CHAPTER 4

Accessible Inclusive Learning: Foundations

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As a foundation to understanding how to be accessible and inclusive in TEL research, this chapter explores different conceptualisations of 'openness' and 'accessibility'. Using a range of examples, we then highlight how research projects take a particular orientation towards inclusiveness through their goals, methods and platforms. Technical accessibility, and opening up the potential to access education, are essential to an inclusive approach, but alone they rarely provide the basis for equitable learning. The examples therefore provide particular insights into how technological innovations need to be considered in concert with pedagogy. We then explore how our research has identified gaps and factors in digital inclusion for particular groups, and has been orientated towards designing for diverse audiences in response. An emphasis on processes and practices has emerged in both the accessibility and open education spaces, and we describe a practical example in which the OU has successfully embedded research-informed institutional practice through the Securing Greater Accessibility (SeGA) initiative.

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The vision: Learning is accessible for everyone

One of the most persistent themes in discussions around technology in education is the idea that technology can affect access to learning. This can be seen as positive or negative, and it is often more complex than it seems. If computers can convert the text in a web page into spoken word, or the spoken words on a video into captions, have we made the learning accessible to deaf or blind students? Most likely we have made an important step in the right direction, but this might be only one challenge in the wider pedagogy and student experience. If MOOCs can teach thousands for free without any cost or entry requirements, does that mean they are increasing access? Perhaps, but are they also creating barriers for some through the pedagogical and technical design? In this chapter we will unpack how these issues have been tackled through research.

What do we mean by accessibility and openness?

'Accessible' can mean different things to different people in different contexts. Similarly, when we say that something is 'open', we have a broad sense of what this entails, but open to whom, when, and how? While it can be unhelpful to get bogged down in definitions, we should consider what these terms can mean. Hopefully this avoids some confusion that might otherwise arise, but it also gives us a starting point to think about what we are trying to achieve.

Let's begin with the model of open access education provided by The Open University (OU). This was developed to tackle the issue of supporting people to enter higher education who are traditionally excluded from it. What makes it 'open access' is the removal of entry requirements and the flexibility provided by support for study at variable levels of intensity, part time, and at a distance. It has been remarkably successful, with the OU's approach adapted in many institutions in countries around the globe. The model was enabled by technology and services from the very beginning. Radio, television, the postal service, printed materials, videos, DVDs, and the Internet have all been essential.

This model also presents an ongoing challenge. As the aim is to be 'open to all', and to provide opportunities for those otherwise excluded from education, the open access model had to include a focus on making learning accessible for people with disabilities, with the recognition that traditional higher education included barriers that might prevent them from studying. Being open to all created requirements for being accessible to an extent and scale that might not otherwise have been considered necessary, particularly in the past, when inclusion was not a major concern for most educational institutions.

How does this compare to a different model of openness? Let's consider Open Educational Resources (OER), including offshoots of this such as Open Textbooks. Here, openness is not just about access, but about the freedom for educators and for students to share and reuse or adapt resources to their needs,

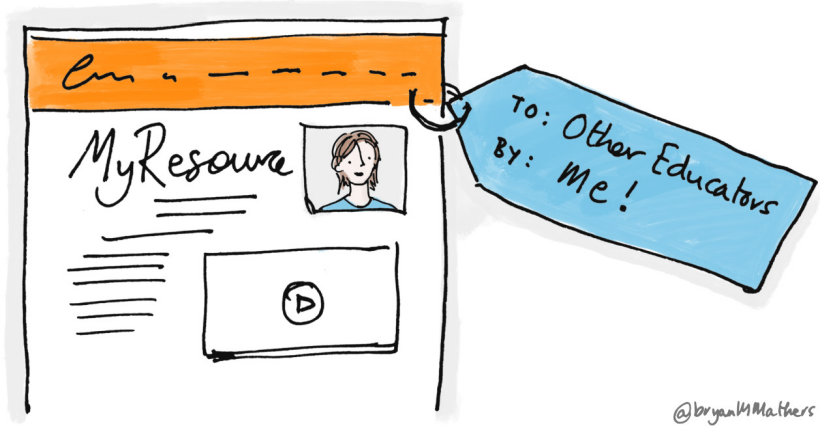

Figure 4.1: Sharing your materials is an important part of OER – Image by Bryan Mathers reprinted under creative commons license.

free of charge. OER are free to use as long as the licence conditions are not breached. This provides a legal definition of openness, not just an educational or social one. It is also notable that the use of OER are intended to open up opportunities for educators as much as it is intended directly for students, since the benefits may be harnessed by educators and then benefit both their practice and their students' learning.

A different, less-defined model of openness is found in MOOCs and similar forms of online open learning at scale. These tend to be free or have lower costs involved than other forms of post-secondary education, and like the OU, they avoid entry requirements. But unlike OER, there are often limitations on the rights of learners and educators to make use of the materials. Anyone can create and share OER, but MOOC platforms may not be open in the sense that they will only publish certain courses or work with particular institutions. They may argue that being closed in this way supports quality control, but this approach could also be seen as exclusive rather than inclusive.

The focus of the MOOC agenda has been on producing platforms and content that can be accessed at large scale with low barriers. However, the need to keep costs low often means limited support for learners is available. In the OU, and in most traditional educational institutions, there are teachers and student-facing support staff to guide students and to adapt the learning to their needs. These forms of individual support do not generally exist within the MOOC approach.

Another less well defined (but often discussed) use of 'open' is that of Open Educational Practices. In this case, the individual or institution aim to reduce any boundaries surrounding them. Rather than teaching solely their own students within a VLE, an open practitioner could potentially teach through conversing and sharing their work on a multitude of platforms, and by working

with others from around the globe. Open practices involve an open attitude towards mixing the role of institutions, resources, and platforms.

Like openness, the term 'accessible' is used in several different ways. In this chapter we mainly focus on accessibility in relation to disablement. This provides a specific focus to which persistent intent can be applied to make a difference to learners. However, the notion of whether something is 'accessible' can be used to focus attention for other populations too. For example, whether the language used in a course is accessible to particular audiences, or is too complex such that it might make the learning inaccessible to them (Rets et al., 2019; Coughlan & Goff, 2019).

As with 'open', there are technological and legal influences working alongside ideology and theory. Most technical consideration of online accessibility centres on whether resources and platforms meet specific criteria laid out by the widely-used Web Content Accessibility Guidelines (WCAG). But accessibility research also explores how a particular technology or service can be designed to enable or exclude particular users. Accessibility and assistive technology research has tended to emerge from the computing disciplines and technology companies.

An alternative perspective to this can be primarily pedagogical, asking whether specific learning activities or outcomes are taught in ways that exclude particular individuals. A focus on the aims for learning experiences and outcomes can then support exploration of how to achieve these outcomes in an accessible way.

We can also take a broader perspective to ask what barriers are experienced when a person tries to access education, and who may be missing out. Research through this approach can be driven by reports or observations from learner perspectives, or by data that highlights the relative gaps in engagement or attainment with education by particular groups.

Finally, we can conceive of accessibility as a quality achieved by the ways in which organisations, as combinations of people, systems, and processes, work together. This perspective recognises the holistic nature of support for accessible learning that cannot be reduced to a single technology or job role.

In the rest of this chapter we will explore how examples of these conceptions, or combinations of them, has driven research and produced greater understanding of what it means to make learning accessible to all.

How can we make learning experiences available to all?

In taking a pedagogical perspective on accessibility, we noted above that particular types of learning activities create specific barriers. In this section we describe how a persistent intent on enabling access to STEM laboratory and field work has driven research over many years. In this, researchers have looked to harness the cutting edge technologies of the day and envision how these can become embedded in mainstream teaching and learning.

It has been argued that science, technology, engineering, and maths (STEM) subjects raise some very particular and stubborn challenges for access in the areas of practical work, such as laboratory and field activities (IOP 2017). The impact of inaccessible field or lab activities can also be exacerbated as many STEM qualifications are accredited by professional bodies, and these bodies often list practical work as a requirement for accreditation. However, the challenges have attracted sustained attention and persistent intent to widen opportunities (Pearson et al., 2019a).

Traditionally, laboratory work requires students to be present in a lab to manipulate apparatus. The requirements to be in a particular location and to perform particular physical activities with apparatus can present accessibility challenges. In response, remote laboratories aim to provide manipulation or control of real apparatus through interfaces at a distance. Such approaches can expand access to important science learning experiences for students with disabilities, and for all students studying at a distance from laboratory facilities.

The Practical Experimentation by Accessing Remote Laboratories (PEARL) project explored ways in which computers could be used to give high quality learning experiences in science and engineering education by bringing the teaching laboratory to the students, giving flexibility in terms of time and location. The tools and activities created in the project were also designed to be accessible to disabled students using assistive technology, such as screen readers.

A model of collaborative working underpinned the learning activities, with students working with peers and receiving comments from tutors. The complex system which was developed provided a structure which combined tools for collaboration with technology to control the equipment, network server and interface technologies, and streaming media, video cameras, and microphones to provide the means of observation and communication.

As one of a number of explorations in different institutions, the project involved a re-versioning of an introductory Open University science experiment usually performed by students co-located at a residential school, to allow remote operation of a spectrometer to measure wavelengths. Scanlon et al., (2004) describe the interface through which students working at a distance could take part in this experiment. Evaluations with disabled students confirmed that they could use the interface effectively. While the remote approach was found to be a different experience, sufficient equivalence with the original laboratory experiment could be achieved.

Students and academics were supportive of the PEARL approach, which has continued to develop. Cooper and Ferriera (2009) summarized the lessons learned about the design and implementation of remote laboratories based on these experiences, stressing the importance of having a well-defined pedagogic strategy, of removing accessibility barriers, and the need for ease of automation and remote control.

Deployment of these ideas at scale then became the focus. In 2013 the OU, with support from the Wolfson Foundation, launched the OpenScience

Laboratory. This virtual lab allows students to carry out experiments online, bringing interactive practical science to students anywhere and anytime they have Internet access. As with PEARL, the aim is to provide access to real physical instruments and equipment through robotically controlled experiments, but the laboratory platform also provides a basis for interactive screen experiments; virtual instruments and labs; immersive 3D experiments; virtual field trips; and mass participation 'citizen science' networks (Garrow et al., 2013; Villasclaras- Fernandez et al., 2013).

This initiative led to the development of the OpenSTEM laboratories, a suite of distinct labs incorporating the OpenScience Lab, the OpenScience Observatories and the OpenEngineering Lab. The OpenScience Observatories provide access to two remotely operated optical telescopes based in Tenerife, and a radio telescope based at the OU campus in Milton Keynes. The OpenEngineering Lab allows practical lab-based teaching at a distance covering engineering, electronics, control, materials and robotics. Together these connect students to instrumentation, data and equipment for practical enquiries over the Internet, where time and distance is no longer a barrier.

In these developments it is important to maintain consideration of the physical and social aspects of the laboratory activities. Experiences that connect students to the on-campus labs allow students to acquire and practise lab-based skills. Lab casts provide an interactive experience by connecting students and lecturers via web streaming in a way that provides a live social experience at a distance.

Another activity that can often be inaccessible to learners, but is a recognised component of science and many other subjects is fieldwork. In subjects such as geology or biosciences, study in the field is seen as essential and is known to support conceptual and practical understanding (Elkins & Elkins, 2007; Scott et al., 2012). The terrain and location of many field sites of interest present barriers to those with mobility challenges. A persistent intent through research spanning more than a decade has led to greater understanding of how remote access to field work can be achieved.

The Enabling Remote Activity (ERA) approach was first prompted as a response to an enquiry from staff and a student who was using a wheelchair and studying earth sciences. They highlighted the possibility of using audio and video to communicate with students unable to reach a particular field site. From this, the wider issue of remote access to fieldwork was tackled through the development of a flexible toolkit (Collins et al. 2016).

The right field site may be expensive and time consuming to reach, so issues of access arise not only for students with mobility challenges. Cost and availability are often prohibitive factors that exclude students from access to field experiences.

As with remote laboratories, technologies including networks, sensors and cameras offer the potential to create remote presence and interaction with a field site. However in fieldwork, variability in locations and the need for mobility in order to explore the field site create further challenges. Technical solutions to these have pushed at the boundaries of what can be achieved with

Figure 4.2: Enabling Remote Activity (ERA) field trials. Copyright Mark Gaved, The Open University.

mobile networking and portable technologies. Meanwhile, the practical and pedagogical approaches employed in remote fieldwork have been a particularly interesting focus for research.

Findings from ERA include the value of multiple communications channels, with voice providing an important direct link between individuals, video providing a sense of presence and live interaction, and photographs important for details. A combination of these are used according to the learning activity. Rapid deployment of equipment was also key in order to fit in with field trip schedules and avoid students being left behind. The ERA approach has focused on getting people as close to the field site as possible, such that they can gain from as much of the field experience as possible and only use technology to overcome the parts that are inaccessible. This attends to the argument that social and experiential aspects of fieldwork are important and could be lost, resulting in a further form of inequity (Collins et al., 2016). Further development of the ERA approach has led to the development of an accessible field trip in Connemara (part of the National Science Foundation funded Geopath Extra project, 2017) and an inclusive field course in Anglesey (part of the Office for Students funded IncSTEM project).

The value of a persistent intent in this area has been that we have developed and tested multiple designs for technology-enhanced learning activities. So where the value of having learners in close proximity to the field site was recognised in ERA, this could itself become a barriers as it might not always be possible to have the learners close by. As such, alternative designs for social and collaborative field activities were also explored. The 'Out There and In Here' (OTIH) project took the ERA findings in a different direction. It explored how to set up a 'command centre' in a classroom setting, where a group of remote students could learn through dialogue and collaboration with their field-based peers. Trials and evaluations looked to find ways to design for balance, such that all students involved could have an equitable and valuable learning

Figure 4.3: Classroom (top) and field-based students in an 'Out There and In Here' remote fieldwork trial. Copyright The Open University.

experience (Coughlan et al., 2010). The outcomes showed that there are different strengths to each situation – a field-based student can capture data, but a classroom setting may be better suited to analysing or identifying it. There are also different challenges to each experience – the field-based student or teacher can feel pressured to provide material to their remote peers, who require this for the experience to be effective (Coughlan et al., 2011).

These examples of designing and evaluating remote laboratory and remote fieldwork experiences show how research can utilise technology to enable access to specific activities that are commonly inaccessible. While these experiences are not an exact replication, they can be designed to offer learning outcomes that would otherwise be lost. They can also prompt thinking about

new pedagogical approaches and help to unpick what the aimed-for learning is, which may be otherwise implicit or taken for granted. Research in this area used cutting edge technologies and overcame a lack of suitable technologies to explore potential solutions in advance of these approaches reaching mainstream use. At the same time, it requires an awareness of the social and experiential aspects of learning to really evaluate how equitable, accessible learning can be achieved.

Broadening our understanding of accessibility from availability to equity

The multiple conceptions of openness and accessibility, and the examples of research that aims to make field and lab work accessible, both show that making learning accessible is not a simple endeavour. For example, the PEARL evaluation raises the notion of whether an accessible remote experience is similar or equivalent to that in the lab, and the ERA and OTIH projects highlight the importance of less formal aspects, such as the shared social experience of being on a field trip, in a particular place and in the company of fellow students.

These issues can impact on the learner but would not be captured by a narrow definition of accessibility. In this section we delve further into this sense that making learning available is not sufficient. The Beyond Prototypes framework highlights the importance of evaluation and evidence to drive TEL innovation. In this area, there is a wealth of evidence of persistent gaps in access, attainment, and experience of learning at scale. A review of this suggests that a simple notion of educational access (i.e. that a person was technically able to join a course of study) results in significantly different outcomes for learners with different characteristics. We then consider how it is possible to respond by understanding the needs of particular groups, in order to facilitate their equitable access to education.

Analysing data on registration, completion, and attainment in post-secondary study, the picture that emerges challenges simplistic visions of making learning accessible or open to all. Richardson has conducted a number of analyses in this area looking at specific groups such as categories of disability or ethnicity. The findings with regards to disabilities show a complex picture, including that students with declared autistic spectrum disorders studying at The Open University were just as likely to complete, pass, and obtain good grades in their modules as students without any declared disabilities (Richardson, 2017), and that students who are deaf or hard of hearing were more likely to complete their modules than their non-disabled peers (Richardson, 2015a). While students with dyslexia or other specific learning difficulties were just as likely to complete their module as students without declared disabilities, they were less likely to pass or to obtain good grades (Richardson, 2015b). In contrast, students with declared mental health difficulties, or with visual impairments, were less likely

to complete their modules, and less likely to pass them (Richardson, 2015c; Richardson, 2015d).

Richardson's work highlights that considering all people with declared disabilities together as a meaningful group is problematic, since it hides differences that become visible when we look at particular sub-groups of 'disabled students'. The types of barriers to equitable learning faced by students with dyslexia, and the technologies and support actions that would enable equitable learning for them, are not the same as those faced by a person with mental health difficulties. At the same time, these analyses also highlight the importance of accounting for intersectionality, where multiple characteristics of a person may impact on the accessibility of learning. Richardson finds substantial proportions of students declare multiple disabilities, and that these groups tend to be less likely to succeed. Focusing on disability in isolation could be problematic, since other factors such as prior educational qualifications and ethnicity can also be shown to correlate with student success.

With regards to ethnicity, persistent and ubiquitous gaps in attainment for ethnic minority students have been identified in UK higher education when compared to white students. A particularly interesting finding from the perspective of making learning accessible is that these gaps are only partly explained by entry qualifications. One analysis extrapolates that around half of the attainment gap in higher education can be explained by poor attainment in earlier stages of education, but that the other half cannot be explained by this measure of academic ability. This may be occurring due to unknown factors within the higher educational experience, which could include discrimination or more subtle processes through which these students are not supported to perform (Richardson, 2015e). We do not fully understand where and why these gaps occur, but this work suggests that a simple notion of accessibility in education – that a person can manage to register, engage, and complete a course – does not necessarily lead to equitable educational outcomes. We need to consider the experience as a whole and identify elements of teaching that a person might find inaccessible or which might lead to inequality that impacts on outcomes.

Richardson's findings draw on data about students taking part in formal open access education at The Open University. But what about OER and MOOCs? Arguments have been made that these approaches could lead to greater inclusion in higher education by lowering barriers of cost and flexibility (Lane, 2008). However, as Farrow et al. (2015) report, non-formal users of OER are likely to already hold a degree, or to be currently studying on a formal higher education course. This is not to say that OER are not supporting some widening of access, but it suggests that they may be primarily useful to those who are already benefiting from formal study. MOOC platforms have been found to have substantial failings with regards to accessibility for disabled learners, and those involved in the production and presentation of MOOCs are still developing strategies to provide disabled learners with a good study experience (Iniesto et al., 2016). OER are often derived from existing formal course materials and

so can replicate some of the barriers for non-traditional audiences that exist in these, while removing the active support and encouragement of learners that would perhaps support them to succeed in a formal educational setting (Lane, 2008; Coughlan & Goff, 2019).

Richardson (2015e) notes that we can struggle to identify the causes of inequity for particular groups, even where we can see the results in quantitative analyses. A range of studies have provided richer insights into ways in which educational provision can be problematic for particular groups, or can be designed with recognition of these problems. Having established these issues, how can we move from a notion of accessible or open as equating to 'available', to something more equitable? What might we need to understand in order to design to close these gaps? The next section addresses these issues.

Responding to the diversity of contexts and individuals

We have already introduced some examples where new uses of technology create a basis for educational opportunities and increased access. In this section we will focus further on ways of designing for audiences and contexts.

An important point to start with is that while the focus of our attention is often rightly on pedagogy, there may be practical and social issues that impede access to education and which need to be understood and adapted to any specific context. For example, working to design educational technology solutions for the context of refugee camps, Alain et al. (2018) argue that issues such as prior and current disruption to formal education, language barriers, and the availability of teachers, need to be considered if technology-based interventions are to effectively engage children. Each refugee camp will have different social, physical, and technological resources and limitations that can be employed to create informal educational opportunities in these settings, and further distinct challenges are faced in situations where refugee children are to be integrated into local school systems. However there has been a tendency for initiatives around refugee education to design for scale in an homogeneous way, with a lack of awareness or potential to adapt to these contextual differences.

The move towards greater online and hybrid learning has enormous potential for making access to education easier for many populations. However, when this results in the removal of other means of study it can create new forms of exclusion. A prime example of this is in education for students in secure environments. A study of universities across four different countries highlighted that prisoners found it increasingly difficult to access distance education, with risk-averse correctional systems prohibiting or restricting access to the Internet and to computers (Farley et al., 2016). Solutions can be used that present an offline digital version of materials, or printed versions can be provided. However, it is important that these solutions are designed in such a way that they provide the intended learning experience and do not become an afterthought.

More subtle barriers to online learning are present for people who lack skills or confidence in ICT. Concepts related to digital inclusion or exclusion have been described and debated to highlight the increasing reliance on digital technologies across society and the impacts this can have. While it was appealing to think that younger generations of 'digital natives' had different expectations and skills with technology when compared to older 'digital immigrants', research by Jones and Shao (2011) refuted such a simple age-based dichotomy. They also found that many of the new technologies discussed in educational research, such as virtual reality, wikis, or blogs, were not ones that students made use of or expected to be used. At the same time, there were clear signs of the rising general use of social media, mobile technologies, and online multimedia. Where these become key to learning – perhaps as part of open educational practices – there are further possibilities to include or exclude.

It is therefore important to understand and critique the factors that mediate the relationships between digital technologies and learners. Seale (2014) argued that it is necessary to look beyond a simplistic notion of accessibility in order to understand the factors impacting on disabled students. If we focus only on whether technologies are available and if the person can access them, there is a risk that the complexity of the relationship that disabled students have with their technologies and their educational institutions will be ignored. We need to avoid a situation where we only consider the relationship between student and institution as one of receiver and provider of resources.

How then can we think more broadly about accessibility in terms of the relationships between students, resources, and educational institutions? Drawing on the ideas of digital inclusion researchers such as Eynon (2009) and van Dijk (2005) who talk about the resources that people need in order to be citizens of a digital society, Seale (2014) identified a range of factors that potentially mediate the relationship between students and their institutions:

> *Temporal Resources*: The time available to disabled students to invest in learning how to use new technologies. Time can be limited and insufficient due to the additional study burden that disabled students experience – particularly if their courses have not adopted an inclusive approach to teaching or made reasonable adjustments.
> *Mental Resources:* The knowledge, awareness and skills that disabled students possess that means they are confident and competent in using a wide range of technologies and have created a wide range of strategies for using their technologies to support their learning.
> *Social Resources:* The range of formal and informal support networks such as academic peers, tutors, friends and family that disabled students can draw on.
> *Cultural Resources:* A climate or environment where disabled students are perceived as legitimate technology users, where there is an

expectation that they (along with everyone else in the community) can and should be using technology.
Material Resources: Access to a range of generic and assistive technologies, some of which disabled students may personally own, some of which are provided by the institution.

In this case, the access to technology (material resources) is just one aspect of a broader view. Even in considering these material resources, we should note that only some of what a disabled student might use to learn is provided by the institution.

Building on this framework, Seale (2013) and Seale et al. (2015) apply a 'Digital Capital' framework to the understanding of the relationship between disabled students, their technologies and the institutions in which they study. Drawing on the ideas of earlier research (Bourdieu, 1997; Putnam, 2000, Selwyn, 2004) two key concepts were proposed: 'Digital Cultural Capital' and 'Digital Social Capital'.

The acquisition of digital cultural capital is exemplified by individuals investing time in improving their technology knowledge and competencies through informal or formal learning opportunities, as well as a socialization into technology use and 'techno-culture' through family, peers and media.

Digital social capital is developed through, for example, the networks of 'technological contacts' and support that people have, which can be face to face (e.g. family, friends, tutors) or remote (e.g. online help facilities).

Seale (2013) used this digital capital framework to analyse data collected from 30 disabled students regarding their experiences of using technology to support their learning. Results indicated that disabled students possessed a significant amount of digital cultural capital and a fair amount of digital social capital. Seale observed however that for some disabled students, this cultural and social digital capital did not appear strong enough. For example, some disabled students appeared to be affected by the extent to which using specialist technologies marked them out as different. Seale et al. (2015) also applied the digital capital framework to analyse the experiences of 175 students with declared disabilities regarding their use of technology to support their learning. Results suggested that while these students do have access to social and cultural resources; sometimes these resources are not appropriate or effective (e.g. school-based ICT qualifications) or disabled students are not drawing on all the possible resources available to them (e.g. non-institutional based support or support from disabled students). This means that disabled students can lack the 'right' kind of digital capital to enable them to succeed within higher education environments.

Using an analytical framework that goes beyond a simple conception of accessibility, this research suggests that higher education institutions may need to conceptualise and organise technology related support services for disabled students differently. There is a need to think beyond simplistic notions of access, availability and skills training.

To summarise, for learning to be accessible to all means more than for it to just be available, because inequitable situations arise through a lack of consideration of how contexts and individuals are related to the resources and support for learning. Analyses of student data can highlight inequalities of engagement or attainment, and qualitative studies offer understanding of the challenges faced in particular contexts. To build on this, we look in the next section at procedural and practice-based approaches to understanding and achieving accessible learning.

Consider process and practice, not just artefacts and outcomes

In research and scholarship around openness and accessibility, there has been a growing recognition of the need to consider process and practice, rather than only artefacts and outcomes. This makes sense to educational technology in particular for a variety of reasons. For example, if we think in terms of process and practice it is easier to explore how we could adapt technological artefacts to be better suited to particular contexts, and support individuals to be aware and able to use them. If we consider the experience of a student as a process that includes multiple events that could have short and long term impacts on their learning and attainment over time, we are better placed to identify why gaps in attainment might appear.

The importance of taking a process view of accessibility has emerged more recently with the suggestion that any artefact can only be considered accessible in relation to a particular person trying to use it; or as Cooper et al. (2012) put it: "The focus of WCAG (Web Content Accessibility Guidelines) is on the technical artefact – i.e. the "web page", not on users and user goals" (pg.1), yet "accessibility is a property of the relation between the user and the resource in the context of how that is mediated; not a property of the resource" (pg. 2). While WCAG is very important in defining characteristics of a resource that should support it to be accessible, it is not sufficient to ensure equitable experiences because it gives no sense of how it is used in practice by particular audiences and (for example) the mental, social, temporal and cultural resources that Seale (2013, 2015) explores in her analyses of disabled student experiences.

There is a related trend in open education research. Much effort has been focused on tasks such as defining what an open educational resource should be in terms of legal or technical infrastructure, and in devising implementations of this such as Open Textbooks. But until recently, it has been less common to conduct research to understand how people do, or could, engage in practices around using these resources (Weller et al., 2015).

In both cases, the original focus on artefacts could be attributed to a desire to build a broadly applicable basis for change at scale – the wide use of WCAG standards to evaluate web page accessibility, and of Creative Commons licences

for sharing of OER are clearly influential developments that have achieved widespread impact. But the move towards practice and process is prompted by the understanding raised in the previous section, that truly providing access means responding to individual contexts and needs that are subject to change over time.

A focus on practices in open education helps us to understand the benefits that stem from sharing resources under open licences, and the barriers that could prevent these from being realised. For example, when Pitt (2015) explored educator perceptions on the impact of introducing OpenStax College open textbooks, they found a range of responses. A key driver for openly-licensed texts was the need to serve students for whom the expense of proprietary textbooks was a barrier, and to save money for cash-strapped institutions. Cost savings were certainly a theme in responses, but when asked what the main impact of introducing the textbooks was on their teaching practice, the most common responses were that it had made teaching easier (29%), or had led to innovations in their teaching practice (25%). These educators reported that they could build on the text, adapt it to suit their classes and students, feel more able to combine it with other resources, and be creative in a way that a closed proprietary text would not support. One stated that with open licences that support adaptation of content "the book is my servant, I am not its servant" (pg. 148).

At the same time, reusing and adapting OER can be challenging. Educational resources are produced for a particular context and audience, and it can be problematic to reuse these with other audiences. Research in this area has analysed processes of reuse to highlight how participation in remixing can improve the relevance of resources to particular audiences, while maintaining the original objectives of the material. In the 'Bridge to Success' project, courses designed by The Open University as an introduction to study for those with limited prior educational experiences, were released as OER and remixed for use with US audiences of underserved learners. The collaborative approach engaged US-based authors in adapting the content to the needs of their own students. Changes were made at various levels including to find appropriate language, or to increase content in areas that were more important for the intended US pre-college audience, when compared to the original UK audience. These included, for example, fractions in mathematics. In addition, promotional activity to introduce the courses, and to work with educators to find ways in which it would be best integrated into their teaching, was essential to gaining uptake across a range of settings. Although intended to be useful to colleges, the resources were also used in unexpected contexts, such as charitable organisations who worked with underserved groups (Coughlan et al., 2013; Coughlan et al., 2019).

Given that open online courses are not necessarily reaching underserved audiences, related practices of targeted collaboration in the creation and use of OER have been applied in other projects. When creating courses with the intent of reaching a particular underserved audience, our research identified

ways in which collaboration with a 'Learner Representative Partner' could be beneficial. The research analysed the processes of creating a suite of six open online courses in collaboration with different organisations, and each aimed at encouraging engagement with higher education from an identified target audience, for example those working in healthcare assistant roles, or looking to start their own business (Coughlan & Goff, 2019). The partners informed the design of the courses, including the reuse of their own resources and media, and in deciding on appropriate language and content for the audience. The partners facilitated the courses to embody student-centred strategies, influenced the language used in the course materials, provided authentic case studies from people similar to the audience, and acted to highlight areas of 'decoupling' where academic practices did not fit with the desire to widen participation.

An interesting example of research that recognises the need to consider process, practice, and particularly people, is the EU4All (European Unified Approach for Assisted Life-long Learning) project, which took place between 2006 and 2011. The project involved 13 European partners and aimed to research and develop ways to make life-long learning at higher education level accessible to disabled people. This involved wide stakeholder engagement, individualised design approaches and extensive evaluation; it resulted in the creation of a model of 'professionalism in accessibility' (McAndrew et al., 2012) and a learner-centred framework for personalisation of content and service. Other, less tangible outputs from the project include key lessons learned about operationalising accessibility; it became clear in the EU4All project that accessibility cannot be achieved in an educational institution if it is viewed only as a technical consideration. Understanding user needs, experience and preferences is critical if accessibility is to be embedded. As accessibility frequently means different things to different stakeholders, human engagement through a multi-faceted, multi-stakeholder approach is an essential part of this process.

The EU4All project drew on work by Seale (2006) that explored adopting a holistic view of the stakeholders and activities involved in achieving accessible learning. Seale had investigated the perspectives of different stakeholders, including their issues and concerns, in an attempt to amplify these diverse voices and provide a cross-sectional view of accessibility. Drawing on personal experience, Seale stresses that for accessibility to be realised, a range of stakeholders need not only to be involved but to actively form strategic partnerships, and that this "cannot happen successfully unless each stakeholder understands the different perspectives of each of the other stakeholders" (2006, pg. 4). The EU4All researchers modelled their work on Seale's, ensuring all Seale's identified stakeholders had a voice in the EU4All project, as well as adding other stakeholder groups. The resulting 'model of professionalism in accessibility' placed strong emphasis on a 'holistic view of accessibility' with stakeholder engagement and human beings 'in the loop' (McAndrew et al, 2012).

These lessons became part of Open University practices through the development of the SeGA (Securing Greater Accessibility) initiative. In 2010 it was

becoming clear in The Open University that there was a disconnect between student support teams and academic staff, which was resulting in academics not being aware, when designing learning content, of feedback about what students were finding inaccessible. This frequently resulted in costly, retrofitted reasonable adjustments being made by student support units that could have been avoided through inclusive design. Pockets of good practice did exist, but responsibility for supporting disabled students was dispersed across a number of academic and non-academic units and information was difficult to find; the good practice that existed was not systematised and was 'decoupled' (Meyer and Rowan, 1977) from institutional strategy, policy and business as usual.

Acknowledging these issues, several stakeholders in different areas joined forces to lobby for a change; an initiative that would begin to address these issues and operationalise accessibility in a way that was systematic, consistent and sustainable. This would be a whole-institution and whole-product and service life-cycle approach, with stakeholders from both academic and support units. The SeGA initiative was launched with the objectives of:

- Clarification of responsibility and accountability for leading on and delivering accessibility.
- Improved access to the curriculum for disabled students.
- Improved understanding of staff roles and responsibilities regarding accessibility.
- Improved documentation of how the reasonable adjustments offered to students have been arrived at.
- Reduced overall cost for providing adjustments to disabled students.
- Improved organisational knowledge of enabling accessibility best practice.
- Improved visibility of the levels of accessibility afforded to students within courses and programmes.

(Cooper, 2014)

In its conception, SeGA drew heavily on Seale (2006) and the EU4All findings and resulting model of professionalism in accessibility (McAndrew et al, 2012). It also incorporated aspects of Communities of Practice theory (Lave and Wenger, 1991) and the social model of disability (Oliver, 1983). Initially it worked to clarify responsibilities, processes and systems, and, through a network of accessibility coordinators and champions, to ensure information was easily available to people who needed it. It acts to bring different stakeholders together and to empower the voice of students and other stakeholders in operationalising accessibility. In short, to be the 'humans in the loop' (McAndrew et al, 2012).

SeGA is embedded in the processes of teaching through 'Accessibility Coordinators', members of staff who take responsibility to advocate for accessibility in the teaching in their faculty and school areas (Pearson et al., 2019b). SeGA supports the Accessibility Coordinators with regular training events, and coordinates a working group through which Accessibility Coordinators can share

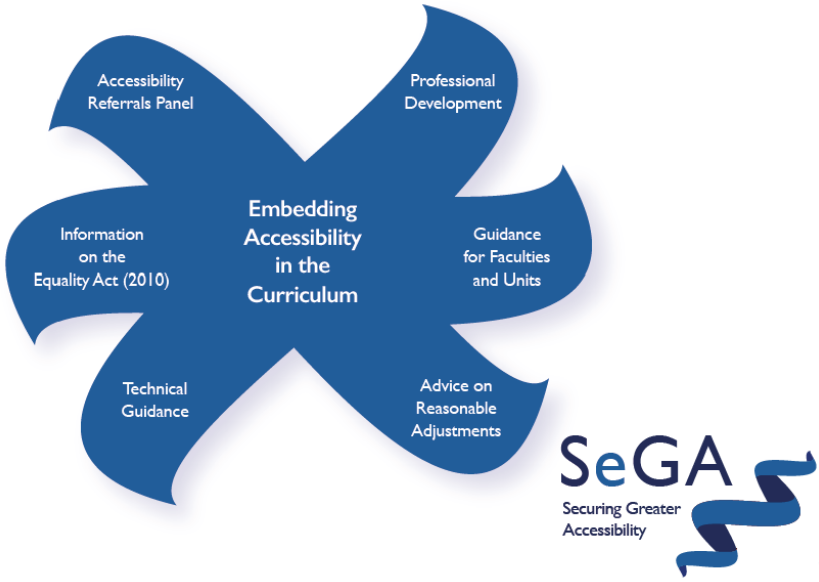

Figure 4.4: Securing Greater Accessibility.

their current practices and challenges, and take part in projects to improve the accessibility of learning and teaching at an institutional level. Recent projects have included creating guidance for external assessors and critical readers of module material, and embedding this guidance in the Curriculum Management System; changing university systems so that all undergraduate modules are required to have an 'accessibility statement' available to prospective students on the university website (as well as coordinating the writing of these statements); and refining the reasonable adjustment process so that examples of reasonable adjustments are recorded in a way that makes it easier to apply similar adjustments for future students.

As the project became business as usual, SeGA expanded its reach beyond the curriculum to include other aspects of learning provision, for example it now includes representation from staff responsible for the production of OER, staff involved in the development and production of online learning tools and resources, and staff from areas such as Careers, the Library, Marketing and IT. A coordination group brings together representatives from across the university to identify and discuss key areas for attention, and a referrals panel brings together expertise to inform decision making on complex individual cases and course-level decisions that could impact on accessibility for students.

SeGA also increasingly plays a conduit role between research and practice, working to implement research findings into practice through training and staff networks, and ensuring current concerns and issues are shared with

research group channels to inform investigation. This acts to facilitate and empower ongoing persistent intent to make learning opportunities accessible to disabled learners.

Conclusions

This chapter started by considering that 'accessible' and 'open' are terms that can be defined and interpreted in different ways. They are often conceived of through technical definitions of licenses and web accessibility standards, or more broadly, that something is available and free or low in cost. However, making educational activities available is only a starting point to producing equity. Persistent intent to utilise TEL to widen access to field and lab-based activities has produced solutions which have been reused and adapted in teaching practice. At the same time, many of the interesting findings from these studies were pedagogical in nature. These technologies provided a positive learning experience where previously there was none available, but this needed to be approached with a sensitivity to social elements of the experience, roles, and the nature of different environments.

The Beyond Prototypes framework emphasises that innovations should be driven by evaluation and evidence. By compiling detailed understanding of uptake, completion and attainment by students with different characteristics, we can see that different issues exist for these groups in the Open University's open access model. Inequity is also found in the wider sector, and in the uptake of OER and MOOCs.

These quantitative findings provide a starting point to motivate and target research on inclusion, and lead to participatory and qualitative approaches to develop richer findings that address the 'why' behind these gaps, and to develop effective and appropriate interventions with audiences. In the past, it has not always been clear to TEL researchers that they should be cognisant of issues such as learner confidence or organisational risk aversion. However, these have come to the fore as factors that can create inequity with TEL.

There are difficulties in moving between TEL research and mainstream practice, and the Beyond Prototypes framework encapsulates the complexity of this. However, there have been encouraging results in moving research and innovation on inclusion into organisational practice. A shift of focus in research beyond creating assistive technologies, and assessing the accessibility of artefacts, towards conceptualising accessibility as process that must include a range of stakeholders, informed the development of the Securing Greater Accessibility (SeGA) initiative which then became embedded in business as usual practices. Similarly, creating and using OER to widen participation have moved from a niche innovation to an established practice at the OU. OpenLearn now provides learning opportunities to millions of people every year, and Chapter 2 of this book provides further examples of practice-based projects to

create inclusion through open learning at scale. In the next chapter, we explore how these foundations are expanding to harness new ideas and technologies.

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