The impact of Technology Enhanced Learning on students with Specific Learning Difficulties

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Abstract

Higher education institutions (HEIs) are experiencing a radical uptake of technology-enhanced learning (TEL) practices. However, there is a lack of robust research exploring how the changing landscape of HEI teaching impacts students who have a specific learning difficulty (SpLD). To address this, we conducted semi-structured interviews with nine undergraduate students with SpLDs, to explore their lived experiences and perspectives on TEL in HEI. The interviews were transcribed, analysed thematically, and four key themes developed. Participants accepted TEL as part of HEI teaching but expressed that it was not always fully integrated or sensitive to students' learning needs. Staff readiness to implement TEL was also mentioned as an element that influenced students' learning experiences. The implications of these findings are discussed in relation to how the integration of TEL and its use by students can be improved to create a more inclusive learning environment.

Key words: technology; higher education; inclusion; technology-enhanced learning; university; learning difficulty

Introduction

Higher education institutions (HEIs) are experiencing a radical uptake of technology enhanced learning (TEL) practices (Gordon, 2014; Henderson et al., 2017), including Virtual Learning Environments (VLEs), online forums, student response systems (such as clickers and text response via mobile phone apps), and the integration of social media platforms such as Facebook and Twitter (Hamid et al., 2015; Manca & Ranieri, 2013). Additionally, the student body is now more socially and culturally diverse than ever before, and there is an increasing commitment to widening participation by addressing access, success, and progression for students from under-represented groups.

Despite these developments, there is a lack of robust qualitative research exploring how the changing landscape of HEI teaching impacts students, particularly students who have specific learning difficulties (SpLD), such as dyslexia, dyspraxia, and attention deficit hyperactivity disorder (ADHD). Without a better understanding of how SpLD students use and experience TEL, it is challenging to develop inclusive teaching practices that provide all students with an equal opportunity to engage with their learning at HEIs. By exploring the experiences of these students, in their own words, it is possible to better appraise current TEL practices, providing insight and guidance for integrating TEL with more traditional teaching methods in HEIs (Kirkwood & Price, 2014). This qualitative study forms the first stage in a planned four-part research initiative to develop inclusive guidelines to improve the provision of TEL for all students in HEIs.

Research aims

The aims of this study were to:

- Explore what TEL practices undergraduate SpLD students currently use, and their opinions of them
- Understand how TEL practices impact SpLD students, both positively and negatively

Methods

Ethics

Prior to recruiting participants, the project proposal and its data collection strategy were submitted for ethical scrutiny and approval by the University of East Anglia (UEA) School of Economics Research Ethics Committee.

Given the sensitive nature of the data, the recruitment of participants was handled by an administrative assistant within the Student Support Service at UEA. To explore the lived experiences and perceptions of SpLD students, a qualitative approach was deemed appropriate, and as such a purposive sampling strategy was adopted (Robson, 2011). Participants were contacted by email based on their declared SpLD under Section 33 of the Data Protection Act and invited to participate.

Interviews were held within the premises of the Student Support Service, to provide a further layer of confidentiality. The interviewer did not have access to the full identity of the students being interviewed, unless students themselves decided to disclose this information; the administrative assistant involved with booking interviews had no access to the content of the interviews.

Student participants were briefed about the project aims and objectives and gave explicit informed consent to be interviewed and have their conversation with the interviewer recorded and transcribed. Students were also advised of their right to withdraw from the study at a later stage by contacting the Student Support Service administrative assistant supporting the project. This process was facilitated by a coding system held only by the administrative assistant that matched student identity with a unique interviewee code.

Interviews

Individual, semi-structured interviews were conducted in 2018, in a quiet and confidential space at UEA, by one member of the research team experienced in using qualitative research methods. A total of nine undergraduate SpLD students from UEA with were interviewed, with interviews lasting between 12-37 minutes. For ease of discussion, we have assigned each participant a gender-neutral pseudonym, shown in Table 1.

Participant number	Pseudonym	Interview length
001	Frankie	19:07
002	George	36:53
005	Jesse	26:14
006	Morgan	12:24
007	Casey	32:06
008	Sam	36:54
009	Ash	31:01
010	Rory	37:16
011	Charlie	23:13

Table 1: Participant assigned pseudonyms and interview length

The interview schedule was designed following a scoping review of the literature, and discussion between members of the research team. Questions within the schedule were deliberately open-ended, with various prompts provided to encourage participants to talk freely and broadly about their experiences of TEL. This format allowed the interviewer to explore participant responses in more depth and with personal relevance, while question prompts elicited key information. It enabled the interviewer to flexibly add or omit questions depending on the information that emerged from the dialogue (Bryman, 2004).

As the participants' experiences and abilities with technology varied, we felt it was appropriate to provide an overview of intent of the study. Therefore, a definition of TEL was provided to the participants before the beginning of the interview to avoid any misunderstanding of what the term involved. The students were informed that TEL was used as an umbrella term to describe the application of technologies that focused on established programmes, virtual learning environments, interactive platforms, social media, online resources and/or online/cloud-based programmes.

The interview schedule included such questions as, "Do you use digital technology often in your learning? Is this your own choice, does it reflect how teaching and assessment happens in your modules, or both?", "does your specific learning difficulty affect your use of digital technologies for learning?" and "do you find digital technology in your learning useful, and why?". In cases where the participants required help to elaborate on their responses, the questions were rephrased to help them understand what was being asked. Expansions of the questions were also provided, situating them in context and contributing

to a better understanding of their content. All interviews were audio-recorded and transcribed for analysis, with the identity of participants kept confidential.

Analytic approach

The interviews were analysed thematically, guided by the six-stage process define by Braun & Clarke (2006). As prior research in this area is limited, this approach allowed for analysis to be primarily inductive, reflecting the lived experiences of participants in their own words. Each of the nine transcripts was systematically analysed and coded, then cross-referenced and re-coded to ensure a rich analysis which reflected the dataset in its entirety. Areas of convergence and divergence between participant accounts were noted and initial themes developed. These initial themes were then related back to the dataset as a whole and refined where appropriate. From these themes, we then developed a concise and coherent narrative to provide a descriptive and interpretative analysis of the participants' experiences.

Results & Analysis

Following analysis, four key themes were developed, highlighting areas of significant convergence and divergence in participants' experiences of TEL. All participants accepted TEL as part of their HEI learning and teaching experience but expressed that it wasn't always fully integrated or sensitive to students' learning needs. Some participants expressed a preference for more traditional, analogue learning methods, stating that they found digital technologies challenging to use (theme 1, "TEL as enhancement, not replacement"). Others felt that teaching staff used digital technologies in a way which was not always appropriate to SpLD students, and this negatively impacted their learning experience (theme 2, "The role of staff"). However, several of the participants discussed the benefits of social media platforms and cloud-based platforms as practical ways to facilitate peer support and collaborative working in group projects (theme 3, "Social aspects of TEL"). All participants were able to identify ways in which current TEL practice could be improved. Two participants stated explicitly that they found the increasing use of TEL was a significant barrier to their successful engagement with the learning materials and found TEL challenging rather than beneficial. All nine participants discussed the importance of varied methods of learning, options, and support for students to adopt a learning approach which met their individual needs (theme 4, "Student-led learning").

(1) TEL as enhancement, not replacement

When asked what digital technologies they used in their learning, all participants were able to identify a variety of TEL practices. These included familiar established programmes (e.g., Microsoft Office, Word), VLEs (such as Blackboard) provided by the university, specialist software and equipment (e.g., DragonTalk, Sonocent) supplied by the Disabled Students' Allowance (DSA), interactive platforms used in formal teaching settings (e.g., clickers, Padlet, Kahoot), social media platforms (e.g., Facebook, Twitter, Snapchat), online resources (e.g., YouTube, Google) and online or cloud-based programmes (e.g., Grammarly, Google Drive, OneDrive, Office 365, Skype).

Most participants were able to describe positive experiences of TEL, giving examples of how TEL resolved certain practical issues such as access to, and organisation of, resources:

> We have some lecture capture within my school, where they like record audio and put the slides up on Blackboard, and kind of marry the two up. Which is quite handy when it comes to revision. (Sam)

Charlie welcomed the increasing use of TEL, preferring working digitally over analogue methods:

> I definitely enjoy, I'm quite good at typing, like touch typing, so I definitely enjoy doing all that on the-, during the lecture cos it keeps me engaged as well. (Charlie)

However, despite these perceived advantages, most participants stated there were elements of their learning they still preferred to adopt more traditional learning methods for. In some instances, this was simply down to personal preference, but in others, participants explained they found the digital format difficult to work with:

> ...for me, I can't read things on a screen, I need it in paper. Listening's fine, but I need it in paper as well to be following properly, or else it doesn't go in as well. (Ash)

Charlie emphasised the importance of adopting TEL practices as preparation for using digital technology in the workplace:

> I would feel quite uncomfortable now if we were still doing everything on paper because that's just not how the world works. So like in a workplace, you, that would never happen, so I'm glad there's a transition. (Charlie)

Conversely, Sam explained that reliance on digital technologies in HEI learning had been a disadvantage in their workplace, suggesting the need to develop a range of different skills throughout HEI study:

> ...sometimes, technology is great and has really helped, other times it's been a bit of a barrier in that I never has a chance to develop my handwriting and then likewise never had a chance to become a quicker typer because I was given DragonTalk software. Then moving into the professional environment where I work in a control room, and there's this 'oh well if you can't type quick enough you need voice to text software', working on a phone, you can't use voice to text... (Sam)

All participants explained that both TEL and more traditional learning practices had advantages and disadvantages – one could not completely replace the other, and participants chose to combine different methods to suit their individual needs and preferences. TEL practices were seen as an enhancement to existing methods of learning, not a replacement of them.

(2) The role of staff

Although students' use of TEL was often self-directed (i.e., In the case of revision/study aids, word processing and group working), participants also described ways in which TEL practices were used by teaching staff. Some felt that staff use of TEL was limited:

> ...they just put the PowerPoints on Blackboard, though occasionally if something's really important, they'll record the lecture, but yeah, they basically just put it on Blackboard [VLE] and that's about it. (Frankie)

Participants such as Morgan felt that the use of TEL practices by some staff was done as a “box ticking exercise”, and not innovative or well considered:

> I think a lot of lecturers see it as a necessity rather than anything that they can like, I don’t know, add to, or use in an innovative way... it does feel a bit, you know, Spartan sometimes. Especially when certain lecturers don’t use it, or they don’t use it consistently. (Morgan)

Rory explained that some staff were more open to using novel TEL practices, but didn’t always appear confident in their use or effectiveness:

> ...there’s only one lady that’s come in quite a few times, using this little clicker system. So it doesn’t happen very often. It’s always a case of ‘I don’t know if this works but we’ll give it a try’. (Rory)

Others felt that this limited range of TEL practices impacted negatively on opportunities to demonstrate their ability and understanding. For example, Frankie speculated that some staff were resistant to the use of TEL practices in fear of it reducing attendance to, and engagement with, lectures. However, they emphasised that the advantages (increased accessibility) outweighed the disadvantages (reduced attendance):

> ...there’s been discussion of the recording of lectures, but then there’s like the whole against argument of that people just won’t show up, which I understand, but I think it’s going to benefit in the long run and if people don’t want to show up, that’s their problem... People have disabilities, stuff like that, so I think it’s a good idea. (Frankie)

For those staff members that did use other TEL practices in their teaching, this was most commonly interactive technologies and student response systems, such as Padlet, clickers, or quiz generators such as Kahoot. Ash found some of these useful, but others anxiety-provoking:

> ...we often use online quizzes in class...we’ve had clickers, Padlet, we’ve had a couple of things. Which I quite like cos there’s no, you know, time thing on it, it’s just you’re answering in your own time...I don’t like

> Kahoot because I always feel rushed, and I can't think that quickly. And then I feel crappy because I can't get any of the answers right. (Ash)

Casey stated that TEL practices were not always used consistently or appropriately, disadvantaging the learning needs of SpLD students:

> ...it gets me so frustrated because they're meant to send the lecture notes to us the day before the lecture, especially for us, like we should get the copies, because it's like, we got told we'll get the copy as we've got disabilities, to help us with. Like that's never happened, except from one lecturer. (Casey)

Morgan felt that staff should be given better guidance on how to effectively integrate TEL in their teaching, particularly regarding the needs of SpLD students, to make sure individual needs are met:

> ...every lecturer having like, a blanket agreement that they'll use some form of technology. Or just like guidelines of how to use that technology […] I'd be very wary of introducing that if you're not 100% certain that a lecturer already has some interest or some knowledge of access services. Because inappropriately used, technology is worse than not having it. (Morgan)

(3) Social aspects of TEL

All of the participants expanded on the social aspect of TEL practice. Some, like Charlie, mentioned how social media platforms enabled real-time peer support whilst studying and revising:

> ...I use Snapchat to interact with my friends, but sometimes that could've been like revision, so especially during exams, because you can send videos on Snapchat now...we did have conversations where we'd be able to talk to each other... (Charlie)

Others, such as Rory, discussed the various forms of group problem solving that TEL practices offered:

> *We've got like a Facebook chat which is for the whole cohort to put queries or whatever on. (Rory)*

Most frequently mentioned were the benefits of digital technologies for collaborative group working:

> ...when we did a group essay, we used Google Docs, because then we could live edit it and comment on each other's work, which was super cool. (George)

Group working using TEL was also described as being more accessible and, in some ways, even more collaborative than more traditional methods, enabling participation of group members who may not be able to attend in person, for whatever reason.

(4) Student-led learning

Most of the participants interviewed for this study experienced benefits from TEL practices but emphasised that these form part of a broader range of teaching practices. Linked to the first theme, "TEL as enhancement, not replacement", this theme encapsulated participants' concerns that HEI practice should be flexible, sensitive to individual learners and, ultimately, student led. However, some participants felt that the increased uptake of TEL was taking choice away from students, as using digital technology in learning becomes the "new normal". George felt more traditional methods of learning were no longer an option:

> It's not my choice, it's everything is just digital. That's how they want to teach it, like a lot of people will turn up to a lecture with their laptop and have like the lecture slides on the laptop and then will make notes on it. And I don't really know how to do that. (George)

For students not confident in the use of digital technology, this may create a sense of feeling left out, or unsupported. For HEI to be truly inclusive, students who share George's experiences should be supported either to develop their knowledge of using digital

technology in learning or adopt learning practices that suit their needs, skills and preferences.

The way in which HEIs adopt TEL practices is not always reflected in the ways students choose to incorporate digital technology in their learning. Casey described how students were already choosing to use social media platforms for group discussion based on convenience, rather than using the formal discussion board set up on the university's VLE:

> It's so formal and you don't, you have to check to get the message, but for Facebook you get a noti[fication] and you can just read it. (Casey)

This example (echoed in other participants' accounts) suggests that platforms provided by HEIs do not always match students' preferred ways of working. It also highlights that TEL use by students may incorporate platforms that are not usually associated with learning (such as social media). However, as the use of social media platforms is not monitored by academic staff, this can create practical problems:

> ...one person says this, one person says that, one person says another, and everyone gets really confused, instead of just all having it fed through one person to the director...if they had a system set up, in place already...they knew it was going to be an issue, but it still happened. (Ash)

This suggests a need for HEIs to recognise the ways in which students adopt TEL practices and respond in a way that best supports their learning and understanding in reality. Sam explained that students' use of TEL practices will likely continue to develop and grow with time. For example, he mentioned YouTube, Twitter, Facebook, Instagram and Snapchat as developing sources of information and tools for learning. However, he emphasised that there is also a need for teaching staff to adapt their ways of working to match, in a way that was flexible to individual need:

> ...the way that we as students interact with technology will develop massively, but I think from, the most part as well, our kind of academic tutors need to change? And need to see that there are more than one way of doing things, and we all learn in different ways, and

> sometimes using a broad range of technology can assist that, but also not in a 'one glove fits all' approach... (Sam)

Many participants, particularly Jesse, supported the idea of student autonomy:

> ...they [the university] give you access to all the software and stuff, and I think it's more, it's up to the individual learner and how they like to learn. (Jesse)

Although there is still a responsibility for HEIs to provide adequate choice and support, participants agreed that HEI learning should ultimately be student-led.

Discussion & Conclusions

Through this research, we explored the TEL practices experienced by undergraduate SpLD students in HEI study. Although participants described some of the positive aspects of TEL practices – such as collaborative group working, peer support, and increased accessibility of teaching materials – they also identified several ways in which use of TEL practices could be improved. Despite the recent, radical uptake of TEL in HEI teaching, these findings suggest that this approach is not necessarily the best approach for all students. Thus, elements such as individualised needs, staff readiness or contextual influences should also be considered.

Although some of the participants in this study saw clear and significant benefits in using TEL to facilitate their engagement with study at HEIs, this was not the case for all. Some participants expressed a preference for more traditional methods of learning (printed materials and face-to-face discussion), and stated they found TEL hard to engage with. With the increasing ubiquity of TEL practices (particularly in the post-pandemic context), it is important for educators to carefully consider how best to scaffold these with students' engagement and understanding (Coxon et al., 2020; Henderson et al., 2017; Schneckenberg, 2009).

Participants also described instances where TEL had been adopted by teaching staff, but not appropriately integrated; this was felt to be more detrimental to the learning experience than not including TEL practices in the first place, echoing findings from Manca &

Ranieri (2016). This is particularly true for students with SpLDs, who may require alternative teaching methods to facilitate their learning (Balakrishnan & Gan, 2016). This research highlights the need for educators to continue to employ a broad range of integrated teaching methods, which support the broad and varied needs of all students.

It also reveals that attention needs to be paid to context and its impact on technology use in learning. Geer et al. (2017) state that the implementation conditions of TEL may not always be the same in educational settings due to issues, such as technological support or educators' preferences. Hence it could be argued that lectures' support in using TEL might not have been adequate to meet students' individualised needs.

Implications for practice

The findings from this research will be used to inform the design of subsequent stages of the research project, including the design of a questionnaire to be disseminated to all students at UEA.

There are some important limitations of this study that should be acknowledged and addressed in future research. First, TEL is a complex term which encompasses a broad range of practices, including but not limited to: social media, specialist hardware and software, web-based programmes and virtual learning environments. Its use may vary between HEIs, further impacting students' specific conceptualisation and experiences of what is meant by TEL. Therefore, technology should not be studied in isolation from the context where it is implemented. Although technology can be an essential element for enhancing learning, educational context in terms of policy, training and infrastructure may influence its use *in situ*. The approach of this study should be extended to include the views of lecturers, to provide a holistic view of the teaching enablers and barriers to technology implementation for SpLD students.

Secondly, the term SpLD covers a range of difficulties which can manifest in a variety of ways so that each profile is unique to the individual (British Dyslexia Association, 2018). Different SpLDs might generate different needs and different reactions to TEL. Considering the heterogeneity of SpLDs and the broad concept of TEL, the study acknowledges that a larger sample of participants might need to be added to the current body of evidence for a

broader representation of SpLDs. Moreover, given that the number of students in English HEIs with a known disability has increased over the years (Hubble & Bolton, 2021), future studies should also encompass the voices of autistic and ADHD students.

In terms of lessons learned from the methodological approach of this research, the use of semi-structured interviews revealed the necessity of specific considerations in the implementation of the interview with SpLD students. Going through the process, it was highlighted the need to adapt the interviewing approach and format to meet the participants' needs. For example, the interviewer ensured that the interview length was kept to a minimum of 30 minutes for the students who found it difficult to concentrate. Similarly, the language used was respectful and the questions asked were appropriately designed to be easily understood by all students irrespective of their needs, age or cultural background. Non-verbal body cues were also important elements of the interview process to identify hidden meanings and understanding. However, considering the variability in participants' needs we recommend that the next phases of the study involve a wide range of data collection methods (such as questionnaires) to provide fuller accounts of TEL use in context.

Finally, the qualitative approach has produced some valuable insights into the different ways that HEIs and students define TEL. For example, the participants mentioned that their institutions did not always use platforms that matched their needs, but that social media might be useful for group problem-solving and self-directed learning. Considering that previous studies highlight the positive impact of social media on learning (Aldahdouh et al., 2020), future research should focus more in-depth on the role of these platforms on the learning of SpLD students. For the next phases of the study, we will consider implementing a questionnaire to examine this topic further, focusing on larger samples (lecturers, students with/without SpLDs) and different contexts.

Overall, it is anticipated that the findings from the research project will be of great benefit to students and educators alike. All students at HEIs in the UK are likely to be exposed to TEL, particularly given the rapidly changing landscape of education practice in the wake of COVID-19. The findings from this research will enable the development of

informed, evidence-based guidance for optimising integrated and inclusive teaching practices.

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