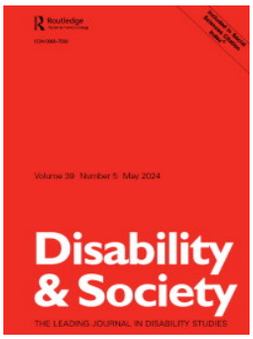

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A whole-campus approach to technology and inclusion of students with disabilities in higher education in Ireland

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ABSTRACT

The increasing demand for equitable higher education necessitates changes in how to consider and develop inclusive university settings. Using a systems-thinking lens, this article examines the whole-campus approach to technology and inclusion of college students with disabilities in Ireland. In-depth interviews with students with disabilities and other stakeholders representing higher education, non-profit organizations, and government bodies uncovered critical areas and dynamics for understanding and building institution-wide capacity for overcoming barriers to technology and access, and creating a systemic culture of inclusion in higher education. Five themes were identified: equity of technology-based access; shared responsibility and accountability; staff knowledge development; institutional commitment and management; and student partnership. The study indicated that embedding guidance, recognition and expectations for universal design, technology-inclusive practice, and meaningful input of students with disabilities across all areas of university life would help to cultivate more equitable higher education for all.

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Disability; technology; inclusion; higher education; whole-campus approach; universal design

Points of interest

- The whole-campus approach to technology and inclusion recommends that all aspects of university life are fully accessible and inclusive to all.
- Creating settings across institutions that can be accessed and used by all, to the greatest extent possible, and developing staff's responsibility and skills for technology and practices that include students with disabilities are important areas for further action.

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- Greater recognition of teaching and professional development for inclusive education is required.
- Promoting assistive technologies and teaching and learning approaches for inclusion in terms of their wide-reaching benefits and diversity, rather than focusing exclusively on disability, may be a promising step towards making inclusion mainstream.
- Fully including students with disabilities in making decisions on matters that affect their experiences and technology in college is necessary to support inclusion across university campuses.

Introduction

While progress has been made in increasing the numbers of students with disabilities in higher education internationally, there are persistent inequities in participation in and completion of higher education by people with disabilities (Cotton, Nash, and Kneale 2017). In Ireland, 20% of people with disabilities have a higher education qualification, compared to 36% of the rest of the population (DFI 2019). Promoting equity of access in higher education is a national priority in Ireland (DES 2011, 2019; HEA 2015, 2018) and internationally (United Nations 2007, 2015). Technology can reduce barriers to access and support inclusion of students with disabilities (McNicholl et al. 2021; Morgado Camacho, Lopez-Gavira, and Moriña Díez 2017; Sarrett 2018; Seale et al. 2015).

Historically, however, higher education institutions have relied on specialized interventions that typically include educational assistive technologies applied as add-on student support at the individual level (Leake and Stodden 2014). This specialist support and assistive technologies have traditionally been situated in the medical model of disability, aiming to compensate for impairment and 'normalize' functioning of the person (e.g. student) through medical intervention (Ellcessor and Kirkpatrick 2017; Michaels and McDermott 2003). Provisions for students with disabilities are often managed through disability services and 'piecemeal institutional response' (Shevlin, Kenny, and McNeela 2004), with university responses to students' needs reactive and retrospective, rather than proactive and prospective (Riddell, Tinklin, and Wilson 2005). Such systems may themselves act as barriers to inclusion and equitable treatment in education (e.g. Collins, Azmat, and Rentschler 2019; Wray and Houghton 2019).

The growing demand for equitable higher education necessitates changes in the design and delivery of higher education (Evans et al. 2017). There is a shifting of national and international policies on inclusion towards a mainstream, human rights, universalist approach (HEA 2015; United Nations 2007). A universalistic perspective acknowledges variations in functioning as encompassing all human beings and common needs and

rights (Jarl and Lundqvist 2020). This has implications for how education systems support access and inclusion for all, including students with disabilities. Ireland's national plan for widening access in higher education clearly states the objective that policies and practices for equity of access should be embedded into everyday life of higher education (HEA 2015). Drawing on a universalistic, whole-institution perspective, this article explores critical areas and key elements for the provision and use of technology in higher education to develop inclusive settings across all areas of university life.

Campus-wide approaches to inclusion in higher education

A growing body of higher education literature examines issues of diversity and inclusion from whole-campus perspectives (Martinez-Acosta and Favero 2018; Thomas 2018). Campus-wide approaches to student participation involve the work of all staff, cover all areas of student experience, and are underpinned by institutional commitments to student participation (Hockings 2010; Lawrie et al. 2017). Internationally, higher education systems are highlighting the need for establishing common procedures and inclusive practices across institutions (García-González et al. 2021; Moriña 2017). This requires consideration and design of curricula, instruction, assessment methods, services, extracurricular activities, and digital and physical environments that can accommodate a diverse group of students. Improving access and participation in higher education from a whole-institution view often combines the concepts of diversity and equity recognizing that disability is socially constructed and that the inclusion of students with disabilities should represent the first line of accessibility (McCarthy, Quirke, and Treanor 2018). These perspectives align with the social model that moves the location of disability into the environment, including technology acting as disabling and oppressive (e.g. Goggin and Newell 2003).

Some scholars specifically point to the influence of institutional culture on student inclusion and emphasize the need for universal design and inclusion across the institution (McMaster 2013; Moriña 2017). Universal design refers to 'designing for all', such that everyone can access and use products, services, and environments, without the need for additional accommodations (Burgstahler 2009; Powell 2013). Universal design in higher education is a campus-wide process involving all stakeholders and incorporating instruction, assessment, services, digital surroundings, and physical spaces accessible to all (Burgstahler 2017); hence, implementation of universal design requires re-thinking and impacting all aspects of the system (Evans et al. 2017). Ainscow (2015) explains this change as one that moves away from addressing exclusively the characteristics of the students to addressing barriers at institutional and systems levels.

For years, dominant discourse and studies on college student development have relied heavily on theoretical assumptions that primarily centred on students' individual behaviours and roles in persisting in higher education (e.g. Tinto 1975, 1987, 1993). More adequate and full consideration of the institutional context and dynamics is needed to study diverse experiences and participation of non-traditional, underserved groups in higher education (e.g. Aljohani 2016; Aquino 2016; Museus 2014). Similar to other underserved groups, students with disability can lack the 'right' capital or social and cultural resources to access and fully participate in college (Seale et al. 2015). Harnessing the power and pervasiveness of technology is essential in considering inclusive higher education (McNicholl et al. 2021; Pacheco, Lips, and Yoong 2018; Perera-Rodríguez and Moriña Díez 2019).

Many studies have examined issues of technology and inclusion of students with disabilities in higher education in the context of teaching (Adams et al. 2019; Perera-Rodríguez and Moriña Díez 2019; Wilkens et al. 2021), or built environments and infrastructures (Moriña and Morgado 2018), assistive technologies (Clouder et al. 2019; McNicholl et al. 2021), information and communication technologies (Fichten et al. 2020), or digital systems and environments (Alahmadi and Drew 2017; Fernandez 2021; Pacheco, Yoong, and Lips 2021). Screen reading, speech recognition, and other assistive software make mainstream education and university resources accessible (McCarthy, Quirke, and Treanor 2018; Sarrett 2018). Digital tools support students' engagement, independence, and self-determination in higher education (Pacheco, Lips, and Yoong 2018). However, technology seems to be under-used in the development of fully inclusive university campuses (e.g. Jacobs et al. 2022; van Jaarsveldt and Ndeya-Ndereya 2015). Joined-up solutions are needed to develop technology-inclusive settings across education institutions (García-González et al. 2021; Perera-Rodríguez and Moriña Díez 2019; Thomas 2018).

While some scholars have investigated the issues of access and participation of students with disabilities within a wider institutional or system-level arena (Hughes, Corcoran, and Slee 2016; Moswela and Mukhopadhyay 2011; Strnadová, Hájková, and Květoňová 2015; Supple and Abgenyega 2011; Yusof et al. 2020), little is known about key elements and processes that constitute whole-campus capacity for inclusion of students with disabilities to include all products, services, and environments that students engage with in higher education. We employed a systems-thinking lens to consider the complexity and interrelatedness in higher education systems and to understand what is involved in the building of campus-wide university settings that are technology-inclusive for students with disabilities. We assumed that 'a problem is created by every part of the system in which the problem is embedded, and that the problem can and should be addressed at every level' (Charnley, Lemon, and Evans 2011, 159) to impact sustainable systems

change; in this study, to build and sustain technology-inclusive, universalist university settings for all. Notwithstanding the need for systemic, campus-wide solutions for universalist practices, it is recognized that for some students with disabilities, bespoke and specialist technologies and reasonable accommodations will remain essential to their participation as they address barriers that cannot be addressed with mainstream practices (Griful-Freixenet et al. 2017; Rose et al. 2005).

Method

We adopted a qualitative research design (Creswell 2013) to understand in-depth the perspectives, processes, and elements that constitute a whole-campus approach to technology-inclusive university settings for students with disabilities. We explored perspectives from a range of higher education stakeholders to reach across the physical and digital aspects of the campus, to span administrative, learning, and social interactions, and to encompass both 'provider' and 'consumer' perspectives or angles. The study is part of a larger research project that explored the role of technology in promoting inclusive higher education in Ireland for students with disabilities. The study was reviewed and approved by the Dublin City University Research Ethics Committee (Protocol No. 2019/217).

Participants

Eighteen students with disabilities (eight females and 10 males) and 28 representatives (16 females and 12 males) of wider stakeholders agreed to participate. The students ranged from 19 to 40 years of age with a median age of 26 years old and came from seven government-funded higher education institutions across Ireland. Half of the students were in undergraduate programmes and half were postgraduate students; seven postgraduate students were in master's degree programmes and two in doctoral programmes. One student was in their first year of undergraduate studies and six students were in their first year of postgraduate studies. Altogether, nine students were users of assistive technology, including educational assistive technology (e.g. screen reading, speech recognition, literacy, magnification, and note-taking technology), mobility aids, visual aids, and communication aids, with three students using more than one assistive technology. Ten students experienced more than one type of disability; six indicated a mental health condition, five with a specific learning disability (e.g. dyslexia), four with physical disability, four with sensory disability, and three with developmental coordination disorder (e.g. dyspraxia), followed by two with significant ongoing illness, two with Asperger's/autism, two with attention deficit hyperactivity disorder, and one with speech and language disability. Twenty wider

stakeholder participants represented various roles and areas within higher education institutions (i.e. disability services, teaching support, assistive technology, educational technology, access, faculty, library, and estates) and eight wider stakeholder participants were drawn from government bodies, non-profit organizations, charities, and other types of organization in the higher education sector in Ireland. Five wider stakeholder representatives self-identified as individuals with disability.

Procedure

Students from government-funded higher education institutions in Ireland, who were registered with the disability services in their institution, were invited to participate through disability officers and other relevant stakeholders. The disability officers were invited to distribute details of the study by email and the university's social media to students registered with the disability services and to inform relevant university stakeholders about the study. Participants chose to participate, if they wished, by directly contacting the research team through the email address provided in the study flyer attached with the email. This flyer was also printed and posted to the disability officers, who were requested to display the flyer in their office. Additionally, five relevant non-profit organizations shared details about the study with their members via social media.

We employed maximum variation and snowball strategies to invite representatives from various areas of higher education, inclusion, policy, and support services to take part in the study. We found relevant wider stakeholder participants through their organizations' work and websites, whereas we contacted other wider stakeholder participants on the recommendation from other potential stakeholders who were contacted for the study.

All participants received a plain language statement within which it was made clear to participants that participation would involve, with their consent, a socio-demographic questionnaire and one in-depth interview. All participants provided informed consent before data collection and we created pseudonyms for them. Interviews were conducted face to face, online, or over the phone and lasted from 32 to 90 min. Each interview was audio-recorded and transcribed verbatim (with identifying information removed).

Interview guides

Semi-structured in-depth interviews with both participant groups were informed by topic guides developed from a scoping review of the literature and the study aims. Grounding the study in the tenets of the constructivist paradigm (Lincoln and Guba 1985), the semi-structured interview format

supported participants to narrate their experiences and insights, while simultaneously ensuring deep reflection and comprehensive coverage of critical areas for building institution-wide capacity for technology-inclusive university settings. Before conducting the interview, all participants completed a short questionnaire. The questionnaire for students included questions about their demographic and academic backgrounds and a self-evaluation of their needs and use of assistive technology in college. Students classified their own disability from the categories provided on the questionnaire. The questionnaire for wider stakeholders asked questions about wider stakeholder representatives' demographic, organization, and role backgrounds and a self-identification of disability status.

Data analysis

Interview data were analysed using NVivo software for thematic analysis, as informed by Braun and Clarke's (2006) six-phase guide (data familiarization; code generation; theme identification; theme review; refining, defining, and naming themes; and final report construction) to identify, analyse, and code patterns and themes. Based on the study aims, we created initial codes. We analysed the interview data across the students and wider stakeholders to determine relationships among codes. We mapped themes and created a hierarchy of concepts. We analysed the interview data, searching for the key aspects of a whole-campus approach to technology and inclusion in higher education for students with disabilities. We analysed these responses across students and wider stakeholders, comparing codes across participants to identify similarities, differences, or relationships between codes. Adopting a whole-system thinking, we re-read through the interview transcripts and used initial impressions to create a picture of the key elements of the whole-campus approach to technology inclusion in higher education, coding additional concepts that emerged. We determined relationships between codes to discern themes, creating a hierarchy of concepts and insights. Peer debriefing and data triangulation from the perspective of students with disabilities and wider stakeholders provided a whole-context and rich understanding of what is included in the building of technology-inclusive settings across the university campus.

Results

We identified five themes as critical to addressing and developing campus-wide technology-inclusive settings for all, including students with disabilities. These include: equity of technology-based access; shared responsibility and accountability; staff knowledge and development; institutional commitment and management; and student partnership.

Equity of technology-based access

Both students and wider stakeholders voiced concerns about access to and design of digital surroundings (e.g. inaccessible formats, contents, and platforms), technology and access in physical settings (e.g. lack of lifts and ramps, staged lecture halls), and insufficient access to inclusive software. These circumstances prevented or impeded students from accessing and efficiently engaging with the higher education setting. For instance, some students who used a screen reading technology experienced difficulties with accessing learning materials, explaining that:

> If a lecturer scanned a chapter from a book, … what you have is like an image of the two pages of the book. When I put that through the [screen] reader, it would read a line from one page, then a line from the second page, then a line from the first page and then a line from the second page. (Nessa)

Other users of screen reading technologies described the virtual learning environment adopted for teaching and learning in their university as 'not a great piece of technology in terms of accessibility [because] the website on that system is very, very inaccessible' (student Ben).

Equally, participants reported that physical settings in universities were often not accessible and user-friendly to all because of the way they were designed. For example, student Liam, who used a wheelchair, described how the insufficient number of elevators in one building prevented him from attending classes as 'sometimes the elevator would be broken when I had to go for class upstairs'.

Moreover, the challenges in higher education institutions were also related to unavailability of technology. Some students experienced insufficient numbers of campus-located computers equipped with inclusive software or assistive technology. These technologies were typically located in university libraries, assistive technology laboratories within disability services, or department computer laboratories. Student Nessa hoped 'that there could be assistive technology for me on all of the computers, so that I could just sit down at any computer I wanted'.

Providing inclusive settings and using certain solutions of assistive technology, such as screen readers, across the entire university community would benefit everybody, while leading to improved access for diverse groups, including people with disabilities. Ellen, who worked in assistive technology services for a non-profit organization, discussed the opportunities for the diverse population, commenting that:

> we're all diverse. My reason for using screen reading software might be because I have dyslexia. The next person is using it because they're vision impaired, the next person is using it because English is their second language and they want to have confidence in having something readout.

This is supported by another participant who also voiced the benefits of assistive technology to be available to everybody:

> There are some [assistive technologies] that are available on most computers within the university and that would benefit all students, because I feel the more we include students with disabilities, everybody is advantaged. (Delia, a university's educational developer)

Accessibility standards

Wider stakeholder participants highlighted that all electronic information across the university institutions should meet content accessibility guidelines, including the Web Accessibility Directive, passed by the European Union in 2019. Universities should consider the Web Accessibility Directive especially when adopting any piece of software, such as a virtual learning system, to make sure the software meets the criteria for digital access, as pointed out by Robert, a faculty member with disability: 'If you're going to have something that's widely used across campus, it absolutely has to conform to accessibility guidelines. It has to!' Students and wider stakeholders pointed out that monitoring and staff training for adhering to guidelines and minimum standards for accessibility should be mandatory across university settings.

Equally, students and wider stakeholders commented that accessible built environments, facilities, and grounds on campus are key to ensuring that higher education institutions are inclusive to all students. Participants' responses to accessibility of the built environment covered various areas of university life, including lecture halls, canteens, student services, libraries, accommodation buildings, sports and recreation facilities, and landscape designs of universities. Features of accessible, user-friendly, and inclusive physical settings ranged from lifts, ramps, automatic doors, signage, and accessible paths of travel on campus to user-friendly furniture and bathroom facilities and dense campus surroundings that still allow for an open social space and natural environment.

The participants' experiences and perspectives concerning limiting digital and physical settings and access to information and technology revealed universities' lack of preparedness and capacity for universal design, 'where what we design is accessible to everyone as much as is possible … so ensuring that what we do suits most people' (Alice, a university's disability officer).

Similarly, wider stakeholder participant Charles, who had extensive experiences with studying and promoting universal design, explained that implementing universal design across the university setting means that:

> in designing that environment, that you're making sure from day one that … extreme users inform the mainstream, be it from a built environment perspective

> to also all the support services, how materials are produced and so on. So that lots of students do not have to declare [disability] … and [are] able to just get on and participate.

Shared responsibility and accountability

For participants, taking mutual responsibility for inclusion required unyielding personal commitment and contributing to creating user-friendly, accessible, and supportive settings for students with disabilities throughout the university environments. Roisin, a doctoral student with a specific learning disability and mental health condition who used screen reading and text-to-speech technologies throughout her higher education, shared that:

> it shouldn't be just the disability office or the assistive technology person that it's looking after the students [with disabilities], but it should be everyone from the person taking the money, to the librarian, to everyone.

Historically, this has not been the case, as commented by one participant that:

> for years, students with disabilities were seen to be the responsibility of the student support department, when in actual fact, it's all of our responsibility to make sure all of our students are included. (Frederick, a university's learning technologist)

Participants' responses reinforced the notion that achieving shared responsibility for inclusion of students with disabilities speaks to reconstructing the disability service concept, such that inclusive-assistive technologies and participation of all students become 'everyone's business' (student participant Olivia; wider stakeholder participants Albert and Maggie).

Staff's awareness and understanding of their own responsibility and accountability for creating accessible and inclusive settings for all, including users of assistive technology, was identified as an area for further support and action. The concept of shared responsibility and accountability for inclusion is broad. In general, people do not feel responsible and accountable because they are unaware or do not know how to provide access for all students. Participants who represented universities' teaching support and access units described the gaps in staff's senses of personal responsibility for providing accessible digital content for students who use screen reading technologies. For instance, Julia, a university's academic developer, shared that:

> they [some lecturers] feel that if a student with disability cannot access any of their content, that's a problem for the disability service. And they would be quite explicit in saying that.

Participants specifically voiced concerns about staff being aware of their responsibility and expectations to possess technical skills and knowledge of technologies that support inclusion of people with disabilities, as discussed

by Sarah, a representative of a university's access office and a person with disability who used a screen reading technology herself:

> The general staff body, or IT [information technology] service actually, don't know enough [about accessibility and screen reading technology], and they don't seem to think it's their role to know it … I think it's still very segregated.

Another participant, Victor, a faculty member who studied the issues of technology and inclusion, explained further the gaps of having relevant knowledge of technology and taking shared responsibility for inclusion:

> The biggest challenge is how do you disseminate that knowledge out to the stakeholders … Who is responsible for ensuring that people have the right knowledge for what they're meant to do.

Creating a culture of shared responsibility and accountability for technology and inclusion in higher education would mainstream inclusive practice across the university system, and improve access and independence for students with disabilities, and this would enhance further the university support of students, as suggested by Amy, a university's disability officer:

> Everyone in the university has a responsibility to support those students [students with disabilities] … [I]deally, we want them to be coming less to a service like ours. And certainly, that we would be supporting the few, a fewer number of students because most students would be able to navigate university without the need for additional accommodations.

Staff knowledge and development

Students and wider stakeholders all raised concerns regarding technical skills and capacity for inclusion, including to recognize and use accessible features of technology and create accessible and engaging content and materials. The discourse often referred to teaching and highlighted a lack of awareness of inclusive technologies, inaccessible learning materials, and a lack of consistency in the provision of digital content. Many lecturers may be still unaware of how to use technology in an accessible way, or 'not knowing how to best use the technology' (Aisling, a national student representative) to meet the needs of all students.

Students described how lecturers employ different practices in how they use or do not use technology in their teaching and support of students, and this 'just depends on the individual and a specific technology and how they are with technology' (student William). Moreover, most lecturers appear to lack awareness and knowledge of which and how technologies impact student learning and inclusion; 'it's very obvious that lecturers have little understanding (of inclusive technologies)' (participant Charles from a

government agency in disability and inclusion), such as mobile phones, tablets, or laptops equipped with assistive technology and inclusive freeware that provide students with access – for example:

> when we moved to free[ware] getting students to use apps on their phones and other things, so they're not having to invest in new technology, they can just use the technology that they have, and then you have lecturers saying, 'Oh no, they're allowed to use the [smart] pen but not a phone'. (Amy, a university's disability officer)

Variations in staff's technical skills and lack of consistency in inclusive education across the institution negatively influence students' experiences, with students being 'very much thrown in at the deep end' (student Shannon).

Wider stakeholders often referred to strong support structures on both institutional and national levels for staff to develop skills and knowledge of accessibility and inclusive education. There are increasing numbers of offered workshops, training sessions, guiding materials, and other resources for creating inclusive learning environments for all students. However, delivering and achieving professional development for inclusive education is challenging; most lecturers 'don't attend … and [limited] time is the biggest thing that we get back in terms of staff development' (Julia, a university's academic developer).

Often, staff seek just-in time, ad-hoc assistance when the need for accessibility and inclusion arises, 'coming mostly from demands from students, … and it's nearly always student-led' (Vincent, a university's educational technologist). Consistently engaging staff in professional development for technology-inclusive teaching continues to be a concern on collective levels, especially in the system, where, 'because of concerns around university rankings, the focus has been completely on research' (Margaret, a project manager in university teaching and technology) in promotions.

Thus, professional development in technology-inclusive education should be meaningfully incentivized and supported, as discussed by Maggie, a university's project lead in widening access in higher education:

> There needs to be a very clear reason as to why I would engage in professional development for my digital skills … There has to be incentive, it has to be embedded in the university strategy, their vision, their policies.

Many participants called for increasing the expectation and value of inclusive practice and professional development through promotions and other reward systems to enhance staff development and improve inclusion and use of technology across the university system;

> It [inclusion] should be somehow accredited or tied into their competencies, their rankings, their scoring … There could be more recognition given to staff who participate in that way [learning about and practising inclusive education]. (Vincent, a university's educational technologist)

Institutional commitment and management

Strategic goals, policies, and institution-wide initiatives that target inclusion and diversity were identified as vital to managing, communicating, and raising awareness of institutional commitment to technology and participation of students with disabilities. Participants appreciated the practice of interdisciplinary and inter-sectoral collaboration in developing, monitoring, and updating policies and strategic plans for widening access and inclusion in higher education. For instance, Samuel, who worked in one university's access and teaching support unit and was a person with disability himself, commented that:

> within policy, within the institution, it's important that inclusion is expressed … [The National] Access Plan – it is important that is updated every two years … It's important that they [higher education institutions] continue to set goals and work within the Higher Education Authority to ensure that the institutions are setting goals within their own plans.

Representatives of teaching support, access, and assistive technology services in universities suggested that formal adoption of inclusive approaches to teaching and learning – that is, Universal Design for Learning – as a university policy would declare the institutional commitment and management of technology and inclusion in a more explicit and systemic way (e.g. through course and programme approvals). They pointed out that formally embracing Universal Design for Learning would enhance the use of technology among staff and this will improve experiences of a diverse group of students, including those with disabilities, across the university. For example, Ronan, a university's head of teaching support unit, commented:

> Absolutely, I think there should be a policy for UDL [Universal Design for Learning] which kind of showcases our ambitions and aspirations as a university and what we want each lecturer to do in each module to make sure that all students are included.

Many believed that developing an institutional policy targeting Universal Design for Learning would help to raise staff's awareness and assign personal responsibility for accessibility and inclusion. For example, a university's learning technologist Frederick highlighted that:

> a UDL [Universal Design for Learning] policy at the university level would really help just to focus people's attention for them to see, 'Hang on, this is something that is important' … It makes people realise, 'Hang on, it's up to me to make sure my students are included; it's not up to student support services in the university'.

This is supported by other participants, who also voiced the benefits of formally embracing the principles of Universal Design for Learning, namely multiple means of engagement (a variety of learning techniques for course

contents to be interesting and motivating), multiple means of representation (a variety of ways of presenting information and learning content), and multiple means of expression (a variety of options for and forms of expression among students to show what they know) (Rose and Meyer 2002) across the university. They believed that such a system would enhance the use of technology among staff and improve access, independence, and equity for student-users of assistive technology, as explained by Henry, an assistive technology officer in a university:

> If that's [Universal Design for Learning] in place across the board, … you will make it a lot easier for the students to access the material, so we won't be doing that one-to-one support once we have the training initially done with the student on how to use their screen reader or magnifier reader … They will be able to access their educational materials the same as their peers.

Participants' responses indicated that bringing forward and fulfilling university's commitment and policy for inclusion across the system requires engagement and support from the entire university community:

> where it's all areas, so it's bottom-up, middle out through the middle management, like the directors of education, heads of school people and then it has to be top-down as well. (Delia, a university's educational developer)

Hence, holding all staff, including senior leadership, accountable for technology and inclusion, while establishing a university's structures and procedures that actively engage all university levels, appear to be vital. As noted by participants, more visibility and buy-in from 'higher up the chain' or senior management for efforts in technology-inclusive education would help to bring forward universities' commitment and efforts for inclusion.

Student partnership

Student and wider stakeholder participants all pointed out the value of positioning students with disabilities as partners in planning and decision-making for inclusion and technology across all areas of university life; that is, 'making sure that there are more student voices represented in any changes that would come forward' (Aisling, a national student representative). As experts about their own learning and needs, students have valuable knowledge and experiences to contribute to shaping access and inclusivity in instruction, assessment, services, policy, governance, and the design and delivery of infrastructure in higher education institutions.

Actions to drive inclusion in higher education for students with disabilities must be informed by deep understanding of the issues and pathways for students with disabilities, whose needs and voices should be fully considered: 'Nothing about us, without us' (students Grace and Liam). Partnering

with students in building barrier-free, inclusive university settings means a culture of collaboration and full engagement of students with disabilities across university systems; that is, the voices of students with disabilities are an integral part of the conversation and policy for technology and inclusion in higher education. Aisling, a national student representative, described the need for:

> ensuring that communication is there and is supported and is meaningful – sometimes it's very easy to say that something has been tabled or discussed in front of students, which doesn't necessarily mean that students have been meaningfully engaged in the conversation.

Directing attention to diverse backgrounds and experiences of students is the centrality of the campus-wide inclusion and inclusive student partnership in institutional planning. One of the students commented:

> What's very important for an inclusive campus is that when they [higher education institutions] are making things like new buildings, making new disability bathrooms … they should always have input from students with different disabilities so that they know before they do these things what will work and what won't. (Nessa)

Listening to, and engaging with, the lived experiences of students with disabilities increases awareness of students' needs, including providing them with accessible and inclusive settings, and this can help staff to reflect on and explore areas of practice that need further attention and improvement. One of the participants explained:

> [It is] very important for staff to hear the student voice, to hear about students' experiences good and bad … Certainly, it would go some way to supporting the staff to start thinking about, 'Okay, how those barriers could be overcome'. (Eileen, a university's educational technologist)

Enabling and encouraging students to regularly share their experiences and views not only can help universities to identify and improve support for students across the system, but can also enhance students' self-advocacy and agency. For instance, when students' needs and voices are fully considered, students become architects of their own learning, challenging the system and becoming agents of inclusivity and justice in higher education, as discussed by one participant:

> Our students need to feel empowered to rise up and point up when poor practices are happening and seek and demand an improvement in practice … [I]t's their right to seek, look for and ask for these things [accessible and inclusive settings] if we're not already providing it. (Frederick, a university's learning technologist)

Hence, higher education institutions are expected to provide students with safe spaces to share their perspectives and needs, and 'we should look at ways of being able to provide that forum for sharing' (Margaret, a project manager in university teaching and technology).

Discussion

As one of the first studies that employed a broad vision of technology and institutional dynamics to examine their influence on student inclusion across university environments, this investigation makes significant contributions to our understanding of how to re-think and transform the higher education ecosystem to become an equitable environment from the design phase amongst diverse groups of university staff and settings. The systems-thinking insight into the challenges and solutions for mainstream-inclusive, universalist settings provides clarity on 'what this means in terms of structures, policies, procedures, etc. and associated capacity and expertise requirements across higher education institutions' (HEA 2018, 40). Consistent with the systems-thinking perspective, our analysis highlights complexity and interconnectivity in the pursuit of a whole-campus approach to technology and inclusion in higher education systems indicating that any gap or change in the structure, guidance, and expectation for universal design and technology in one area of the university's system has a 'domino-type' effect on practices, technology, and inclusion in other areas in the system. As technology and institutional dynamics impact on implementation of universal design and inclusion across all areas of the university's system, these findings suggest that understanding these connections provides a more realistic, contextual understanding of the challenges and solutions for cultivating technology-inclusive practices across the institution. As highlighted in the results, responsibility and capacity for technology and inclusion in Ireland's higher education appear inconsistent and primarily evident at individual levels and in departmental silos rather than in institution-wide programmatic initiatives. Similar to other, international contexts of higher education (e.g. Biewer et al. 2015; Hitch, Macfarlane, and Nihill 2015; Tinklin, Riddell, and Wilson 2004), Ireland's university systems continue to mainly rely on specialist support for students with disabilities.

The study suggested that embedding guidance, recognition, and expectations for inclusive integration of technology and universal design across university life – for example, policy and practice of planning, monitoring and evaluation of instruction, assessment, co-curricular activities, services, information technology, and facilities and buildings – would likely integrate accessibility in design and engage personal responsibility and inclusion across the campus. As indicated in our findings, this may reduce needs for additional accommodations and technological fixes on individual levels, as diversity and inclusion would likely become the norm; that is, students with disabilities, and especially those with non-visible impairments, would be full and equal participants from the start, with many of them realizing their fundamental rights or without needing to declare disability to participate

in college. This aligns with what Craddock and McNutt (n.d.2020) call a 'more organic model' that has the potential to transform the educational settings towards more holistic, student-centred higher education tailored to students' individual needs and contexts.

For example, this article highlights that universal design in teaching and learning has the advantage of meeting the needs of most students by incorporating a choice of learning activities, accessibility, scaffolding, and technology into a continuum of mainstream pedagogical practices. For many students with disabilities, inclusive solutions are located in mainstream devices, such as mobile devices, free accessible software, and online content. However, insufficient thought being given to inclusive freeware and accessibility of mainstream education resources used alongside assistive technologies and specialist university spaces (e.g. selected computers with inclusive software, assistive technology laboratories) limits the experiences for students, including for users of assistive technology. Jarl and Lundqvist (2020) argue that if we view assistive technology as 'different', we will also view the users of assistive technology as 'different'; that is, our dichotomous view of technology may hinder a universalistic, human-rights perspective of variations in human functioning. Such findings and views are consistent with calls for developing a systemic culture of inclusivity in higher education (e.g. Burgstahler 2020; Fovet 2021) and provide additional insights into how to address and secure buy-in from the entire university community, such that participation and technology of all students, including users of assistive technology, becomes everyone's and shared 'business'.

The study indicates that formal adoption of Universal Design for Learning as a central policy would explicitly advance institutional commitments and promote staff's capacity for technology-inclusive teaching practice. Hence, it is vital that higher education institutions align missions, policy, and support resources to ensure staff development and coherent and inclusive education across the institution (Lawrie et al. 2017; Svendby 2020). A number of studies (e.g. Collins, Azmat, and Rentschler 2019; Martins, Borges, and Gonçalves 2018; Moriña, Sandoval, and Carnerero 2020) report that faculty are willing to provide all students with tailored, quality support and recognize the need for their skills development in inclusive education. However, Ashworth, Bloxham, and Pearce (2010) found that even faculty who valued inclusion struggled to reconcile their passion for inclusive education with existing academic standards and practices. In our study, the limited time of lecturers and emphasis on research excellence rather than teaching scholarship in formal promotion procedures acted as barriers to sustained cultures of staff engagement and technology-inclusive teaching. While the systems of higher education institutions in Ireland have established strong support units for building capacity and skills for inclusive pedagogies, results from the study

suggest that a meaningful rebalance of the culture and inclusion efforts across the systems to prioritize an inclusive curriculum, teaching, and support of students across their journey in college is needed.

Adopting a universalist, whole-systems lens, these findings lead to addressing technology, inclusion, and staff development in additional, non-traditional aspects of the curriculum. Faculty teaching and designated staff should be able to identify and understand the core, non-negotiable outcomes of the study programmes as they relate to student learning across higher education, including off-campus learning experiences (e.g. study abroad, fieldwork, clinical sites, and work placements). Academic–clinical/field partnerships and awareness training in disability, inclusion, and technology can contribute to designing an education professional setting that is universally accessible and tailored to students' individual needs. Such support and gains allow for greater access to and inclusion in a number of professions/professional settings (e.g. Halligan and Howlin 2016).

This study also highlights the value of partnering with students with disabilities on matters that affect their experiences and technologies in college. For example, when students have a joint role in conversations about technology, policies, and practices of higher education and their voices are fully considered, they become active and empowered participants in the design and delivery of higher education, taking ownership of their own learning and inclusion. Refocusing students as users refers to listening to the users and validating and designing the products and environments in light of their expertise and expectations (Bourke et al. 2018). Participatory approaches to inclusive design, such as the concept of co-design, recognize the unique existential experiences of people with disabilities and place at the centre their active collaboration and contribution (MacLachlan and Scherer 2018; Sarmiento-Pelayo 2015). As indicated in the study, such activities and gains support universal design and the human-rights disability movement 'Nothing about us without us', where active involvement of people with disabilities is a central idea of promoting empowerment and equalizing opportunities for, by, and with persons with disabilities (e.g., Charlton 2000; Schulze 2010; Spassiani et al. 2017).

Implications for policy and practice

Recognition of the pivotal role that technology plays in improving participation of college students with disabilities from a whole-campus perspective has important implications for policy and practice. Results from the study call for higher education systems to take a more proactive role in addressing the needs of students with disabilities by increasing the value and scope of inclusive-assistive technologies and inclusive design in higher education. For example, the shared responsibility, accountability, and capacity of every staff

member towards inclusive, universalist practice could be suitably supported and embedded in role expectations, promotions criteria, and programme and course approvals and quality assessments across the university. As this study indicates, framing inclusive technologies and practices, such as Universal Design for Learning, in terms of diversity rather than disability may be a promising step towards shifting institutional culture, re-conceptualizing support for students with disabilities, and embedding and institutionalizing diversity and inclusion in higher education in a more authentic way (e.g. Evans et al. 2017; Wilson 2017).

To create more sustainable changes for access and inclusion across the university systems, institutional policy and implementation guidelines for technology and access should be developed, monitored, reviewed, and updated by working groups representing the diversity of the system's stakeholders. Addressing inclusion in higher education both collectively, to provide access for students, and individually, to ensure students receive relevant accommodations when the mainstream, universalist design offering does not already do so, is seen as a prerequisite to ensuring access for all students (Bunbury 2020; Griful-Freixenet et al. 2017; Yusof et al. 2020). Therefore, access to a university's technology, curriculum, services, facilities, and systems should be monitored and reviewed periodically from users with diverse characteristics (e.g. through online surveys, focus groups) to track and evaluate progress and to adjust and improve the system as needed (e.g. Burgstahler 2020). As higher education institutions must ensure accessibility when providing digital content, online courses, and systems, evaluating usability and accessibility before purchase or adoption of any technology, including virtual learning systems, should be mandatory.

As this article has revealed the significant role of student partnership in creating technology-inclusive settings across the university campus, more strategic institutional support and recognition for students' input would likely encourage staff in different roles and capacities to fully include students' perspectives on matters that affect their experience and participation in college. Diverse student groups, including those with disabilities, should be supported to share their views of instruction, assessment, technology, services, extracurricular activities, and digital and physical settings of university campuses to help identify needs and promote universal design. Identification and full consideration of voices of diverse groups that have been affected by the lack of technology and inclusive design and could be further supported by the expansion of the use of technology (e.g. Clouder et al. 2019; Jacobs et al. 2022; Sarrett 2018) could assist in developing a better understanding of those groups' needs and contexts. Retaining multiple perspectives of stakeholders as a lens for improvements could assist in moulding practices and environments that can combat educational inequities and lead to more inclusive university settings for all.

Limitations and future research

We explored the whole-campus approach to technology and inclusion in Ireland's higher education from students with a wide range of disabilities who were registered with a university's disability services. However, we did not manage to reach the perspectives of students with deafness and blindness. Future studies could seek to understand the experiences of diverse students, including those who are blind or deaf, and their implications for the campus-wide perspective of technology and inclusion. Additional research is also needed to further understand the ways diverse groups of university community, including staff with disability, can access and fully participate across university settings.

While collecting and analysing the perspectives of a range of university stakeholders shed light on what constitutes the institution-wide capacity for technology and inclusion, this analysis is based on the educational and professional contexts of participants involved in the study. It is possible that other dynamics, contexts, and key elements constitute the campus-wide pursuit of technology-inclusive practice. To further understand pathways for creating barrier-free, inclusive settings across the university system's areas, including the ones not explicitly captured in the study, future research could widen the scope of participants and data collection to other relevant stakeholders, including representatives of dining services, admissions, work placements, study abroad, careers development, recreation and sports, senior management, and human resources. Given the contextual nature of this research, we acknowledge that findings may not generalize to other students, wider stakeholders, and systems of higher education. Additional studies are needed to explore whether similar results for taking the whole-campus approach to technology and inclusion exist in other higher education contexts.

As the pivot to fully online higher education during the COVID-19 pandemic exposed the entire university community to digital settings, pressing questions to further inquiry include an additional understanding of the dynamics and outcomes of online education and greater use of technology in this context, and whether and how these might be harnessed for a sustained shift towards inclusive university settings.

This article found that the pursuit of a whole-campus approach to technology and inclusion in higher education speaks to the interplay and alignment of responsibility, skills, incentives, policy guidelines, and the perspectives and realities of students. By discovering the ways in which to address and secure institution-wide buy-in and university settings that accommodate a diverse group of students, the article can assist in levelling the playing field for students with disabilities and cultivating more equitable higher education systems so that all students flourish.

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