over-use) and task designs which were engaging and clear in their wordings, instructions and purpose. In terms of the CLA types, the module used all of the five common, frequently used types of CLA that were defined in the introduction section. There were no CLAs that could not be categorised into one of them. Two distinctive features of the CLAs in this module were:

- A discussion which was clearly set as peer feedback only, in an appropriate place to foster learning community near the start of the module (but not too early).
- A direct link between the summative assessment and the final CLA: in the activity itself learners were asked to apply theory to a case study and then comment on each other's applications. As part of their assessment they were asked to write up a reflection of what they learned from the activity, including from peers (Note: this latter design approach is currently unique within our programme yet the CLA had particularly high participation and CL levels – see Figure 2, CLA 6 above).

As part of our ongoing project, we are carrying out further analysis of the tutoring and design practices within all three of the modules in our sample. We will also seek participant perspectives through interviews with the module designer/tutors and students, and will issue programme-wide student questionnaires on CL.

A future direction of the project will be to fully identify and define the types of CLA in our programmes, and to investigate which others might be possible and appropriate for our context. Developing a full taxonomy of CLA types will be valuable for our own internal module development and maintenance purposes (e.g. to support authors writing new modules and members of staff to redevelop existing ones). However, it is not just the CLA type in isolation that matters, we need to continue taking a wider perspective. The overall success of CL could relate to holistic details such as the balance of CL types across a module, details such as their positioning and how they iterate/develop learning across other activity types. Even the exact name of a CLA (along with other small details) is seen as being potentially important to student participation (Salmon, 2013).

The results shown above lead us to a range of interesting questions in the design and delivery of online learning that we intend to pursue further, for example:

- What more can we say about the design and delivery practice associated with higher rates of CL where it was observed in module B and relatively so in some CLAs from the other modules?
- Which aspects of design and delivery practice could be associated with the lower rates of CL where they appear?
- Is there any design or delivery reason which might explain threads 'stopping' at IRF rather than peers getting involved to trigger CL?
- What are the details of threads in the different categories? For example, for those involving peers, how long were they, how many students were involved and what was the nature of the interaction/collaborative learning relative to the CLA task? Was there evidence of community building, online socialisation and discussion around the topics in addition to work on the task?
- What are the reasons behind the 'zero response' posts – is this related to students posting outside defined timescales for responses? Are tutors responding to those posts in alternate ways to direct replies (e.g. acknowledging them through summary posts or announcements)? Are tutors allowing 'interactional space' by not responding too quickly, to avoid dominating interactions and to allow time for peers to respond instead?

Because further research is needed after an IRF analysis, this could be viewed as a weakness of the method. It is rather reductive in nature, meaning that further evaluation will always be useful (although conversely, it is a good starting point). In terms of other limitations: some outlying post types could be difficult to codify, meaning that extra categories might be needed or some post types might need to be excluded. Furthermore, as indicated under point 5 above, this method will not capture extra kinds of communication from a tutor beyond direct replies. For example, if they are offering feedback and acknowledgments via summary posts or announcements, this method will not pick those up: an expanded approach to communication across modules would be needed.

So far, we have only applied the IRF method to CLAs using Canvas discussion boards or Padlet. However, it should be equally applicable to CLAs in any other VLE or communicative learning tool, if they allow for posts and threaded replies.

An interesting possibility for the future would be the automation of IRF analysis (with thanks to the member of the audience who raised this as

a question). If either the internal learning analytics of a VLE or an external programme could calculate this automatically, this could potentially offer an overview of CL levels across academic programmes in addition to modules. This could be tracked over time creating a large and potentially very useful database for evaluation purposes. The manual process of counting and categorising is not too onerous, however automation would greatly expand the possibilities of the IRF method.

Conclusion

This paper has demonstrated that the levels of collaborative learning within online modules and programmes can be mapped out via a categorisation of student task responses into occasions where there were no replies, 'tutor-only' replies and replies involving peers. The application of this method could be useful to anyone involved with the support or direct delivery of online learning involving the use of asynchronous collaborative learning activities. Its main benefit is to reveal the levels of CL within the module, which will spark useful conversations over how CL might be maintained or enhanced by local practice in the design and delivery of online learning.

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Notes

Section 5: Emerging practices and methodologies

Notes

ITT in the digital realm: Moving complex f2f teaching into asynchronous delivery

Abigail Ball and Miriam Averna-Joint

University of Warwick

Correspondence email: A.Ball.1@warwick.ac.uk

Abstract

The Centre for Teacher Education (CTE) at the University of Warwick delivers postgraduate taught programmes to graduates looking to gain Qualified Teacher Status (QTS). In September 2024 the new Initial Teacher Training (ITT) curriculum comes into effect and there is an expectation that students will have the opportunity to participate in Intensive Training and Practice (ITaP) activities on various aspects of the curriculum. ITaPs are intended to consolidate students' understanding of how evidence shapes teaching practice and increase the links between taught theory and practice in schools (Department for Education, 2023).

In September 2023 CTE successfully piloted a Behaviour Management ITaP on its on-campus Postgraduate Certificate in Education (PGCE) programmes. This was developed by and co-delivered with CTE staff and teachers in several of its partner schools in the region. Students spent two days in CTE learning about the theory behind Behaviour Management and two days in partner schools where they had the opportunity to observe and reflect upon expert practice in relation to Behaviour Management. They were supported to understand what makes such practice effective and to consider how it could be embedded in their own teaching using role play activities, teaching practice opportunities and feedback from expert colleagues. The students then returned to CTE for the final consolidation and reflection activities on day five.

One of the challenges CTE faces is that it must make the ITaPs available to its fully online international QTS programme. Unlike students on its on-campus programmes, its international students do not have access to collaborative partnerships with teachers in schools. Additionally, these students are frequently in full-time employment, they are operating in varied time zones, and there is no expectation for their employing/placement school to provide anything beyond the opportunity to teach.

Building on the success of our work with Reusable Learning Objects (RLOs) we are evaluating CTE's online ITaP delivery and looking to use a variety of technologies such as H5P to create a comparable and enriching online ITaP experience for CTE's international students. This practice-based paper discusses some of the RLOs we have created, activities being developed and considers some of the challenges we have faced.

Keywords: Online, Initial Teacher Training, Intensive Training and Practice Opportunities (ITaPs), International Teaching, H5P, Digital Fatigue, Digital Communities of Practice, Digital Poverty, Accessibility

Introduction

The Centre for Teacher Education (CTE) at the University of Warwick delivers postgraduate taught programmes to graduates looking to gain Qualified Teacher Status (QTS). Its Postgraduate Certificate in Education (PGCE) programmes equip students to teach in the early years, primary and secondary phases, and they are delivered locally, nationally and internationally, with the international programmes being delivered fully online.

Post-COVID-19, CTE saw a fall in applications and enrolments across all its PGCE phases, and this is a continuing trend across the English Initial Teacher Education (ITE) sector. The Department for Education's ITE market review and reaccreditation process effectively destabilised the English ITE sector and created what Noble-Rogers (2022) refers to as recruitment uncertainty. Additionally, the number of teachers year on year leaving the profession due to factors such as workload pressures (Malm, 2020) and the recent teacher pay dispute (National Education Union, 2024) is a significant issue that also needs to be considered (Adams, 2023). This context has evolved since CTE began its strategy renewal process which had already identified several challenges to extending its portfolio and expertise including how to:

- utilise its expertise in online and blended learning on all its programmes
- offer cost-effective teacher training in geographically dispersed, hard to recruit to locations where 'in person' attendance at university sessions is not possible
- compete with other digital teacher education providers who offer a lower cost model approach to ITE.

Consequently, CTE needs to offer alternative provision to reach the widest possible audience and logically this means an increase in online programmes. As part of its curriculum development work ahead of September 2024, CTE is creating a national digital PGCE programme and expanding its international QTS programme to include Intensive Training and Practice [opportunities] (ITaPs).

ITaPs are a required element of the new ITE curriculum intended to help consolidate students' knowledge of key evidence-based principles for effective teaching (Department for Education, 2023). ITaPs enable students to apply and integrate these key principles into their developing professional practice and strengthen the link between evidence and classroom practice. Some elements of the ITaPs take place in a school environment, led and supported by an appropriate range of practicing teachers, while others take place in CTE. Students undertake 25 hours of input per ITaP which are designed to give students appropriate content, scaffolded practice and feedback in relation to the chosen foundational aspects of the ITE curriculum (Department for Education, 2023).

In September 2023 CTE successfully piloted a Behaviour Management ITaP on its on-campus PGCE programme. This was developed by and co-delivered with CTE staff and teachers in several of its partner schools in Coventry and Warwickshire. Its students spent two days in CTE learning about the theory behind Behaviour Management and two days in partner schools where they had the opportunity to observe and reflect upon expert practice in relation to Behaviour Management. Students were supported to understand what makes such practice effective and to reflect upon how it could be embedded into their own teaching practice using role play activities, teaching opportunities and feedback from expert colleagues. On day five, the students returned to CTE for the final consolidation and reflection activities. Although this process worked very well for the on-campus PGCE programme, the challenge now is to establish how this can work online, and particularly online in international contexts where the practice-based support of the English QTS system is unavailable.

Discussion

Digital fatigue

At Warwick we have a learning management system (LMS), a coursework management system, a reading list management system and a lecture recording system. A similar range of technologies is used in other UK HE institutions (UCISA, 2022). We use webinar software to deliver our online sessions and our students also use a wide range of technologies on their

placements. Feedback from our students has highlighted the anxiety caused by navigating these multiple platforms. Our student feedback is supported by findings from the JISC Student Digital Experience Insights Survey with quotes such as 'Sometimes I find there is an overwhelming amount of information or information is too hard to find and is hidden behind too many links or pathways' (JISC, 2023, p. 18). As such, we have identified digital fatigue as a significant concern and a topic to discuss.

Digital fatigue is commonly defined as a form of mental exhaustion which occurs after an intense period of screen time (Bradshaw, 2023). While this definition is still important, we are referring to digital fatigue in terms of the number of platforms and pieces of software that our students experience during their studies.

Mishra and Koehler (2006) developed the TPACK model (see Figure 1) to illustrate how using technology to teach concepts should enhance the student experience. If TK, PK or CK is missing, or proves to be too difficult for the students to grasp (perhaps due to the number of platforms that they are using), then they will not be able to achieve TPACK and make effective use of the learning opportunity presented to them. This is something that we were very conscious of during the development of the online Behaviour Management ITaP. Introducing any new technology can be challenging, so we wanted this to be as simple as possible to reduce the TK load, especially as the delivery of the Behaviour Management ITaP takes place at the start of the PGCE programme when the students' PK may be somewhat limited.

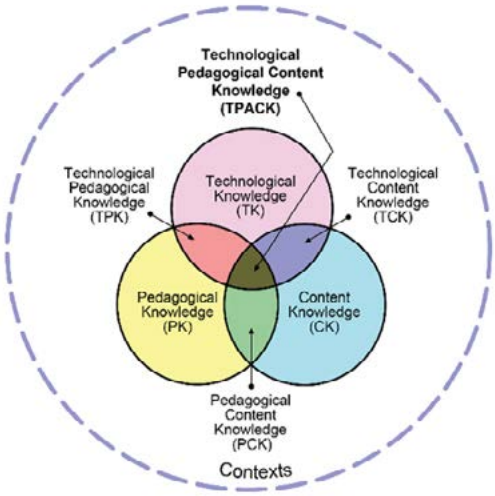

Figure 1: The TPACK model (Mishra and Koehler, 2006) (Reproduced by permission of the publisher, © 2012 by tpack.org).

H5P (HTML 5 Package) is described by Hart (2023) as both a content development tool and as an instructional tool, as it can be used to create both interactive and instructional content. We chose to use this HTML 5-based tool (which is available via our LMS) as it enabled us to use interactive content (e.g. videos or interactive presentations) and combine them in a simple book format (see Figure 3). The simplicity of the interface means that the students can concentrate on the PK and CK component of the TPACK model without having to worry about the TK component.

Cognitive load refers to the amount of information our working memory can process at any given time (Sweller, 1988). Cognitive load theory helps us to avoid overloading learners with more than they can effectively process into schemas for long-term memory storage and future recall (Atkinson and Shiffrin, 1968). Once again, this was a factor in our choice of technology as we wanted something that would enable us to create bite-sized content that would not overload students' working memory. We did not want the manner in which the content was presented to inhibit the students' learning by adding to their extraneous cognitive load. Nor did we want to inhibit their learning

due to our organisation of the sometimes complex content which could impact their germane cognitive load (Main, 2022).

Once more H5P gave us the ability to chunk the content into bite-sized sections (pages) which limited the students' extraneous and germane cognitive loads (Main, 2022). Additionally, it gave us the opportunity to combine passive learning opportunities that required students to absorb or assimilate information with active learning opportunities that required students to discuss or analyse information (Bloom, 1956). Too much of any one type of these learning opportunities could lead to boredom or exhaustion. Hence, the ability to mix content types in the H5P books is a bonus (see Figure 2).

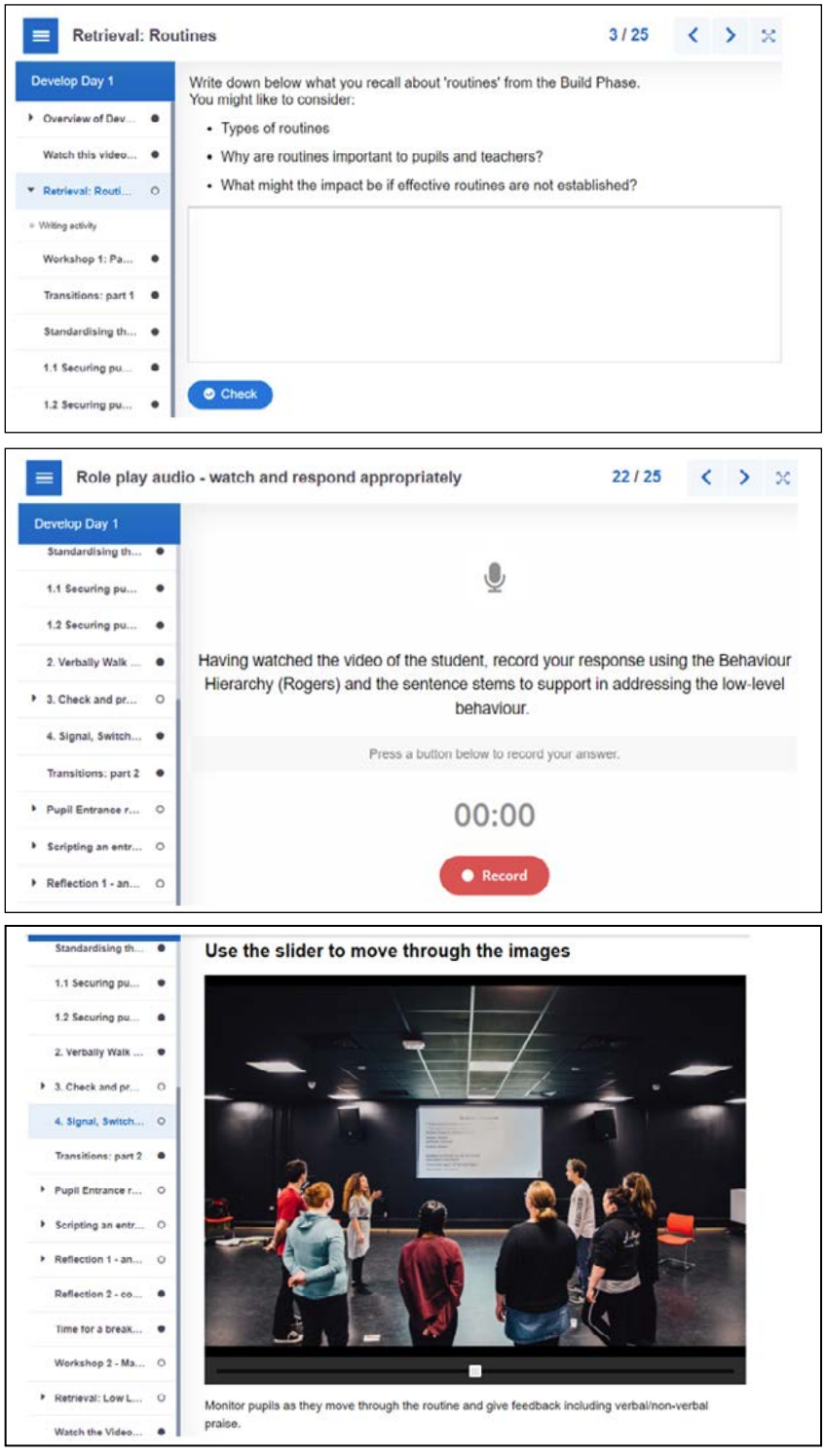

Figure 2: Examples of H5P activities created for the Behaviour Management ITaP.

Digital Communities of Practice (DCoPs)

As part of CTE's strategy renewal process, the senior leadership team stipulated the need to offer cost-effective teacher training in geographically dispersed, hard to recruit to locations where 'in person' attendance at university sessions is not possible. At a workshop facilitated by the lead author to consider how CTE might achieve this goal, staff commented on the value of professional communities of practice (e.g. the BERA Special Interest Groups (BERA, 2024)) for Continuing Professional Development (CPD).

A community of practice is a group of people who 'share a concern or a passion for something they do and learn how to do it better as they interact regularly.' (Wenger-Trayner and Wenger-Trayner, 2015, para. 5). A digital (virtual or online) community of practice has the same definition, but it is created, developed and maintained using the internet (Sibbald, Burnet, Callery and Mitchell, 2022). One of the key benefits of a DCoP is the ability to connect a wide range of people, regardless of geography, time, or cultural limitations.

We want to incorporate the opportunity to create a DCoP into the Behaviour Management ITaP and use our experience of developing a Rainbow Allies DCoP (visible supporters of the LGBTQUIA+ community) to inform this process. Booth (2012) comments that fostering and sustaining knowledge sharing, and trust are some of the most difficult challenges DCoPs face, and we certainly experienced this with the Rainbow Allies DCoP. Interest was minimal. We established that member familiarity (Adams, Roch and Ayman, 2016) was impacting student engagement as many of our PGCE students were not familiar with Rainbow Allies nor with the staff involved in the community. For the ITaP DCoP we will provide informal opportunities for students to meet outside of the ITaP process to mitigate these issues, including the opportunity to experience using gather.town. This is a web-conferencing software where participants can see themselves as characters in the virtual room they are occupying (see Figure 4 below). They can move around the room and interact with other participants either in public areas (like cafés) or private areas (like meeting rooms) using audio, video and chat. Participants can also interact with objects that have been uploaded into the room such as images or links.

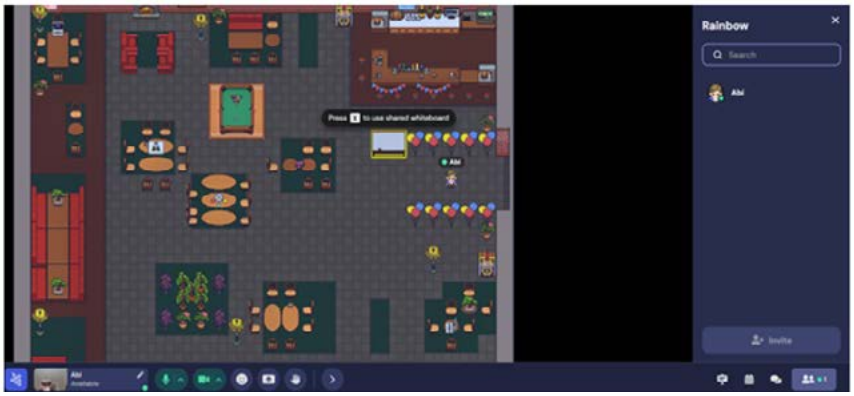

Figure 3: An example of a gather.town room.

We will be careful how we articulate the choice of topic (Wenger, McDermont and Snyder, 2002) for any communities created as this was also an issue experienced with the Rainbow Allies DCoP. In our experience, being too prescriptive can limit student engagement but, conversely, leaving the topic too open can mean that students consider that the DCoP is irrelevant to them, so it is a balancing act that requires ongoing management and fine-tuning. Additionally, we will embed DCoPs into the PGCE programmes (Bourhis, Dubé and Jacob, 2005), ahead of the delivery of the Behaviour Management ITaP (during Foundation Week) to maximise student familiarity and engagement.

Digital poverty

The Digital Poverty Alliance (2024) defines digital poverty as the 'inability to interact with the online world fully, when, where, and how an individual needs to.' Operationally, this means that individuals are lacking one or more of the following:

- connectivity
- a suitable device
- skill
- confidence.

Good quality wi-fi is not ubiquitous in the UK and with the development of our international programme, students are now joining us online from all over the world. As such, it is increasingly difficult to gauge the standard of student connectivity. Although we can mitigate some of these issues through the provision of minimum guideline technology specifications at application/enrolment, should we be designing ITaP resources that can be used offline? In the past, this may have meant providing predominantly text-based resources that were largely passive in nature. As previously discussed, this would have reduced student engagement (Freeman et al., 2014), but once again H5P provided the solution. Many of the resources are downloadable and by designing them to minimise student cognitive load (Sweller, 1988) we also minimise their file size and make them more available for students with poor connectivity.

Many secondary teachers have anecdotal evidence of children writing A-level essays on mobile phones during the COVID-19 pandemic. While this is not something that we have experienced in CTE, student access to a suitable device is another consideration that we must be aware of. Once again, this can be largely mitigated by the provision of minimum guideline technology specifications, but also by using H5P to develop our ITaP resources. As you can see from Figure 4, H5P is mobile friendly and following user testing we have established that the resources work equally well on mobile devices and larger desktop or laptop devices.

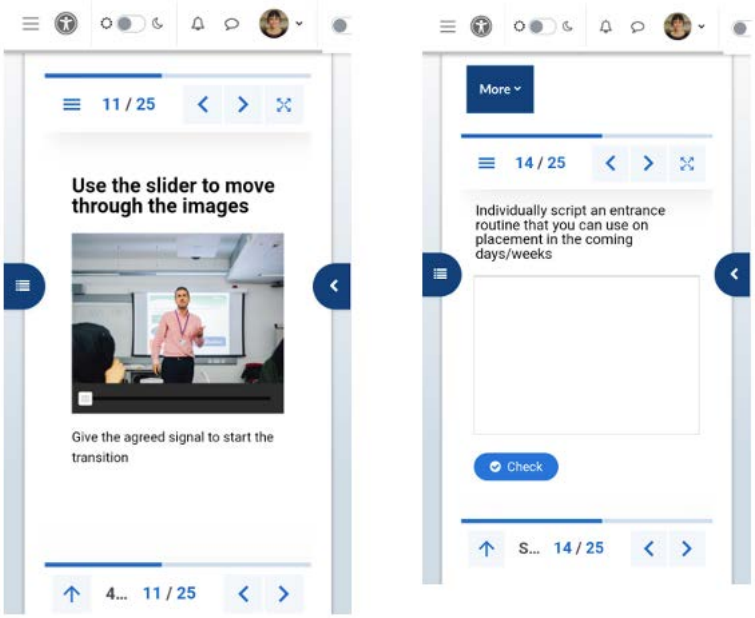

Figure 4: Screenshots of example H5P ITaP activities on a mobile device.

Skill and confidence will be considered together. Many of our students lack confidence in their use of technology for teaching and learning purposes and the Digital Poverty Alliance (2024) comments that this operational lack is frequently seen in the older population. We find that many of our younger

students struggle with technology confidence, so it is by no means a generational issue. Digital fatigue can be a factor in this, so we have made our technology signposting across all our programmes more explicit. We have also developed an online programme called digiBITE, which introduces students to the skills they will need to study online. Feedback from participants has been very positive, for example: 'The course was very simple allowing for minimal cognitive overload whilst providing lots of information, whilst building my confidence.' (Student feedback, personal communication, September 2023).

Conclusion

We asked for feedback via Vevox polls during our RIDE 24 presentation and accessibility was raised as something that we had not previously mentioned. H5P is partially conformant with WCAG 2.1 level AA (the Web Content Accessibility Guidance) which means that some components are non-compliant. As H5P is browser based we have confirmed that it is compatible with Chrome, FireFox, Microsoft Edge and Safari. We already advise staff and students to use the latest version of any browser they use, and this should mitigate any accessibility issues due to out-of-date browsers. According to H5P Group (2024) H5P is compatible with the latest versions of the main screen reader software but we recognise that this is something that we need to explore further as our experience of these is limited.

H5P Group (2024) also comments that content created in H5P modules using third party content (e.g. images or videos) may not be compliant as it relies on the content developers to make their content accessible. The content that we add to our H5P modules is fully compliant and CTE staff who create their own H5P resources have access to comprehensive accessibility support materials advising on everything from creating image ALT tags to developing accessible PowerPoint presentations.

Finally, H5P Group (2024) recognise that certain components of the H5P authoring interface are not particularly compatible (e.g. the drag and drop options). They advise that they are working to make the interface as accessible as possible for authors.

We've worked hard to mitigate many of the issues discussed in this practice-based paper, but the success of our choices will ultimately depend upon how effective and easy to use the students find the resources during the relevant ITaP window. We plan to disseminate interim and end of programme evaluations that will identify what resources the students found effective and those that could be improved. Accessibility will be a specific focus of these evaluations as we must establish if using H5P adds an additional level of challenge for students with accessibility needs that could inhibit their achievement of TPACK (Mishra and Koehler, 2006). Additionally, we will be asking CTE staff and partners in schools for their feedback on the ITaP resources and what can be done to improve them or make them easier to use.

DCoPs are going to be a particular challenge as we've already experienced issues with student engagement, as previously discussed. It is only once we have completed an entire academic cycle that we will better understand whether they are useful for our students or if they are something that only more experienced practitioners find effective for CPD. We are piloting their use on our Department for Education mandated Mentor Training programme with our partners. It will be interesting to compare how they are used by the different groups and to identify any common benefits or issues that arise.

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Notes

Section 6: Internationalisation and transnational education

Notes

Academics engaging in formative peer assessment of reflective scholarly accounts of doctoral supervision

Jennie Golding

UCL Institute of Education

Correspondence email: j.golding@ucl.ac.uk

Abstract

I focus on the formative peer assessment of reflective scholarly accounts of doctoral supervision, undertaken as part of three iterations of an online supervisor collaboration developed using design research. Participants were academics in the United Kingdom and in southern Africa. Common opportunities and challenges were identified, but also some differential responses that underline the deeply contextualised and culturally-infused nature of academics' skill and knowledge sets and their peer interactions. Such processes therefore require context-responsive and culturally sensitive facilitation. The paper contributes to the literatures around comparative academic development, as well as of distance formative assessment.

Keywords: Formative Peer Assessment, Supervision, Critical Reflection, Comparative Study, Southern Africa

Introduction

Postgraduate research supervision is under-valued, under-provisioned and under-developed in many HEIs globally (Taylor et al., 2021). Timely doctoral completion rates are, widely, low. Further, recent years have seen multiple changes in the nature of doctorates and expectations of doctoral supervisors, including massification, and proliferation of format and purposes. The United Kingdom Council for Graduate Education (UKGCE) has recently introduced accreditation of experienced doctoral supervisors in an effort to support deliberate systematic and scholarly reflection on, and valuing of, such supervision. Such recognition is based on a reflective account of supervision in 10 key areas, required to be 'personal, recent, analytical, example-based, scholarly and systematic', and supplemented by two references, one each from a former doctoral student and a colleague.

The focus initiative of a series of six collaborative online workshops for experienced supervisors was developed using design research and introduced in the author's home, research-intensive, institution in 2021. The initiative is analysed in Golding (2024), and aims to support development in preparation for UKCGE recognition, predicated on the value of professional reflection on/in/for practice (Huet and Casanova, 2022; Schön, 1987).

Following initial participation by a South African 'critical friend', annual workshop series participants have alternated between UK and sub-Saharan African academics. Formative peer assessment of post-workshop draft reflective accounts of doctoral supervision was introduced for iteration 2, as analysed below. Currently, iteration 4, across 10 countries in sub-Saharan Africa, is in train but has not yet reached the peer assessment phase. Under the design research paradigm, practice for the formative peer review stage for iteration 4 will be informed by the analysis presented here, and consequent design developments. Data are therefore drawn from iterations 1–3, of which the first provided the rationale for introduction, but only the second and third featured formative peer assessment.

Such peer assessment is reasonably well represented in the literature, at both school and university levels (e.g. Topping, 1998, 2009), and including, recently, online approaches (Alemdag and Yildirim, 2022; Gao et al., 2023). However, the focus here, on peer assessment with experienced academics, is new. For other groups, key benefits are known to include student motivation (Planas Lladó et al., 2014), with motivation known also to be important for academics, autonomous critical thinking (Carnell, 2016), a better understanding of the subject matter, assessment criteria and their own values and judgements (Wanner and Palmer, 2018). Peer assessment can lead to the identification of knowledge gaps and engineering their closure, as well as increasing reflection and generalisation to new situations, promoting self-assessment and greater metacognitive self-awareness. Cognitive and metacognitive benefits can accrue for both assessor and assessee before, during, or after the peer assessment (Topping, 2009). Wanner and Palmer (2018) identify a need for deliberate development of students' capacities for giving feedback, and the continuous and timely involvement of the teacher, for successful peer-assessment. Topping (2009) recommends overt training, with exemplification, checklists and monitoring. However, for peer assessment in universities, Adachi et al. (2018) also identify challenges of perceived expertise, power relations, time and resource/motivation and superficial engagement with feedback.

In sub-Saharan Africa, entitlement to universal basic education is relatively recent, and demand for university education has exploded in recent years, leading to pressure on resources and rapidly-increasing expectations of academics, accompanied by under-availability of experienced doctoral supervisors (Goujon et al., 2017). We might therefore expect exacerbated challenges in developing appropriately equipped doctoral supervision. It is not clear that the pedagogical approaches, including for peer review, constructive in an English university context will transfer unproblematically to a different cultural context. Across academic research, African ways of knowing, and knowledge in an African context, are less valued in the academy, and much less is known about African academics' ways of developing professionally. The underlying comparative research question addressed in this paper is therefore, 'What is the same, and what is different, in participant group response to the formative peer review process?'

Methodology

As outlined in Golding (2024), research tools were developed around Halse and Malfroy's (2010) dimensions of supervision and Bruce and Stoodley's (2013) categories of supervision-as-teaching. Ethical consent was secured from the author's institution (REC 1590), and for research related to iteration 2, from the University of Johannesburg also. After the first three iterations, data comprised workshop recordings (22), participant post-submission survey (37), interviews with key personnel probing workshop experiences and learning (7), draft reflective accounts (23), feedback given (23) and submitted reflective accounts (35).

Analysis was reflexive thematic (Braun and Clarke, 2022), starting from the above themes. Here, I draw largely on the last three sources, together with recordings of peer review preparation and feedback workshops. A range of findings around the workshops is available in Golding (2024); here I focus on those specifically related to the peer review process.

Genesis of formative peer assessment phase

Despite the experience and collaboratively-evidenced supervisory expertise of participants, not all initial applications for recognition were successful, and that was a real, sometimes traumatic, challenge to the senior academics concerned. Analysis of their submissions usually showed this was the result of a limited, or uneven, application of the given assessment criteria in their reflective accounts, and with peer support, all were successful on

resubmission, though some still struggled to evidence the required depth of reflectivity.

For the second iteration in southern Africa, therefore, facilitators gave a stronger steer on making notes of reflections and experiences during and after sessions; they also introduced a structured optional formative peer assessment phase. Design of peer assessment responded to considerations identified from the literature, adapted for the target participants. In particular, formative peer review of draft reflective accounts of doctoral supervision was asynchronous and anonymous. It was preceded by an assessment workshop focused on collaborative analysis of a sample reflective account using UKCGE assessment criteria, leading to discussion of content and framing of feedback, structured in terms of UKCGE requirements of 'personal, recent, analytical, example-based, scholarly and systematic' reflection. All drafts received assessment from one peer and one UKCGE-accredited assessor, and those were compared, discussed and edited at a post-assessment workshop before anonymised assessments were returned to their authors.

Even so, with most of the available supervision literature emanating from the global north, and despite leadership actively listening to, and probing for, contextual or cultural affordances and constraints on supervision practice throughout the workshops, some southern African colleagues found it difficult to translate the given criteria into practice, underlining the importance of the research question upon which this paper focuses.

Findings and discussion around the formative peer assessment phase

Interviews broadly suggested that benefits of the whole process accrued in two (interdependent) phases – first, from participation in workshops, supported both by the commitment and engagement needed to research and lead a session, and the active approaches adopted. Second, benefits were reported accrued from the reflective, analytical and scholarly writing needed for construction of the reflective account of supervision submitted. From the second and third iterations, the formative peer assessment phase was widely reported to be instrumental in linking those two phases, as well as deepening and broadening the knowledge acquired, including of assessment criteria.

In both workshops and peer assessment, the cross-disciplinary nature of the participant group was felt to support development of new perspectives, in line with Guerin (2015). Surveys and interviews reported the experience of engaging in peer assessment demanding and time-consuming, but very fruitful. Participants reported gaining knowledge of the supervision literature, and of possible approaches to (especially problematic) supervisory scenarios; refined critical thinking around their own supervision experiences, practices and values; enhanced grasp of the assessment criteria; and renewed confidence and expertise to improve their own account. All these benefits were reported in similar terms across participant groups.

However, a number of challenges were also exposed, sometimes differentially across groups, as summarised in Table 1 below. A representation as for example '(3)' indicates there was some such challenge reported in iteration 3, but not to a significant extent; '3' indicates a more serious challenge. As a reminder, iteration 2 involved colleagues from South Africa, Namibia and Zambia, and iteration 3, colleagues from the author's home institution in England.

Iteration	Identified challenge
1,2,3	Participant academic colleagues had previously engaged very little with the supervision literature: 'The literature is really very thought-provoking, and I had almost no knowledge of it. Applying it to my own practice is hard, though' (Iteration 1 survey).
2, 3	Descriptive rather than analytic writing.
2(3)	Feedback to academic peers is different from feedback to students, and more difficult in this context, but there was also supervision-related learning from that: 'I found I had to be much more careful about how I gave feedback to colleagues, with respect and being very careful not to offend. But I think that's important learning for working with students also' (Iteration 2 interview).
2(3)	Systematic reflective supervision practice was unfamiliar to most participants. While valued for these workshops, it was reported hard to achieve on an ongoing basis, as suggested by UKCGE, given current pressures on academics' time, and the wider under-valuing of supervision within that: 'I have to admit to not stopping to analyse my supervision, very often. I can see that my first attempt was fairly superficial, even though colleagues said it needed to be deeper. I definitely learnt a lot by resubmitting, though maintaining that depth is really hard given everyday pressures. I am, though, now better sensitised to a lot of the issues' (Iteration 3 interview).
2(3)	Cultural constraints of seniority and, sometimes, gender, in both assessment and feedback: 'It is challenging to give critical feedback to experienced and senior colleagues, but it has been instructive to learn to do that in respectful and constructive ways' (Iteration 2 survey)
2(3)	Challenges of separating the personal contribution from the institutional, particularly in contexts where conformity and managerialism are valued: 'We have to do what the university says, and that governs most of our thinking. We do not think about whether or how we might choose to do things differently as individual supervisors, but these workshops, and writing the reflective account, have given me confidence that how I supervise can make a difference' (Iteration 2 interview).
2	Some inter-cultural issues in global discourses surrounding doctoral supervision evident in structures, bibliography and feedback from UKCGE: imbalances of power between the global north and south, post-colonialism, tensions of multiple identities, little external valuing of African-sourced supervision research and of African ways of knowing: 'In the workshops, there was respect for how different universities work, and that some of the global north literature doesn't just transfer to our context. But some of the feedback assumed ways of supervision which are not possible for us' (Iteration 2 interview).

Table 1: Summary of challenges experienced in formative peer review process.

Most challenges identified were specific to the focus learning, rather than attributable to the formative peer assessment process. The exception was an impact from perceived power relations. Substantive assessment of draft

reflective accounts was double-blind, and supervisory biographical details were removed. However, some details within the account gave an indication of the seniority of the writer, and sometimes, their gender. Several southern African colleagues reported feeling uncomfortable about assessing the draft account of a senior, or male, academic, although such issues had not been obvious during workshop sessions. Where it was possible to probe, such sentiments appeared to result from perceptions of status, rather than of expertise. Even in an English university, occasional comments were occasionally made about assumed seniority. Otherwise, none of Adachi's (2018) identified challenges of perceived expertise, time and resource/motivation, and superficial engagement with feedback was evident – perhaps a reflection of mature learners who had opted into the process.

No participants to date have claimed significant familiarity with the supervision literature. While that might appear odd in academics, Taylor et al. (2020) show that is common, globally. Rather more surprising in academics experienced in supervising academic writing, at least half produced draft or submitted reflective accounts that were judged by their peers to be largely descriptive, rather than analytic, in nature – despite one given assessment criterion being 'analytic'. It appears some academics in both contexts are rather better at recognising descriptive writing, than avoiding it themselves! Again, across cohorts, though more marked in iteration 2 'in' southern Africa, there was widespread report that feeding back to peers in this context, and with this focus, was considerably more difficult than feeding back to students – in relation to both content and framing – although leading to cognitive as well as metacognitive gains, as in Topping (2009). The specific content, while focused on a familiar set of activities, is required to be accounted in particular, unfamiliar, ways. The framing of feedback, for peers, is of course also largely unfamiliar: many academics have experience of feeding back to those they line manage, but that is seldom a true peer relationship. However, several participants commented that the focused analysis and discussion of feedback had made them more aware of feedback impact on the recipient, and also of the need for constructive specificity, including of positives, consistent with Wanner and Palmer (2018); some also said they were confident that learning would transfer unproblematically to their supervision – and indeed, reported in their final submissions that was already happening.

Other challenges were more prevalent in southern African (iteration 2) reports than in those from English academics (iteration 3) – though it is important to remember these are only quite small, unrepresentative samples. The UKCGE framework promotes an ongoing and systematic reflective approach to supervision. Such discourses are widespread in education in England, though achieving them another matter, certainly in doctoral supervision (Huet and Casanova, 2022). They are less familiar in sub-Saharan Africa, where rapid expansion of education, together with the recent focus on competency curricula, has catalysed a focus on 'basic' teaching and learning at all levels (Goujon et al., 2017). Southern African colleagues were therefore much less familiar than their English counterparts with the underlying approaches. Both cohorts, though, identified the focus workshop/formative assessment/accreditation process as supportive of 'systematic reflection on practice' that resulted in enhancement to their supervision – but expressed reservations about whether the approach was sustainable, as analysed in Kenny (2018). Relatedly, some colleagues in both iterations found it difficult to separate their own supervision practice, and impact, from that of university-imposed systems and frameworks. Arguably, as Kenny (2018) evidences, that is harder to achieve where universities place high value on conformity and managerialism, as is common in sub-Saharan Africa (Goujon et al., 2017).

Finally, southern Africa academics, reflecting post-accreditation, identified inter-cultural tensions in global discourses surrounding doctoral supervision that they felt were somewhat evident in UKCGE materials and feedback: academic imbalances of power between the global north and south, post-

colonialism, tensions of multiple identities, limited external valuing of African-sourced supervision research and of African ways of knowing as evidenced in, for example, Ndlovu-Gatsheni (2018) and Schöpf (2020). Addressing such issues is not easy, but for the focus initiative, the emergent annotated bibliography of sub-Saharan sourced supervision literature, expansion of the pool of global south UKCGE assessors and, eventually, the establishment of an African accreditation scheme that fully recognises African epistemology, are useful steps forward.

Conclusion

Common opportunities and challenges were identified, but also some differential responses that underline the deeply contextualised and culturally-infused nature of academics' skill and knowledge sets and their peer interactions. Such processes therefore require context-responsive and culturally sensitive facilitation. For the focus academic development, that is likely to be a particular issue for iteration 4, where participants work in 12 different universities across 10 sub-Saharan African countries, each with their own context and both academic and wider social culture. Data from that iteration will further enhance our knowledge of comparative academic development, as well as of distance formative assessment.

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Notes

The old and the new digital divides continue to separate global North and South in blended higher education

Sheriya Sareen and Sayantan Mandal

Indian Institute of Technology Jammu

Correspondence email: sheriya.sareen@iitjammu.ac.in

Abstract

The widespread adoption of blended learning (i.e. combining traditional in-person education with online learning), is accompanied by a surge in scholarship centred on equity concerns. There is, however, a dearth of literature exploring blended learning barriers across the global boundaries in the higher education context. In this light, the study addresses the following research question: How do the barriers to implementing blended higher education vary across global North-South regions? To answer this research question, a systematic literature review was conducted, wherein we selected 39 relevant studies out of an initial pool of 642, strictly adhering to the PRISMA guidelines. Sixteen inductive themes were derived from clustering 37 sub-categories, informed by 238 codes from the selected literature (188 from students, 41 from teachers and 9 from administrators). The categorisation of these themes in the light of digital divide theories shows that though the barriers are not unique across the global boundaries, their intensity is. The first-level digital divide concentrating on access issues finds prominence in the global South, whereas more research on the second-level digital divide, related to skills and competencies, is emerging from the global North. This shows the peripheral response of the global South towards blended learning barriers because of disproportionate resources, delaying their focus on core issues related to digital competencies. This study can serve as a valuable resource for identifying and addressing the challenges encountered by students, teachers and educational institutions across the global North and South in the realm of blended learning, ultimately contributing to its development as a mode of instruction. The study also provides a theorisation of digital divides in a higher education context. It finally underscores the need for policymakers to consider regional contexts when formulating blended learning policy imperatives.

Keywords: Blended Learning; North–South Divide; Digital Divide Theories; Blended Learning Barriers; Systematic Literature Review

Introduction

With the new conflicts and crises ravaging the world, there is a shift from traditional classrooms to blended teaching-learning modes. A key topic of discussion is the sustainability of these modalities owing to issues of social justice and inequities across and within global boundaries. However, this phenomenon seems to be understudied through the lens of digital divide theories, particularly in higher education across global boundaries. Furthermore, theorising the digital divide has mostly been a comprehensive and interdisciplinary effort, overlooking its intricacies in higher education (Valdez and Javier, 2020; van Deursen and van Dijk, 2019; Vartanova and Gladkova, 2019). In its light, this study attempts to understand the barriers hindering the implementation of blended higher education across the global North-South through the digital divide theories and, in turn, contribute to the existing scholarship of the digital divide theories in the higher education context.

The references to 'third world', 'global South', and 'periphery' are not uncommon in literature (McFarlane, 2006), serving to underscore the North–South divide. This divide highlights the international socio-economic and political inequalities dissecting the rich, industrialised North and the poor underdeveloped South. The Southern countries frequently share a colonial history, occupied by the Northern countries. Unfolding of literature presents three camps on the current status of the North–South divide: one, which refuses to acknowledge the divide, claiming that it was always overstated; two, which found this gap meaningful in the past but argues against these binary categories in the present times, asserting contemporary challenges of development to be shared by the poor and rich countries; three, which espouses that the North–South divide persists and continues to remain relevant (Lees, 2020). This work finds alignment with the third camp and hence contributes to its literature.

The North–South divide in the educational realm is frequently measured through indices like literacy rate and child malnutrition (Wheeler, 2001). Literature also contains a few other examples to explicate this divide. For instance, a study by Wheeler (2001) found problems in teacher education to be more severe in the global South than in the North. Zhang et al. (2023) highlighted disproportionate knowledge production between the global North and South, with the majority of literature evolving from the global North. Also, the digital divide between the developed and developing regions was widely acknowledged in the literature and recognised by UNESCO (2005). Digital penetration has undoubtedly increased, but unevenly, and the divide still remains, as evidenced by the percentage of internet users globally as of 2023 (Figure 1). This divide perpetuates the risk that the 'data economy will be permanently dominated by a few stakeholders from a handful of technologically advanced economies' (United Nations, 2023).

However, merely looking at the internet penetration gap may not be sufficient to understand the intricate state of affairs of blended learning across global boundaries. Thus, at the nucleus of this study is the gap of understudied systematic analysis of blended learning in higher education across the global North-South. In its light, the study attempts to answer the following research question: How do the barriers to implementing blended higher education vary across global North-South regions?

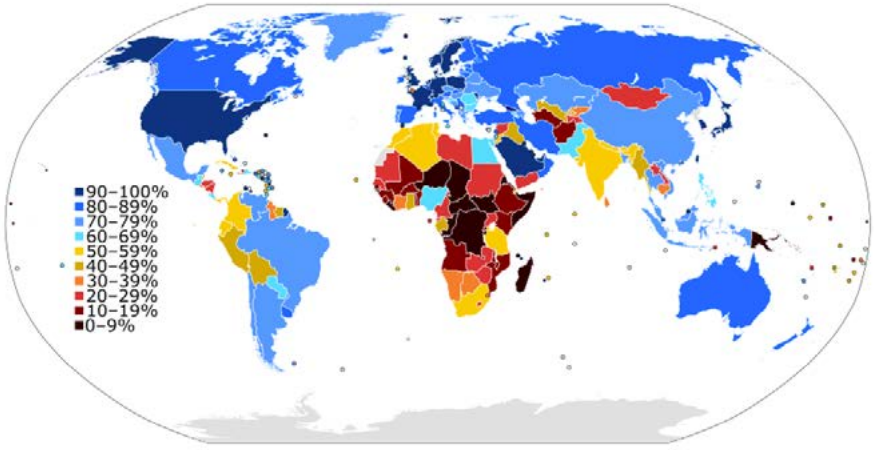

Figure 1. Internet penetration globally in 2023. Source. https://commons.wikimedia.org/wiki/File:InternetPenetrationWorldMap.svg This figure is licensed under the Creative Commons Attribution Share Alike 3.0 Unported licence.

This study extends our previous review (Sareen and Mandal, 2024) to understand the blended learning challenges through multi-stakeholder analysis. While in the work of Sareen and Mandal (2024), we illuminate differing barriers across global boundaries, we do not discuss these differences in the light of digital divide theories. Thus, the data for this

study is sourced from the systematic literature review study by Sareen and Mandal (2024), further analysed through digital divide theories. Following a theorisation of the digital divide in this section, the next section briefly explains how the systematic literature review was conducted. This is followed by the identification and classification of the blended learning barriers across the global boundaries in the next section. Further, the penultimate section discusses the findings, including the limitations of the study and theoretical implications, followed by the concluding remarks.

Theorising digital divide in higher education

The digital divide theories have evolved from a binary problem of access between haves and have-nots to a multifaceted concept. Valdez and Javier (2020) comprehensively define digital divide as the 'disparities that separate segments of society and nations into those who do not have digital access, skills, and knowledge, which lead to differences in digital use, opportunities, and benefits.' Earlier literature (Valdez and Javier, 2020; van Deursen and van Dijk, 2019; Vartanova and Gladkova, 2019; Wei et al., 2010) details three levels of digital divides permeating interdisciplinary studies. We have selected those aspects of the digital divide that may directly diffuse into higher education spaces, as explained below and summarised in Table 1. The first level of the digital divide, or the 'digital access divide' (Wei et al., 2010), focuses on uneven access to ICT resources (Vartanova and Gladkova, 2019). This includes disproportionate physical access (i.e. access to devices) and material access (i.e. purchase of internet services). New divides like device opportunities, diversity of devices, and maintenance costs are explained by van Deursen and van Dijk (2019), which we add to the existing inequalities relating to material access within the first level of the digital divide (Valdez and Javier, 2020). Van Dijk (2005) adds motivation to this equation of the digital divide, defining it as the 'general attitudes toward the internet and advances to having physical and material access.'

With time, there was a realisation and general consensus that the digital divide was more than just access-related. The second-level digital divide, or the 'digital capability divide' (Wei et al., 2010), dissects individuals based on their capabilities and skills in using ICT resources. These skills include: (i) technical competence (i.e. skills required for operating hardware and software); (ii) operational skills (i.e. the ability to effectively recognise and use information to solve a problem); (iii) social skills (i.e. using online interactions for shared learning and acquiring social capital); and (iv) creative skills (i.e. creating quality content and sharing with others) (Mossberger et al., 2003; Van Deursen et al., 2016).

The limitations of the second-level digital divide were highlighted by emerging complexities. The third-level digital divide, or the 'digital outcome divide' (Wei et al., 2010), encompasses a spectrum of divisions, recognising that the digital divide is not static but influenced by the ever-changing market needs and educational landscape. It concentrates on the impact of ICT on people's lives and its 'negative consequences for society' (Vartanova and Gladkova, 2019). Vartanova and Gladkova (2019) proposed two constituting elements for this divide: (i) the spread of digital content and (ii) internet overuse affecting the clarity of self, potentially due to fragmented attention and reduced self-awareness.

Digital Divide Levels	Inequalities in higher education in terms of:
First-level digital divide	Motivation to use the internet for learning
	Access to ICT resources like desktops, laptops, tablets, smart TVs, software, and peripheral equipment like printers, storage devices
	Purchasing ability of internet connectivity for its sustained use
	Maintenance costs
	Diversity of devices
	Replacement of device
Second-level digital divide	Technical skills for operating hardware and software
	Operational skills to search, filter and evaluate information online
	Social skills for shared learning
	Content creation skills
Third-level digital divide	Negative consequences of ICT for society
	Spread of digital content
	Overuse and excess dependence on digital networks

Table 1: Three levels of digital divide in higher education.

Methodology

Research design and search strategy

This study is based on a systematic literature review conducted by us (Sareen and Mandal, 2024) to explore the barriers related to blended learning in higher education settings. The review period spanned from mid-September 2023 to the first week of October 2023, using the Web of Science database and Google Scholar via the Publish or Perish software (Harzing, 2007).

The search focused on terms like 'blended learning', 'hybrid learning', 'flipped learning', combined with 'higher education', 'college', 'university', 'postsecondary', and keywords such as 'barriers', 'challenges', 'obstacles'. This strategy ensured a comprehensive capture of relevant articles discussing the challenges of implementing blended learning approaches in higher education.

Inclusion or exclusion criterion

The systematic literature review focused on articles published after 2000 in English and appearing in peer-reviewed journals. Other inclusion criteria are as follows: (i) research papers defining blended learning as the integration of traditional face-to-face and online learning in a higher education setting, (ii) studies examining barriers to blended learning implementation derived from primary data, such as case studies or surveys, and (iii) studies in which participants were higher education students, teachers or administrators. Articles that did not meet these criteria were excluded. All the included articles were segregated based on the context (or country) in which blended learning barriers were explored. Further, the criteria given by the United Nations (2022) was employed to identify the countries belonging to the global North or South.

Quality assessment

The full text of articles was imported for quality assessment, utilising a 10-item criterion adapted from the recommendations by Kitchenham and Charters (2007). Each article was assessed on a 3-point scale, where '1' corresponds to

'yes', '0.5' corresponds to 'partially', and '0' corresponds to 'no'. A higher score indicated greater credibility, ensuring higher quality in the study. All articles met the criteria for further data coding and analysis based on the assessment results. The article selection diagram is presented in Figure 2.

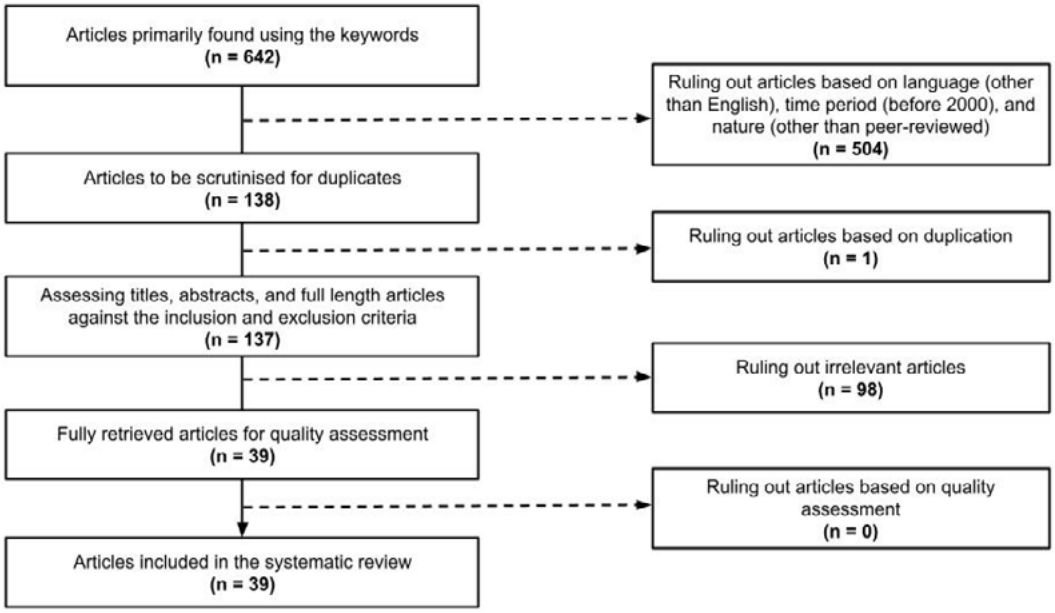

Figure 2: Article selection diagram.

Findings

We (Sareen and Mandal, 2024) identified 39 out of an initial pool of 642 studies which qualified to be included in this study. Sixteen inductive categories of barriers were derived from the clustering of 37 sub-categories, informed by 238 codes from selected papers (188 from students, 41 from teachers and 9 from administrators) (Braun and Clarke, 2021). In order to answer the research question, we first briefly explain the categorisation of barriers, followed by their classification across global boundaries.

Identification of barriers hindering implementation of blended higher education

Table 2 summarises the 16 identified barriers. It also gives their brief description along with the percentage of studies which captured different barriers.

S.No.	Barrier	• Descriptors	No. of studies (%)
1.	Inactive learning	• Internal inertia • Lack of motivation • Disengagement • Difficulty focusing	13.0%
2.	Designing constraints	• Overweighed online tasks • Improper planning • Limited personal space	11.8%
3.	Training deficiencies	• Lack of adequate training • Limited support for teachers	10.9%

S.No.	Barrier	• Descriptors	No. of studies (%)
4.	Support deficiencies	• Technical issues • Platform-related issues	7.6%
5.	Digital connectivity challenges	• Poor internet quality • Connectivity delays	7.1%
6.	ICT infrastructure constraints	• Limited ICT resources • Financial burdens	6.3%
7.	Compromised self-regulation skills	• Poor time-management • Poor self-organisation skills	5.9%
8.	Reinforcement constraints	• Lack of supervision • Delayed feedback	5.5%
9.	Content-related constraints	• Lack of quality content • Passive online videos	5.5%
10.	Lack of institutionalisation	• Absence of structured frameworks • Absence of institutional policies	5.0%
11.	Lack of purpose	• Adding online activities for its own sake • Inflexibility	4.6%
12.	Limited human connection	• Isolation • Overindulgence of technology	3.8%
13.	Individual paradoxes	• Hindered translation of knowledge to skills • Distrust with online exams • Lack of confidence • Limited satisfaction	3.8%
14.	Resource-management constraints	• Excessive shared material • Multi-platform usage	3.4%
15.	Mental-wellness constraints	• Stress • Fatigue • Anxiety • Burnout	3.4%
16.	Socialisation constraints	• Limited collaboration • Limited interaction	2.5%

Table 2: Blended learning barriers.

Classification of barriers across global North-South

The studies emerged from 22 countries,[2] with the most studies conducted in the USA, followed by the UK, China and Australia. Out of the representative 22 countries, 50 per cent belong to the global South and the remaining 50 per cent to the global North. The nature of barriers is found to be disproportionately distributed across the global North and South, as shown in Figure 3, suggesting a divide between the global North and South.

[2] 11 countries from global North (USA, UK, Australia, Ireland, Denmark, Germany, New Zealand, Poland, Saudi Arabia, Serbia and Spain) and 11 countries from global South (China, Indonesia, Iran, Malaysia, South Africa, Cameroon, Ghana, Kazakhstan, Philippines, Sri Lanka and the United Arab Emirates).

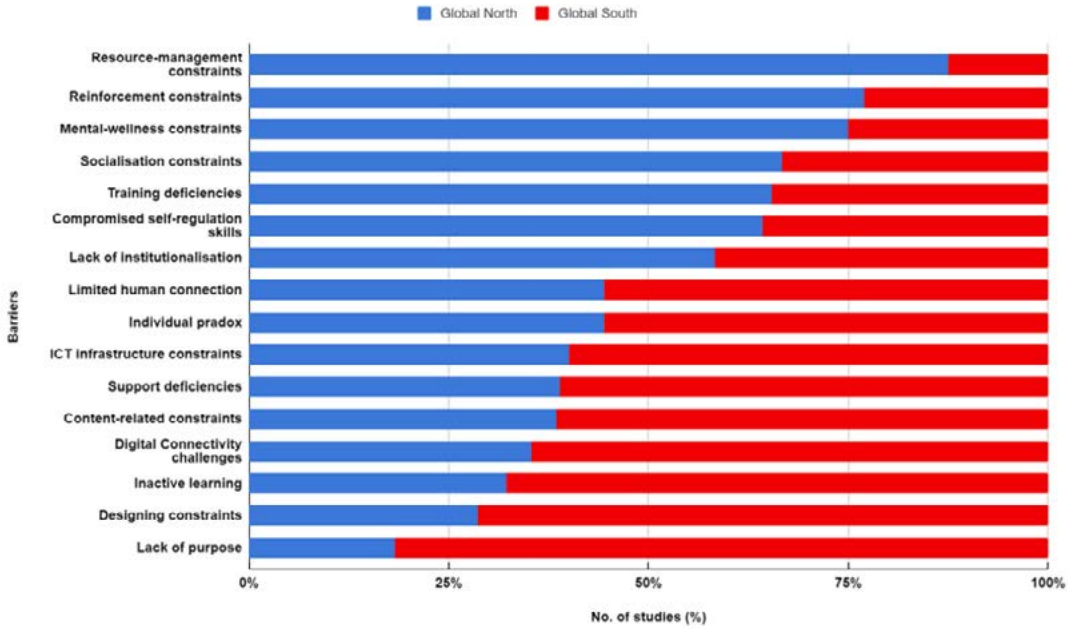

Figure 3: Frequency (%) of identified barriers in the selected studies across global North and South. Reprinted from Sareen and Mandal, 2024. This figure is licensed under the CC by-NC-NC 4.0.

Discussion

The study attempts to understand the nature of blended learning barriers across the global North-South. We find that the barriers are disproportionately distributed across the global boundaries. The global South has been primarily focused on addressing fundamental challenges, such as connectivity and ICT-related constraints, potentially delaying efforts to tackle deeper issues related to mental wellbeing, training, socialisation and more. To understand this more fully in light of the digital divide theories for higher education, we map the identified barriers with the central characteristics of the digital divide theories pertaining to higher education (in Table 1). The resulting digital divide pyramid is shown in Figure 5. To avoid interpretative issues, we add another scale containing high, low and arbitrary exploration, which is a function of how intensively these barriers have been relatively explored in the literature emerging across the two global regions.

Figure 5 suggests that the problems highlighted here regarding blended learning implementation are not unique to the global South but are global. However, their 'scale and severity' is different across the two regions (Wheeler, 2001). The elementary digital divide regarding haves and have-nots, depicted through the first-level digital divide, seems more concentrated in the global South. This is in synchronisation with disproportionate digital penetration in the global South, as shown in Figure 1. Contrastingly, the second-level digital divide, which focuses on skills and competencies, is more intensively explored in the global North, with the exception of content-related constraints. This does not mean the global South is not observable in this division. Rather, it indicates that the countries in the global South have not been able to cross the digital access divide in relation to their northern counterparts, and hence, fewer studies are emerging from this region to explore more intricate issues about skills and competencies. The exception could be explained in the context of the pandemic, when online content development became a mandatory requirement, with additional bottlenecks for the global South teachers because of the prominence of the first-level digital divide. Therefore, this aspect of the second-level digital divide, compared to more sophisticated constraints like self-regulation and socialisation skills, may have received more attention in the global South. The emerging third-level digital

divides seem arbitrarily explored across the two regions, and more research may be needed to provide a conclusive explanation for this.

Thus, the trends from the old and new digital divides show that it is not that blended learning barriers are unique to 'rich' or 'poor', but the intensity is. Even when the whole world had to grapple with the aftermath of the COVID-19 pandemic, recovery was relatively easier for the North than it was for the South (Makau, 2021). This is because of different resilience strategies contingent on the heterogeneous distribution of divides, particularly in higher education, as reaffirmed by this study.

However, we highlight two potential limitations of the study, paving the way for future directions. First, the literature is sourced in the English language from two databases only, leaving the possibility of missing potentially relevant works. Second, the study is insufficient to detail the arbitrary results within the third-level digital divide. It calls for future studies capturing data in multiple languages from diverse databases, particularly to explore the emerging third-level digital divide in the global and national contexts.

Theoretical implications

The study builds on the initial categorisation of digital divide theories for higher education (Table 1) to inductively provide a more comprehensive theorisation based on the barriers typology (as discussed above). The characteristics of the first-level digital divide for higher education cohere with two categories emerging from the study: inactive learning and ICT infrastructure. We propose adding support deficiencies and digital connectivity challenges to this equation. Next, training deficiencies, socialisation constraints and content-related constraints resonate with the characteristics of the second-level digital divide for higher education. Two more factors emerging from the study, reinforcement constraints and compromised self-regulation skills, are proposed to be placed herein. Finally, mental wellness constraints, resource management constraints, lack of purpose, and designing constraints find alignment with the characteristics of the third-level digital divide for higher education. To this equation, we propose the addition of three more factors derived from the study: lack of institutionalisation, lack of human connection and individual paradox. Figure 4 presents the comprehensive theorisation of the digital divide in blended higher education.

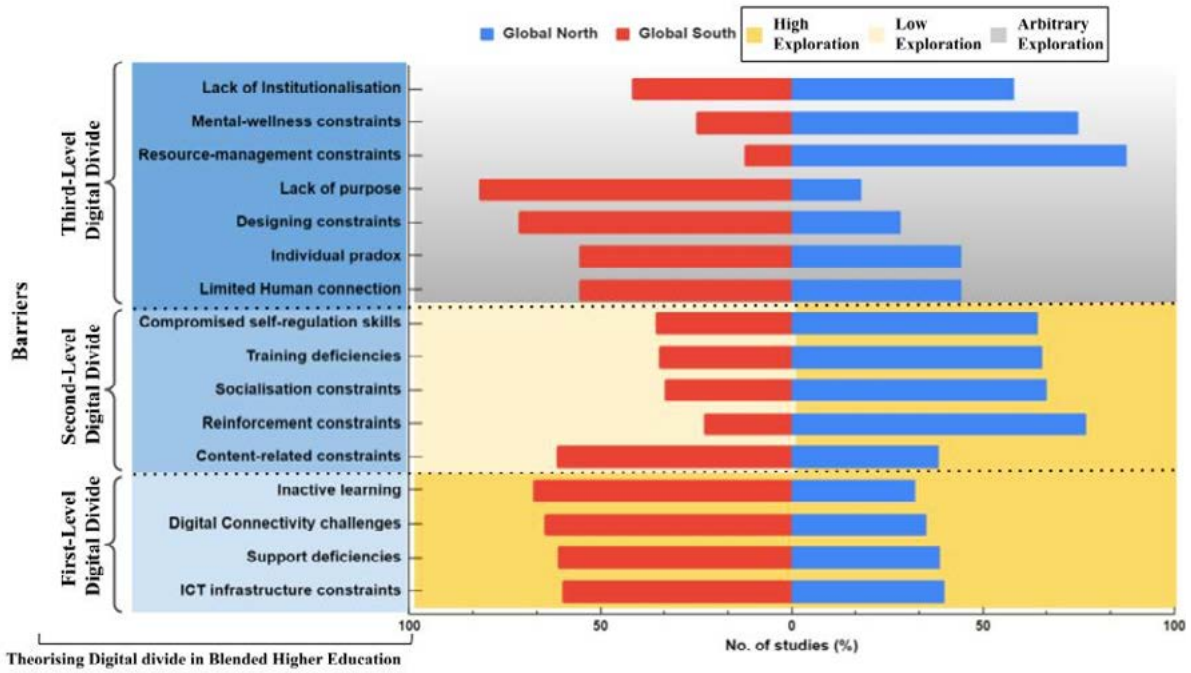

Figure 4: Digital divide pyramid.

Conclusion

This study attempts to understand the prevalence of the global North–South divide in the context of blended higher education. Based on the inductive categorisation of the blended learning barriers sourced from a systematic literature review, we reaffirm the divide in the higher education context. Though the nature of barriers is not unique to the two global contexts, their intensity is. With the focus in global South on the first-level digital divide, the second-order digital divides are less explored in these regions. It indicates the peripheral response of the global South towards the deeper and more complex problems ravaging higher education due to their struggles with disproportionate access in comparison to their northern counterparts. It favours the continued scholarship of global categories as long as it succeeds in the political merit of serving need-based development in the light of sustainability. This also emphasises the importance of policymakers taking regional differences into account when creating policies for blended learning. Further, we bring to the table the old and new digital divides in higher education and consequently contribute to the evolving theorisation of the digital divide, particularly in the context of higher education. We conclude by advocating for inward-looking policies concerning South–South collaboration for inclusive blended learning implementation practices in higher education, in addition to the outward-looking North–South collaborations.

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