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ARTICLE

Embedding and Sustaining Inclusive Practice to Support Disabled Students in Online and Blended Learning

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UK higher education data has shown persistent differences in degree outcomes for specific student groups. Consequently, the Office for Students (the UK government's higher education regulator) are funding 17 projects to address these inequalities. Building on its expertise, our institution is leading the IncSTEM project alongside colleagues from two other universities, to evaluate, scale up and promote inclusive teaching and learning practice within Science, Technology, Engineering and Mathematics (STEM) disciplines in higher education.

There are challenges with inclusive distance learning, many of which are emphasised in STEM through the prevalence of practical and field activities, the widespread use of groupwork, and the use of text that is rich in symbolic notation. Online and blended learning approaches, including access to digital learning resources, bring opportunities for more inclusive practice, but can also lead to unforeseen and unquantified barriers for students. Integrating an inclusive approach to teaching and learning requires universities to embed and sustain practices that consider the diverse needs of students throughout curriculum design and delivery, bringing benefits to all students.

In this paper, we present data on staff perceptions and practices regarding accessibility and inclusion for disabled students, explore examples of inclusive practice, and discuss how these can be applied by practitioners in order to create a higher education environment in which students of all backgrounds and characteristics are able to succeed.

Keywords: inclusive; disability; STEM; online learning; distance learning; barriers

1. Introduction

Data from the UK higher education (HE) sector shows the persistence of differences in degree outcomes for specific student groups, even when other background characteristics and prior attainment are taken into account (HEFCE, 2015). In response to this, the Office for Students (OfS, previously the Higher Education Funding Council for England) have committed £7.5 million to fund projects that aim, in various ways, to tackle these inequalities (HEFCE, 2017b). One such group is disabled students: gaps exist between disabled and non-disabled students both in attainment and in progression to further study and employment (HEFCE, 2014; HEFCE, 2015; HEFCE, 2017a). This is concerning since the number of students declaring a disability is growing; in the UK there has been a 56% increase in the number of full-time, first-degree students declaring a disability since 2010 (HEFCE 2017a).

It is recognised that Science, Technology, Engineering and Mathematics (STEM) disciplines can create or exacerbate barriers to learning for disabled students (IoP, 2017). Activities such as laboratory work, fieldwork, or manipulation of large datasets present challenges that may be less prevalent in other disciplines (IoP, 2017). STEM degrees are also accredited by professional bodies with specific requirements that are unclear regarding alternative arrangements for some disabled students. Online and blended learning approaches can offer flexibility for students and bring opportunities to develop more inclusive assets and activities (Cooper, 2004). However, they can also lead to unforeseen and unquantified barriers, resulting in requests for adjustments to learning and teaching (e.g., Paniagua and Simpson, 2018). This can have a detrimental effect on students' study experiences.

Minimising the adjustments needed by individual students requires universities to integrate inclusive approaches to teaching, learning *and* support that consider the diverse needs of students throughout their study experience. Our institution is leading an OfS-funded project, "Embedding and Sustaining Inclusive Practices in STEM" (IncSTEM), that aims to evaluate, scale up and promote inclusive practice in STEM disciplines and the HE sector. The project focuses on disabled students, but inclusive approaches to teaching and learning will benefit students of all backgrounds and characteristics.

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2. IncSTEM

IncSTEM is a partnership between three HE institutions in the UK: The Open University (OU), the University of Leeds and the University of Plymouth, all of whom have successfully developed inclusive approaches to STEM teaching, learning and student support. This paper describes the approach and work undertaken at The OU, including some preliminary results and emerging themes.

The OU IncSTEM team have adopted a collaborative and consultative approach, incorporating experiences of those involved in STEM teaching and learning and other individuals and units that are pivotal to the success of students. The OU team includes STEM academics, accessibility practitioners (STEM and institution), digital content creators, and researchers, and they are working with other units and disabled students as appropriate to the individual work packages.

The team initially scoped out examples of inclusive practice based on ongoing institutional activity. Consultation with heads of STEM departments and directors of teaching identified additional examples of effective practices and specific challenges that create barriers to inclusive practice. Not all of these related directly to pedagogical approaches; institutional decision making and support structures were also areas identified that directly impact on students.

The following criteria were developed to prioritise the examples for further attention:

- student-centred: the example focused on the perspectives of, and benefits to, students
- necessary: the example identified a gap in provision for students that needed to be filled
- impactful: the example's outcomes would contribute to improvements with a wide reach
- forward looking: the example would meet the needs of future students, staff or others as UK HE evolves
- challenging: the example critiqued current practice and offered constructive alternatives
- innovative: the example presented a novel way of addressing an issue
- simple: the example would be straightforward to undertake and disseminate
- success: the example explored the benefits and/or pitfalls of approaches already adopted or trialled
- excellence: the example emphasised institution expertise.

Using these criteria, the team individually reviewed and ranked 15 examples, then shortlisted eight of these for development as work packages, along with a survey work package to collect qualitative and quantitative information about staff and student perceptions of inclusivity. Ethical approval was obtained from The OU's Human Research and Ethics Committee and the two panels with responsibility for approving research involving staff and students. This process ensured a robust check on the approach, methodology, language and sample.

The remainder of this section briefly introduces four of the work packages. The paper then focuses on the preliminary results of the staff survey and the emerging findings from four other work packages. These have been selected to illustrate a systemic view of the factors that impact students' experiences.

2.1. Degree accreditation

It has been identified that, in some disciplines, curriculum staff feel constrained by the requirements of degree accrediting bodies, which they interpret as preventing the use of reasonable adjustments (Disabled Students Sector Leadership Group, 2017). This work package therefore addresses the relationship between teaching and learning, degree accreditation and disabled students. The team has undertaken a review of the accreditation guidelines from a number of STEM accrediting bodies to determine whether, and how, they consider and address inclusive teaching and learning practices. The competencies that accrediting bodies require degree programmes to include have also been reviewed to identify those that may present specific challenges for disabled students. The work package intends to collate reasonable adjustments that have been effective for disabled students, and work collaboratively with professional bodies to determine the extent to which these would be acceptable on accredited programmes. It will thereby establish a set of examples of reasonable adjustments in specific disciplines.

2.2. IT procurement

In collaboration with staff from the institution's finance unit, this work package reviews the process and decision making employed when procuring software applications and delivery platforms used by students. With reference to a range of publications, such as 'Accessible technology procurement protocol' (BDF, n.d.) and the Official Journal of the European Union (OJEU, n.d.), it will identify when, how and by whom decisions should be made on the accessibility of third party products, and make recommendations that can be adopted internally and disseminated across the HE sector. In addition, the work package will review the post-procurement process and the steps taken to ensure that students and staff have guidance on overcoming barriers to the use of any purchased system. Although initially limited to software and platforms used for teaching and learning, the procedures and decision making processes reviewed in the work package are the same as those used for procuring 'service' software for students and staff, so the outcomes are likely to have an impact on the inclusivity of software and systems institution-wide.

2.3. Development of an accessibility policy

This work package reviews how our institution developed a policy on accessible teaching and learning for students with accessibility needs. Many UK universities do not have such a policy, and our own institution, despite having inclusivity at the heart of its guiding mission, did not previously have one. Thus, the development, approval and implementation of this across our institution could be used as a model for others. This policy was predominantly developed 'bottom-up', gaining momentum as units progressively contributed to its development. This work package involves interviewing

those involved in the policy's development to identify the personal, institutional and political barriers and enablers that were encountered during the process. From this, it is intended to establish appropriate methodologies that could be adopted by other institutions seeking to develop similar policies.

2.4. Discipline-specific inclusion groups

Discipline-specific inclusion groups are a way of sharing practice and developing staff knowledge and skills around inclusive practice in a particular subject discipline. This work package is taking an institutional example of a discipline-specific accessibility group and is investigating why and how this developed, the motivations of those involved, and how it has been able to make an impact within its own, and other, curriculum areas. It is intended that this example of, and guide to, good practice will be disseminated across other disciplines, and will include the confounding factors that might hinder the sustainability of such groups.

3. Staff survey

Given that the project is drawing on existing intitutional activities, the project team joined with an existing institution-wide initiative to survey staff attitudes to, and practices in, accessibility. To that end, a survey was designed and distributed to a cross section of the following staff groups to obtain quantitative data for analysis: academics and curriculum management staff who write teaching materials and manage the delivery of courses; student support staff; curriculum production and technical staff who create and edit courses (i.e. media designers, editors and graphic artists); and Associate Lecturers who deliver tuition and provide pastoral and study support.

As part of IncSTEM, responses from curriculum production, technical staff and student support staff who do not sit within a discipline were analysed alongside data from STEM academic and curriculum management staff and Associate Lecturers.

The survey used statements about accessibility practices and perceptions and a five-point Likert-style scale ('strongly disagree' to 'strongly agree') with a 'not relevant' option. The survey also asked staff to indicate their role, duration of employment and specialist area and included an open question for further comments.

The survey questions focused on four key areas:

- knowledge and awareness of disabilities and inclusive teaching
- skills and confidence
- attitudes towards accessibility, inclusion and disabilities
- effectiveness of support (e.g. training, guidance and human support).

We asked staff to state their knowledge, skills, attitudes and perception of how supported they were, and we tested their knowledge of sector-wide disability issues, such as degree outcome gaps. The questionnaire was piloted with a sample (n = 42) of technical staff involved in the production of curriculum content. No changes to the questionnaire were required so the responses from the pilot were included in the overall analysis. The final survey was distributed by email between July and November 2017, and via the Associate Lecturers' intranet. **Table 1** shows the sample size and response rates. Summary analysis was carried out in Microsoft Excel using descriptive statistics (i.e., mean, median, mode, and range). Responses of 'not applicable' were discarded, since they were considered a non-response.

The conflated results for all staff groups revealed three key findings. Firstly, the majority of staff (96%, n = 252) felt personally committed to accessibility and that the institution and their colleagues were also committed to accessibility (**Figure 1**). Secondly, most staff (73%, n = 187) felt confident supporting disabled students within their role (**Figure 1**). When looking at individual disability categories, however, staff were relatively confident with categories such as visual, hearing and mobility impairments, but were less confident supporting students with mental health issues (48%, n = 69) and students on the autism spectrum (46%, n = 58) (**Figure 2**).

Most staff (81%, n = 213) were confident they could recognise potential accessibility issues, but fewer (66%, n = 169) were confident they could signpost students to further sources of support (**Figure 3**). Indeed, fewer staff were satisfied with the training (45%, n = 115) and guidance (51%, n = 132) they received (**Figure 3**). Surprisingly, most staff (60%, n = 157) were unaware of sector-wide issues such as attainment gaps, and few were aware of the

Table 1: Sample size and response rates from each staff group targeted. Academic and curriculum management staff, and Associate Lecturers were STEM staff. Production, technical and student support staff were not discipline-based. Since the invitation to Associate Lecturers was open (available to >4000 staff in this role, 1800 STEM-related), there is no information about how many staff in that category saw the invitation.

Target	Sample size	Responses received	Response rate/%
Academic and curriculum management staff (STEM)	284	72	25.3
Curriculum production and technical staff	248	57	23.0
Student support staff	251	82	32.7
Associate Lecturers	(Open invitation)	56	Not Applicable

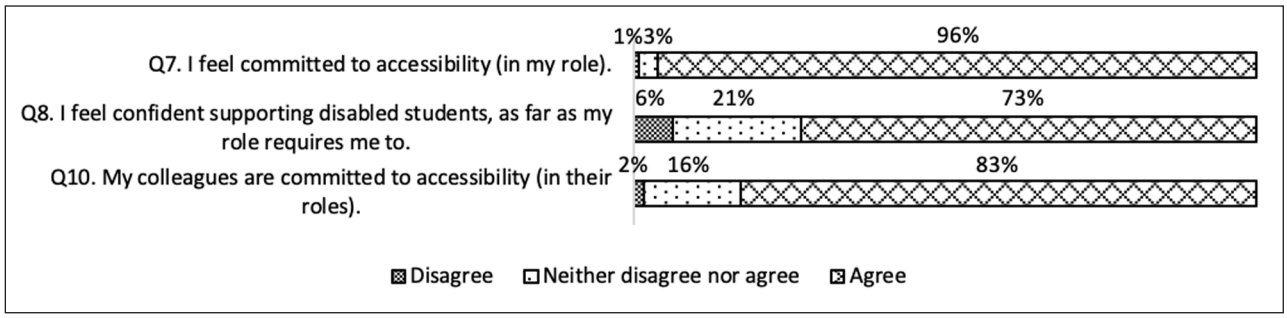

Figure 1: Survey responses regarding commitment to accessibility and confidence in supporting disabled students.

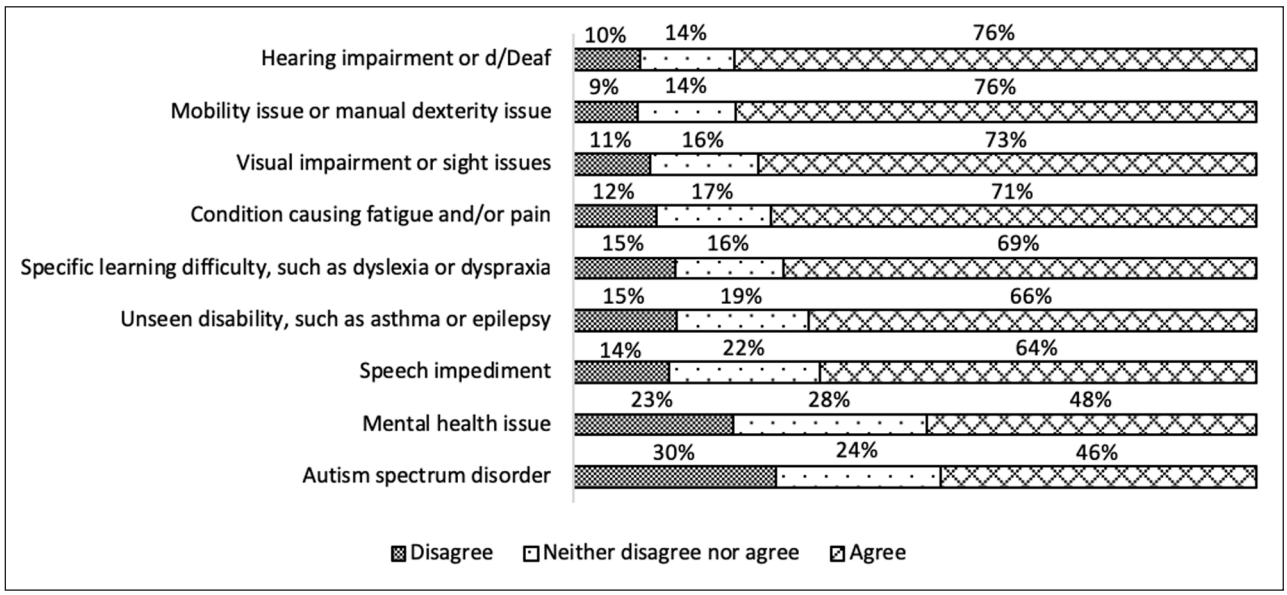

Figure 2: Survey responses to: 'I feel confident supporting people with the following disabilities through my role'.

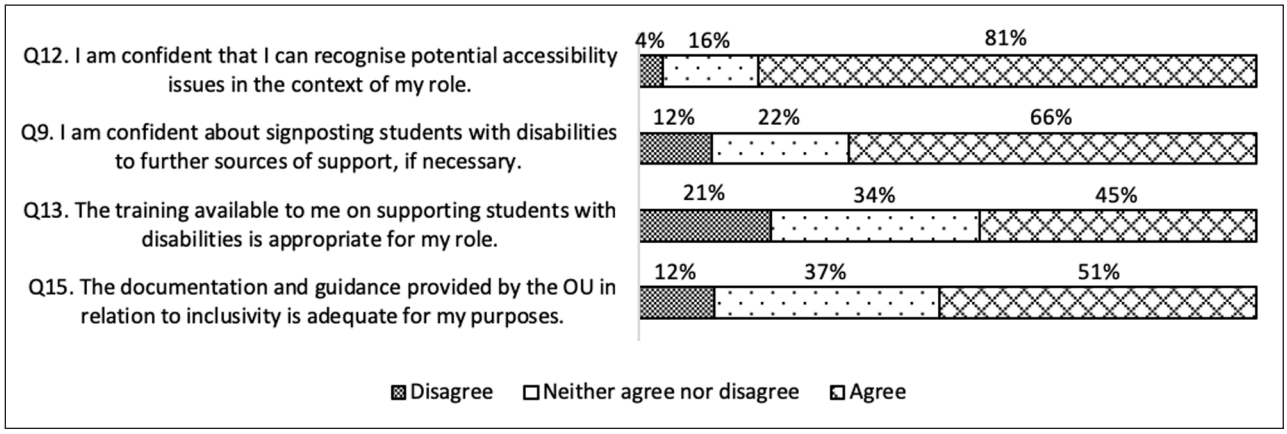

Figure 3: Survey responses regarding ability to recognise potential accessibility issues and confidence in signposting students to support.

barriers that students face when studying or in the world of work (44%, n = 115) (**Figure 4**).

When looking at individual STEM staff groups, some additional findings emerge. Within the academic and curriculum management group, most staff agreed (62%, n = 33) that they design teaching and learning resources to be accessible and inclusive. Additionally, most agreed (63%, n = 33) that they design their assessment tasks so that all students engage with them, regardless of disability (**Figure 5**).

The majority of Associate Lecturers (86%, n = 48) were confident that their tutorial learning objectives could be met by all students, regardless of disability (**Figure 6**). Also, most felt confident interacting (80%, n = 44), teaching (80%, n = 45) and leading face-to-face sessions (85%, n = 45) with disabled students (**Figure 6**). This result is unsurprising, since Associate Lecturers have the most direct contact with students.

These survey results identify a clear need to raise awareness among staff of the internal and external support

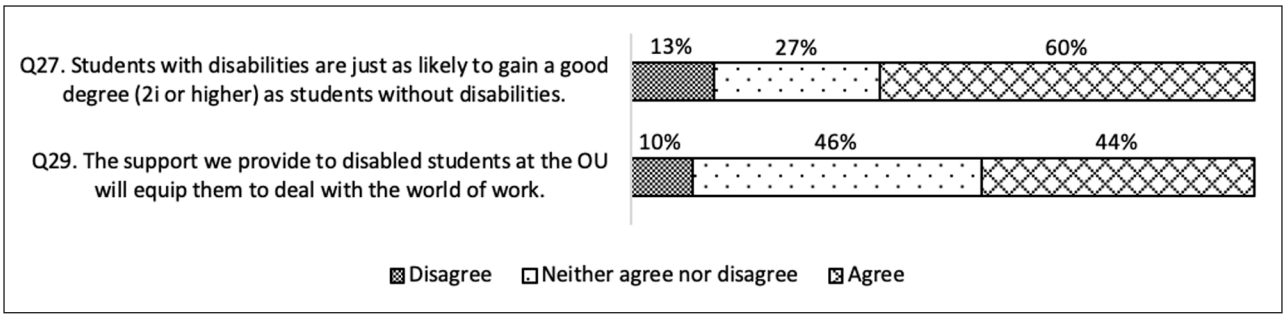

Figure 4: Survey responses regarding confidence in supporting disabled students and awareness of attainment gaps.

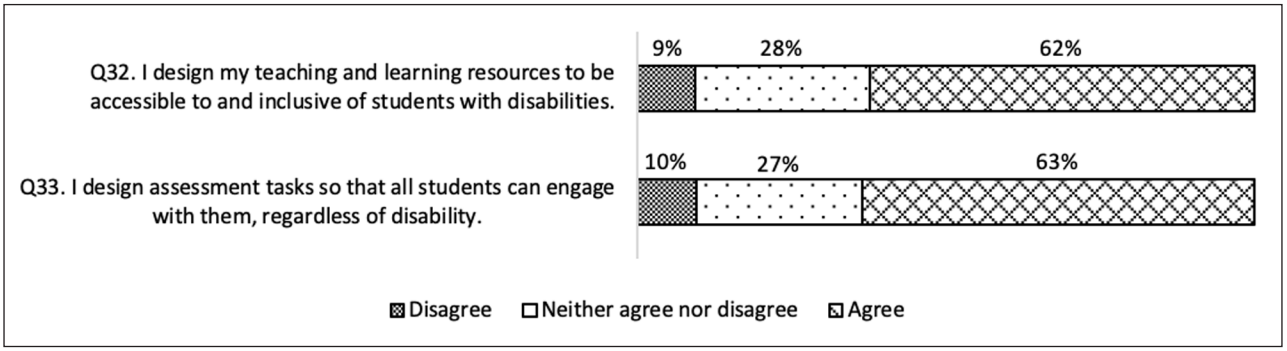

Figure 5: Survey responses regarding perceived accessibility of teaching and learning.

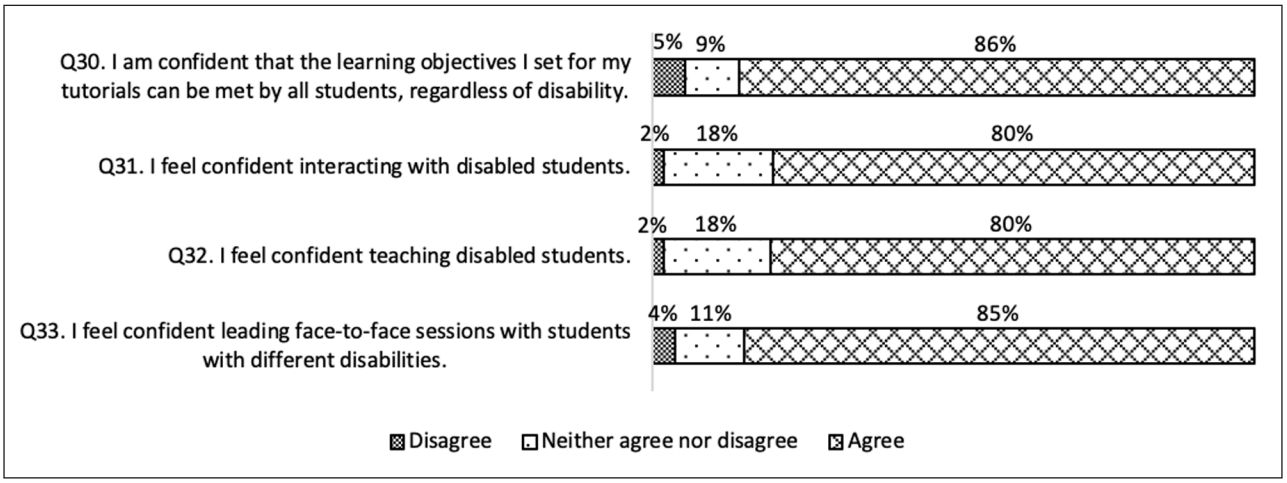

Figure 6: Survey responses demonstrating the confidence levels of Associate Lecturers.

services and challenges faced by disabled students; given the positive attitude towards accessibility, it is hoped that such training would be welcome. Further, staff need support in addressing the needs of students with mental health issues and autism spectrum conditions; it may be pertinent to review the training and development of academic and curriculum management staff in the context of that provided to Associate Lecturers, who overall felt more confident meeting disabled students' needs.

4. Inclusive language work package

This work package focuses on one aspect of student support: communication with students. This builds on work from the ASSIST project that looked at the language that students prefer to use to discuss their disability and study needs, and methods by which staff can be encouraged to adopt student-driven language. By adopting such approaches, students may feel more comfortable declaring disabilities and discussing their study preferences, ensuring they get the support they need to help them succeed.

ASSIST identified gaps between the language students use to describe their own disabilities and the language often used in university communications. The language was categorised into three models: a 'deficit' or 'medical' model, focusing on the disability itself and the issues it causes; a 'support' model focusing on 'barriers and obstacles to study' and the institution supporting the student; and an 'empowerment' model, focusing on student 'needs', autonomy and 'independence', with the institution enabling and empowering the student. However, ASSIST revealed that no single language model was consistently preferred, i.e. students' preferences regarding language and terminology were highly dependent on the

context of the communication and its intended message. For example, there was a clear preference for a 'medical' language model to be used for a disability disclosure question. This suggests that a one-size-fits-all approach is not appropriate to choosing language used to communicate with students.

ASSIST also revealed that students had strong preferences around the language used to identify people as disabled, and that the term 'disabled student' (the term most commonly used in UK HE) was the least popular; 'student with a disability' (also commonly used in UK HE) was the second least popular, although preferences did vary according to participant demographics. Students considered terms such as 'additional study needs', 'your circumstances' or 'conditions that affect your study' more appropriate, but dependent on the communication context. This finding presents a striking contrast to the official position of our own and other UK HE institutions, and provides strong evidence for the value of a participatory approach to understanding the preferences of students towards the language used about them.

In the Inclusive Language work package, the aim was to disseminate this message in a way that would enable greater understanding of students' language preferences. To do this, the team created guidance for students, student-facing staff and researchers, and policy makers that would enable and empower them to adopt more participatory and inclusive approaches to using language. A similar approach was taken to create the guidance, co-writing it with stakeholders and consulting widely on drafts, both within the institution and the sector. This approach aimed to ensure that the guidance was relevant and meaningful to the stakeholder groups.

4.1. Guidance developed

Evidence from ASSIST and elsewhere indicates that students, whatever their circumstance, are often unsure of how to engage with disability terminology (e.g., Evans, 2014; Fuller et al., 2004; Rose, 2006). In many cases, students were unsure whether they were 'disabled enough' to seek support, or they felt that their study needs were 'not a disability'. Furthermore, younger students who were used to the term SEN (Special Educational Needs) used in UK schools reported that the transition 'from SEN to disabled' was difficult for them to make. Some students do not consider themselves 'disabled' and so do not read the information provided by the university for 'disabled students'. Therefore, the work package team created guidance for students on commonly used terms that they might not know how to engage with (such as 'disabled students allowance' and 'reasonable adjustments'), what these terms mean for them practically, and how they can engage with them. It also included guidance on choosing and advocating for their preferred language, with the intention that, although students may be required to engage with particular phrases, for example in official paperwork, they should feel empowered to ask staff members to use their preferred phraseology.

ASSIST found that many student-facing staff, including academics, Associate Lecturers, student support staff and others, are unsure of what terminology to use when discussing disability. Previous studies have also identified disparities between language used by disability communities and practitioners who engage with these communities (e.g., Kenny et al., 2016; Rosenblum and Erin, 1998). Our institution provides basic guidance on acceptable vocabulary, but with a top down 'say this, not that' approach that does not deal with the nuance and range of student preferences. Therefore, the project team created guidance on 'speaking to students about disability and study needs', covering the importance of language, how to listen and mirror students' language, general demographic preferences (for situations when staff are initiating contact) and encouragement to ask students about their language preferences and record these for future conversations.

The findings of ASSIST are highly contextualised, and therefore a strong recommendation from the project was that other institutions replicate the study in order to investigate their own contexts. The guidance for researchers and policy-makers produced in the Inclusive Language work package provides a five-step guide for 'Improving your communication by engaging people with disabilities in the language used by your organisation'.

4.2. Next steps

ASSIST and the IncSTEM inclusive language work package lay the foundation for greater understanding and awareness between staff and students, for more effective disclosure of study needs and disabilities, and for a more equitable study experience for students in HE. The guidance is currently being disseminated through formal channels, and a project will begin in 2019 to cascade it through a network of champions within stakeholder groups, using the AIM change management methodology (IMA, 2018). A plan for evaluation of the guidance and its impact is being developed.

5. Curriculum Specification

The Curriculum Specification work package critically reviews how inclusivity considerations become embedded into the specification, design and creation of new teaching and learning. By embedding inclusivity at an early stage and designing the learning content to be accessible and inclusive, learners with different needs can participate to the best of their ability.

Neglecting inclusivity has been found to result in increased numbers of requests for reasonable adjustments, consideration of special circumstances, complaints and lower attainment levels for disabled students (among other groups). Although frameworks and guidance are available to support inclusive practices (e.g., Kingston University, n.d), the work package team explored the hypothesis that the process of utilising a framework, guidance or template to facilitate embedding inclusivity presented its own challenges to staff that could impact on student success. The work package aimed to identify where improvements could be made to the specification process to mitigate the challenges identified.

5.1. Approach

The specification process was mapped from the perspectives of those who complete, review and approve the documentation in which inclusive approaches should be outlined. At

our institution, this is part of a wider specification that also defines content, tuition and delivery modes, with the inclusivity aspects supported by a framework and guidance. The process of creating the specification documentation requires academics and curriculum designers to identify challenges for certain groups of students, and, as a by-product, creates text for describing the curriculum in promotional material, supports allocation of budget and provides a record of decisions to which module teams can be held accountable.

The process mapping identified a number of stakeholders with varying responsibilities and opportunity for input, and individuals who had recently engaged with the specification process were invited to respond to an email questionnaire or one-to-one interview. This included academics and curriculum managers (who define and oversee curriculum creation and delivery), inclusivity specialists (who may review the specifications before they are submitted for approval) and senior management (e.g., directors of teaching and Associate Deans who approve the specifications). The intention was to elicit the collective understanding of the process, identify barriers and enablers to using any framework or guidance, and uncover any perceived limitations of the specification process itself.

5.2. Findings

Initial results from academic and curriculum management staff indicate that the process of specifying inclusive approaches is too complex, administratively cumbersome and time-consuming. Indeed, the use of a number of different frameworks and guidance has been identified, the navigation of which adds to the complexity and time commitment required from staff. Furthermore, the framework and guidance were open to interpretation, and staff were unclear of what was required practically.

Further, the process of approving (and therefore validating) the specification documentation was opaque; academic and curriculum management staff were unaware of whether approvers were trained in inclusivity and therefore able to competently review the specification. They were also unaware of how (and whether) the specification was used, once approved and so it was seen as a procedural exercise rather than a pedagogical one; this was supported by the observation that direct contribution from academics to the specification was highly variable and could be minimal.

5.3. Next steps

To date, the work package has focused on those responsible for completing the curriculum specification. The next steps involve evaluating the knowledge, skills and input of those who review and approve it. Recommendations around improvements to the process and a single framework and guidance are expected. Improved awareness raising of the importance of the curriculum specification is also expected, emphasising practical ways in which the final specification can be used beyond the approval process to set student expectations and drive inclusive curriculum creation.

6. Online labs: OpenSTEM Labs

The OpenSTEM Labs provide students with access to laboratory work 24/7, using a sophisticated range of interfaces to archives of real data and to remote-controlled (robotic) apparatus (Drysdale and Braithwaite, 2017; Kolb et al., 2018). Access to real instruments allows students to plan experiments, make mistakes and try again, and collect real data, providing a more authentic experience (Brodeur et al., 2015) and an alternative for those unable to access traditional laboratories (Colwell et al., 2003). However, making cutting-edge laboratory equipment available and accessible online is a challenge that requires careful consideration of interface design, and robust coding to link the user to the equipment for control and data retrieval. High-speed synchronous control and monitoring over the internet is significantly more challenging than simply adding a webcam and a digital control panel to existing equipment. In addition, remote apparatus needs to be accessed via a booking system to ensure equitable access.

6.1. Approach

This work package investigates the inclusivity of a number of digital tools available within the OpenSTEM Labs in terms of their technical accessibility and the ways in which they are used in the curriculum (The Open University, 2013). Several of these tools were identified by heads of schools and directors of teaching during the consultation phase at the beginning of the IncSTEM project as being paramount to the success of students on their qualifications (e.g., digital microscopy tools), resulting in these being prioritised.

6.2. Example: The Practical Preview pilot

The OpenSTEM Labs consist of a suite of tools that are used extensively across the STEM curriculum at The OU. Although consideration of technological accessibility is made during their development, individual students' needs, often identified at the time of first use, can result in requests for alternatives or adjustments that can take time to put in place. This risks some students being disadvantaged, leading to a poor experience of online practical work. Hence, as part of this work package, a 'Practical Preview' was devised to offer students an opportunity to engage with the digital tools and associated activities (equivalent to those they might encounter in their studies) outside the structure of their degree programme. The 'Practical Preview' is an online workshop in which disabled students are introduced to the range of microscopy tools that they might encounter during their STEM qualification.

The development of the workshop has been twofold, addressing both technological and pedagogical inclusion. Firstly, existing tools were tested by an expert within the institution to identify potential accessibility issues that disabled students might encounter. Any issues identified were taken to the OpenSTEM Labs developers to seek a resolution, and practical work-arounds were identified that students might adopt for any issues that could not be resolved. The intention is to incorporate these work-arounds into guidance documents for students to use as study companions. Secondly, the workshop content was designed to include teaching about the microscopy techniques, demonstrations of the associated digital tools, and a facilitated discussion about the tools' accessibility.

The evaluation of this pilot will determine whether the Practical Preview approach can be rolled out more widely,

using other examples of STEM digital tools. The anticipated benefit is to enable students to try the apparatus outside their formal study programmes and to identify accessibility issues and take steps to address them in good time, prior to those students needing to use them in a future module.

7. Inclusive groupwork activities

Investigating an example of pedagogical activities, this work package explores the challenges faced by disabled students when participating in online or face-to-face groupwork, and investigates approaches that can help to mitigate these. Such tasks can include collaborative practical activities, shared presentations, data collection activities or debates. There are a range of challenges being considered, including those faced by students with some social anxiety disorders for whom groupwork can exacerbate pre-existing anxieties or even prevent them taking part. Current alternatives for these students include working one-to-one with a tutor or support person, accessing example data or using versions of outputs from previous collaborative tasks, none of which replicate an authentic groupwork experience. The aim of the work package is to create tools and guidance to enable academics to create and lead inclusive groupwork activities, and to consider what types of reasonable adjustments may be appropriate. Furthermore, it aims to develop a guide for all students to help them think about what it means to work effectively in a diverse group.

In the first instance, a focus group was held to understand disabled students' experiences of groupwork. This explored their perspective on what those who deliver groupwork can do to improve the experiences of disabled students. The team also interviewed a range of staff (those delivering groupwork, and those supporting disabled students), to explore perceived barriers to inclusion, identify good practice and investigate successful (and unsuccessful) reasonable adjustments.

7.1. Emerging themes

Discussions with students raised the importance of how groupwork is initiated (i.e. how the tone is set by the facilitator and the chosen icebreaker activity). They also emphasised the importance of providing detailed information about group activites in advance of the course start date, including information about dates and duration, so that students can plan ahead, for example, to put into place arrangements for non-medical helpers. In contrast, staff raised issues around design, timings, the role of group members and the importance of making groupwork activities 'authentic'.

It is clear that, while conducting groupwork online is beneficial to some students, it can present additional challenges for others. For example, audio conferencing may present significant difficulties for students with hearing impairments but can provide an accessible solution for those unable to attend face-to-face events. The team are in the process of creating staff development materials (e.g. a pack of information and guidance, videos of personal stories, discussion pieces and prompts for preparation and reflection) and student-facing materials (i.e. guidance around inclusivity when working in groups and videos such as personal stories).

8. Conclusion

HE institutions are increasingly adopting inclusive approaches to education, yet attainment gaps still exist between students who declare a disability and those who do not. The IncSTEM project was designed to identify inclusive practices in STEM teaching and learning that could be scaled up and applied across disciplines and institutions to empower educators and teams who support disabled students. This paper presents a selection of work packages within the project that address inclusion through: staff perceptions and skills, communication with students, curriculum design, online practical work and groupwork.

Some important themes have emerged from this early work. Firstly, developing and embedding inclusive approaches to teaching and learning go beyond how to design and deliver the curriculum; staff must consider the processes, services and support structures that directly and indirectly impact on students, to ensure that the students study in an environment which is comfortable, flexible and empowers them to learn. Secondly, staff often have the commitment but not necessarily the skills or confidence to develop and deliver inclusive approaches; a key facet of many of the work packages is that training needs have been identified. Therefore, the project is working with colleagues across the university to develop and embed ongoing professional development and training support for staff and students, building on existing good practice and informed by the work undertaken in this project.

The themes emerging from the work packages are significant because they are unlikely to be unique to The OU, or even to STEM disciplines; some could be applied to higher education more broadly or within other public or private sector organisations. It is intended that these outputs, once user tested within our institution, will then be disseminated via HE networks, professional associations and other routes in order to have wider impact. The IncSTEM project is ongoing, and as such it is too early to evaluate its overall impact. However, the project has had several early successes, and at this stage it is appropriate to publicise the achievements to date. To this end, the authors welcome input from those also interested in inclusive practices that can positively affect the lives and experiences of disabled people.

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Competing Interests

The authors have no competing interests to declare.

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