Digital agility and digital decision-making: Conceptualising digital inclusion in the context of disabled learners in higher education

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Abstract

Digital inclusion in higher education has tended to be understood solely in terms of accessibility and does little to further our understanding of the role technology plays in the learning experiences of disabled students. In this article, we propose a conceptual framework for exploring digital inclusion in higher education that attempts to broaden the way in which digital inclusion is understood. The conceptual framework encompasses two strands: one that focuses on technology, personal and contextual factors, and one that focuses on resources and choices. This framework will be used to present and discuss the results of a study which aimed to explore the e-learning experiences of disabled students at one higher education institution. The discussion will focus particularly on concepts of digital agility and digital decision-making and will consider the potential implications for the empowerment of disabled students.

Introduction

Digital inclusion is broadly understood as a phenomenon whereby marginalised people, in this case disabled people, are able to access and meaningfully participate in the same learning, employment, social and citizenship activities as others, through access to and use of digital technologies such as computers. As a concept digital inclusion is frequently equated with social inclusion and the digital divide. In terms of social inclusion, it is generally agreed that the groups most likely to be digitally excluded are those who are already social excluded (Abbott 2007; Selwyn 2006). This exclusion has been primarily understood in terms of unequal access (the digital divide), with commentators such as Warshauer, Knobel and Stone (2004) noting that unequal access to technologies serves to exacerbate social stratification, whilst equal access can reduce marginalisation (Castells 2001). For some, access to technologies, means access to the information society and opportunities for civic engagement (Communities and Local Government 2008). For others, access to technology promotes access to, and participation in, local communities and social networks (Wessels 2008).

The focus of digital inclusion has until recently been on increasing peoples' access to technologies and their abilities to use them (Selwyn and Facer 2007). The process of digital inclusion has therefore been about creating gateways, opening doors and letting people in. Practitioners working with those identified as digitally excluded would therefore be encouraged to identify barriers that keep these gateways and doors shut. If people did not own or have access to technology then the proposed solution was to give them access; if people did not know how to use the technologies, then the solution was to teach them (i.e. improving digital literacies). In other words an implicit link was made between "not having" and "not being able" or not "knowing".

Compared to generic debates regarding the digital inclusion of particular groups of society, conceptualisation of the digital inclusion of disabled students in higher education is significantly under-developed. Digital inclusion tends to be solely associated with technical accessibility issues (Steyaert 2005). A particular focus of attention has been the inaccessibility of Virtual Learning Environments for disabled students (e.g. Newland, Pavey and Boyd 2004). In a review of accessibility issues in higher education, Seale (2006) noted that although disabled students may have access to computers and the Internet, they may not necessarily have access to accessible online learning resources and activities. Seale concluded that in this sense, disabled students may still be "have-nots" and experience what Burgstahler (2002) described as the "second digital divide". Seale and others such as Draffan and Rainger (2006) have attempted to expand the context with which accessibility is understood to include not just technical issues, but also pedagogical and institutional factors. Such moves have helped to expand our conceptualisation of accessibility, but on their own they only partially contribute to improved conceptualisation and understanding of digital inclusion.

A conceptual framework for exploring digital inclusion in higher education

The vast attention that has been placed on debating accessibility issues in higher education has in our view, over-simplified our understanding of digital inclusion. In particular, we know comparatively little about the role technology plays in the learning lives of disabled students in higher education. We argue that it is unhelpful to conceptualise digital inclusion solely in terms of access. Drawing on recent debates in the generic digital inclusion literature we propose a conceptual framework for exploring digital inclusion in the context of disabled students in higher education, which has two strands:

- *Technology, Personal and Contextual factors:* representing the complex, multi-layered nature of digital inclusion

- *Resources and Choices:* representing some of the ways in which technology, personal and social factors express their influence.

Technology, Personal and Contextual Factors

Several commentators have argued that an overly simplistic view of digital inclusion tends to be adopted. Selwyn and Facer (2007, 10) for example argue that: "The contours and complexities of access and use are often glossed over by those commenting on the digital age". Three factors tend to be discussed in particular, factors which we will call technology, personal and contextual. There is a growing consensus that each of these factors need to be understood individually, in more detail; but also that we need to develop our understanding of the interaction between these three factors. For example, Abbott (2007, 6) argues for the need to understand "the interaction between digital tools, contexts and people".

In relation to technological factors there is much concern that understanding is limited to thinking about access to computers and the Internet, rather than thinking about wider technological issues such as connectivity (Selwyn, Gorard and Williams 2001); the range of hardware and software that people may wish to access (Abbott 2007) or the content and information that is delivered through technology (Selwyn and Facer 2007). In relation to personal factors, there is a growing recognition that we need to move beyond thinking about the basic technological skills required by users in order to benefit from access to technology

(Selwyn and Facer 2007) to thinking about digital skills or literacies in a broader sense (Crawford and Irving 2007; Wessels 2008). In addition, the need to explore user perceptions and attitudes regarding the value and relevance of technologies in their lives is slowly being recognised (Selwyn 2006; Livingstone and Helsper 2007). In relation to contextual factors, there is emergent evidence to suggest that factors such as family environment might influence digital inclusion (Ching, Basham and Jang 2005).

Resources and Choices

In their attempt to prompt a re-think in terms of digital inclusion, Selwyn and Facer (2007, 4) introduce the concepts of resources and choices arguing that: "Every individual is entitled to be able to make informed and empowered choices about the uses of ICTs [Information and Communication Technologies] whilst having ready the resources required to enable them to act on these choices". Drawing on the ideas of Warshauer (2003) and van Dijk (2005), resources are conceptualised by Selwyn and Facer as encompassing human and social resources as well as technological or physical resources. The range of definitions for resources, are useful in terms of representing the different ways in which technological (e.g. physical and material resources), personal (e.g. human or mental resources) and contextual factors (e.g. temporal, social or cultural resources) influence digital inclusion.

The introduction of the concept of choices has largely been influenced by reactions against conceptualising digital inclusion as dichotomous: as using or not using technologies. Selwyn (2006) for example talks of the need to understand patterns of use; Selwyn and Facer (2007) talk of needing to explore best or "smart" use of technology, whilst Livingstone and Helsper (2007) refer to a gradation of technology use. In a study exploring why adults do not use

computers in their daily lives, Selwyn (2006) identified a hierarchy of engagement with technology; ranging from absolute non-users, to lapsed users and rare users. Pragmatism, perceived lack of relevance or "fit" with current life were recurring themes when exploring reasons behind level of technology use. We need to further our understanding of how the choices that people make regarding the nature and extent of their technology use might be influenced by technological factors (e.g. issues of access); personal factors (e.g. skill levels) or contextual factors (e.g. "life-fit").

Mapping the conceptual framework against previous research

Compared to other groups who are potentially excluded from our digital society, very little research has been conducted exploring the role that technology plays in the learning experiences of disabled students in higher education. When we map the findings from the few studies that have been conducted in the UK, Ireland and Northern America, against the proposed conceptual framework (See Table 1) gaps in potential knowledge are identified, in particular in relation to exploring the personal factors that influence disabled students' access to and use of technologies, and the choices students make about whether and how they use technologies. In this article we will describe a study, called LEXDIS, which aimed to fill some of these gaps by exploring the e-learning experiences of disabled students. We will use the proposed conceptual framework to present and discuss the results of this study.

[Table 1 about here]

Overview of the LEXDIS Project

The LEXDIS project was a JISC (Joint Information Systems Committee) funded project, situated within its "E-Learning Pedagogy programme". The overarching aim of the LEXDIS project was to explore the e-learning experiences of disabled learners within one institution, the University of Southampton in order to increase understanding of the complex interactions between students and technologies. The related objectives of the study were to:

- Explore and describe how disabled learners experience and participate in technology-rich, e-learning environments;
- Investigate the strategies, beliefs and intentions of disabled learners when using technology-rich environments and identity factors that enable or inhibit use of technologies.

In order to meet these aims, the project adopted a participatory framework where participation was defined as:

> Involving disabled learners as consultants and partners and not just as research subjects. Where disabled learners help to identify and (re)frame the research questions; work with the researchers to achieve a collective analysis of the research issues and bring the results to the attention of each of the constituencies that they represent (Seale, Draffan & Wald 2008b: 16)

The use of this framework distinguishes the project from other studies that have researched the experiences of disabled learners, in that participation is conceptualised as involving more

than being a research informant (See Table 1). There were three key phases of participation in the project. In the first phase of the study students were consulted, using an online survey, regarding the relevance of the proposed research questions and the appropriateness of proposed data collection methods. In the second phase of the study students contributed their own experiences of using e-learning through an interview and the provision of an additional artefact, in a form and media of their choosing, that illustrated the strategies they employed when using technology. In the third phase of the study students were invited, through a focus group, to advise on the analysis of the experiences obtained through phase two and what key implications needed to be drawn out from them. They were also involved in the design and content of the LEXDIS website and offered opportunities to contribute to the dissemination of the project. Each of these phases is described and evaluated in more detail in the LEXDIS Methodology report (Seale, Draffan and Wald 2008a).

Using these methods, 30 students were recruited from the University of Southampton who participated in all three phases of the project. In addition, LEXDIS were given access to the interview transcripts of one participant from a related JISC project called E4L. There were 17 female and 14 male students. The disabilities of the group were varied, with some declaring more than one disability (See Table 2). The majority of students were aged 20 or under.

[Table 2 about here]

Evaluation of the data obtained from the LEXDIS study suggests that the findings can be mapped against the proposed conceptual framework, but also that certain gaps in knowledge, particularly in relation to personal factors and choices or digital decision can be filled (See Table 3). Detailed analysis of accessibility issues (technology related resources) and support

issues (contextual resources) are presented elsewhere (See Seale, Draffan and Wald 2008b), therefore for the purposes of this article, data focusing on digital agility and digital decisions will be summarised and illustrated using example quotes from the students. Each student will be referred to using a code name that they themselves have chosen.

[Table 3 about here]

Digital agility

Results suggest that an important personal resource that disabled students in the study drew on when using technologies to support their studies was their "digital agility". Evidence for the digital agility of students included being extremely familiar with technology; using a wide range of strategies and having high levels of confidence in their own ability to use technology.

Familiarity with technology

Evidence for how incredibly familiar disabled students were with technology was drawn from a number of related findings. For example, all the students used a computer everyday along with email and the Internet. This compares to the findings from a study by Fichten et al. (2000) which indicated that the majority of disabled students use computers and the Internet. In addition, all the students customised their computer in some way; particularly toolbars and menu items and the print size on screen. The majority of students owned a mobile phone and a laptop. The majority of students used instant messaging; participated in discussion forums; knew how to use social networking sites and uploaded videos or photos onto the Internet. All

the students used search engines such as Google, accessed online learning materials of some kind; used word-processors and spreadsheets and contacted tutors using email.

Nine students shared how they were extremely familiar with technology prior to coming to university.

> I was already more advanced than most people at school, because of my Dad […](Chloe)

> Me and my twin were fortunate enough to have an Acorn Electron, so we used to program it from when we were about five. We used to read it out to each other and type it all in. The same with Dos and Q-basic, and all that. (Hannah)

For six of the students, this familiarity may be due in part to the fact that technology use was positively encouraged or supported at School or college. This extreme familiarity with technologies meant that many students in the project were able to talk incredibly knowledgeably about the strengths and weaknesses of specific technologies in terms of design, usability, cost and availability as well as the implications of these factors for their own strategy development and technology use. In studies where disabled students are invisible in the reporting of data, students have typically been described as sophisticated "digital natives" of the "net generation" (Prensky 2001; Oblinger 2003). The findings from the LEXDIS project regarding familiarity with technology enable us to extend this description to disabled students (albeit those studying at one university). Furthermore, the findings regarding use of strategies and levels of confidence enable us to add depth to the description.

Use of a wide range of strategies

From the personal accounts of technology use and associated interviews we have been able to draw out 31 different types of strategies that students were adopting and devising when using technology to support their learning (See Table 4). Students described on average about seven strategies each. The most common types of strategy adopted by students tended to be related to computer or information access and ways of coping with written work. These strategies therefore involved the use of both specialist assistive technologies (e.g. IrisPro, quill mouse, Kurzweil, Inspiration or Dragon Dictate) as well as more generic technologies (e.g. mobile phone, DS40 digital recorder, Google). Tellingly, students tended to dismiss some of their strategies as being well known or unimportant when in fact they were indicative of the agile and considered way in which they were approaching the use of technologies; for example using free alternatives to standard assistive technologies that may be provided under the DSA [1] (Disabled Students Allowance) scheme or using three different assistive technologies to cope with the computing environment.

[Table 4 about here]

Based on the range and creativity of strategies that the disabled students have described in their personal accounts, we would suggest that they have the kind of "sophisticated awareness" that Creanor et al. (2006) described when they talked about effective learners being prepared to adapt activities, environments and technologies to suit their own circumstances. This contradicts somewhat the arguments of Parker and Banerjee (2007, 6) who, in making comparisons with non-disabled students argued that disabled students were less able to develop meta-cognitive "self-regulated strategic approaches" to using learning

technologies to help them meet academic goals. Whilst we do not deny that some students will have different strategic abilities to others, we believe the results regarding strategy use are important in terms of reminding us that a deficit-based approach to understanding disabled students use of technologies may not always be that helpful.

High levels of confidence in ability to use technology

When asked to rate their confidence in using technologies; where 0 was not confident and 10 was highly confident; the average rating given by students was 8.5 (mean & median). Linked to this, six students explicitly discussed their high levels of confidence. For some, high confidence levels appeared to be linked to comfort levels and familiarity. For others, confidence manifested itself in not being afraid of the technology, or in a preference for learning how to use technology through trial and error:

> I've had quite a lot of experience with it by now. It's generally quite easy to use. It doesn't faze me. (Sarah P)

> I'd just launch in, - like with Inspiration. No one showed it to me, I just picked up a leaflet in the Assistive Technology service. I thought: "I can do that", and I did. It was fine. I had no fear of it. (Stacey)

> I'd just use it – trial and error. I'd possibly ask my peers, but as I'm quite good with computers, I can just get stuck in […] Most of the time I would probably just have a play. (Ben C)

Trial and error approaches are probably most successful when students have the confidence to know what to do when something they try doesn't work (not being "fazed", as Sarah P said). It could be argued that it would be more effective for students to be trained how to use technologies, so they don't need to rely on trial-on-error approaches when something doesn't work as expected. Evidence suggests however that training is not always the solution it is imagined to be. For example, in a US study, Wimberley, Reed and Morris. (2004) evaluated the success of a technology training intervention and found that for many learning disabled students, when something did not work they had no strategies to deal with the problem. This suggests that for technology training to be effective it might need to recognise and utilise the skills (e.g. strategy use) abilities (e.g. confidence) and preferences (e.g. trial and error) that disabled students bring to training sessions.

Digital decision-making

Results suggest that a range of technological, personal and contextual factors influence the choices or digital decisions that disabled students make regarding technology use. Whilst the nature of these digital decisions was varied, some interesting results were revealed with regards to the decisions students made *not* to use technologies. Furthermore, the complexity of the "digital decisions" that disabled students in the LEXDIS project were making appeared to be reflected in the way disabled students approached decision-making.

Factors that influence decision-making

The factors that influenced decisions about whether or not to use technologies were varied: and included technological factors such as the perceived properties and affordances of

technologies; personal factors such as a desire to keep things simple and IT skills and literacy and contextual social factors such as feeling stigmatised when using specialist technologies in public.

Decisions about technology use influenced by perceptions of affordances and properties of technologies

The most frequently mentioned affordance of technology that students mentioned when discussing their reasons for using technologies to support their learning, was the efficiency it offered them in terms of organisation of time; organising essays; and finding references and information quickly:

> Anything that would help me to get quick access to that information is also necessary. […] For example, the icons help me to have a quick access to data, because I have a lot of data and they pile up quickly. (Robert)

The most commonly mentioned property of technology that appeared to influence decisions about use and nature of use, was whether or not it was a technology that students perceived to support learning or support socialising. When talking about their use of technologies, eight students made distinctions of some kind of other about technologies for learning and technologies for personal life. The most common technology referred to was social networking tools, which were viewed as just for personal life, mainly because they were too distracting:

> I use FaceBook quite regularly – almost too much (laughing) but only for social purposes! Not as frequently as some of my friends who are semi-addicted to it, but yes, it is quite distracting. (Nick)

While Selwyn (2006) identified that a perceived lack of relevance or "life-fit" influenced non-use of computers, what the results suggest here is that for a significant number of disabled students there can be a significant lack of "study-fit", where certain technologies don't fit with the study obligations that students feel they have.

Decisions about technology use influenced by concerns over being marked out as different

Four students described specific experiences where, despite being proficient and digitally agile technology users, they felt uneasy that their assistive technology use might be marking them out as different. Jim and Paul K described how using assistive technologies in lecture theatres drew attention to themselves, which made them feel uncomfortable:

> In lectures it's a little bit intimidating […] In nursing there are quite a lot of dyslexic students, but I still feel its a personal thing – that by showing that you have got your assistive technology such as your laptop and your voice recorder, you are making an issue of it. (Paul K)

Nick and Reena outlined circumstances under which they would not use assistive technologies in "public" for fear of standing out as different:

> If I did have assistive technology I would use it on my home computer. There's no way I would use a lot of it in the lab because I wouldn't want that stigma on me like that thing – which is bad, but it's how people are. (Reena)

Although only four students mentioned stigmatisation in their interviews, it struck a real chord in the focus group, particularly with dyslexic students:

> I was working in the library. Only the students with the password can 'get on', but if you think about it, people are looking at you knowing that you have special technology. It makes you reluctant to use them. They think "Why should you get it – just because you are dyslexic?" (Sarah D)

The stigma of dyslexia and disability is a recurrent theme in the research literature (Mortimore and Crozier 2006; Fuller et al. 2004; Shevlin, Kenny and Mcneela 2004). Students in the Mortimore and Crozier (2006) study for example, reported worries about other students' perceptions of the allowances that were made, fearing they would see dyslexia as a "free ticket to easy street". The sense of stigmatisation expressed by Sarah D could also be interpreted as echoing the work of Waterfield, West and Parker (2006: 84) who commented on the 'ghettosiation' of disabled students through the segregation of disabled students who require extra time in examination. It might be argued that Sarah D was experiencing a similar 'ghettoisation' in the library, through the use of a separate assistive technology room (called the Assistive Technology Service or ATS). However, comparing interview responses across the whole group of participants; there were mixed feelings about the ATS. Some felt it did separate them from their friends but most said they liked the quiet area, extra space, extra help and specialist technologies. The focus group responses also revealed that some disabled

students did not feel stigmatised by their technology use; commenting that this was not their experience; or that their course was such that many students, irrespective of disability, were using laptops and digital recorders in lectures. Whilst accepting that not all disabled students will feel stigmatised by their technology use, results from the LEXDIS project offer an insight into potential barriers to digital inclusion for some disabled students; barriers that will not be eliminated by simply improving access or skills.

Decisions about technology use influenced by personal circumstances

Interview analysis revealed five personal factors that appeared to influence students' decisions about technology use: a desire to keep things simple; a lack of DSA awareness; self-reliance; IT skills and digital literacy and a reluctance to make a fuss. The three most talked about factors were desire to keep things simple, IT skills and digital literacy.

Three students talked about their desire to keep things simple in relation to their technology use, where simplicity could potentially be associated with notions of study-fitness. For Ben C simplicity centred on using Multimedia applications that did not slow his computer down. For Nikki, simplicity meant using the mind-mapping software Inspiration, to start off organising her essay ideas, but not for the whole essay writing process. For David, simplicity meant not complicating things by using lots of technologies:

> I think that if you can keep things quite simple, like if you've got Braille or you've got a disc of all the stuff you need, why complicate your life even more? I have to be honest about that because I don't like a complicated life. (David)

In terms of IT skills and digital literacy, Chloe discussed how although she had been offered access to speech recognition by her department, she chose not to use it because: "I don't think I'd be very good at it, so I haven't gone down that route." Conversely, Jim felt that because he was so computer-orientated and comfortable using assistive technologies he was more likely to search for references online, than physically visit the library. The results here, remind us that digital literacy or comfort can influence digital inclusion in many different ways.

The nature of decisions made about technology use

The results from across all phases of the LEXDIS project revealed that students loved and hated technologies (both general and specific) in equal measure and were able to express preferences for using certain technologies over others based on detailed knowledge of the strengths and weaknesses of particular technologies compared to others. There were however, three striking examples where students made decisions not to use technologies:

- Deciding not to use social networking tools (see previous section on affordances and properties of technologies);
- Deciding not to use assistive technologies;
- Deciding not to access technology related support systems.

Deciding not to use assistive technologies

Four students talked about making decisions not to use assistive technologies. For Andrew and Paul K the decisions were made on the basis of not needing to use them:

> Talking about using TextHelp for assignments but not for emailing tutors: *Would you use Texthelp or any other technologies?* No. *So, Texthelp is something to use just when you're writing your essays?* Yes. At the end of the day, my tutor knows that I'm dyslexic and what I'm saying. (Andrew)

For Jo, her decision was influenced by the fact that she didn't get on with some assistive technologies, and for Ben C, it was because he was doing OK without them:

> Mainly the applications are not set up very well. I don't work well with them. It would enlarge things so that you can't see the whole thing in one go, which I like to be able to do. Whereas, if I use something like Word, and just change the font size, I can see it all on the screen at the same time. […]Some of the assistive technologies I don't like, because I don't get on with them. (Jo)

Deciding not to access technology related support

A number of students reported that they had made decisions not to access technology related support. The two most frequent reasons given by participants for not accessing support were having a preference for trial and error and being too busy to access support. For many students being too busy to access support was possibly linked to the nature of their courses, for example whether or not they were vocational in nature or had a large placement element, suggesting again that "study-fitness", influences to some extent the decisions that disabled students make:

> When I got all my software in autumn last year, and they said: "You need to have your training on this" […] I did feel like I was doing 2 courses and that was, frankly, too much. I had to stay with my old bad habits because I just didn't feel I had the time to take out to learn something new to help me. It was a vicious circle, really. (Stephanie, studying for a Physiotherapy degree)

> I don't want to make them (support services) sound bad, but I think that's a lot to do with me being so busy, and not getting in touch with them so much. Their emails are always there. There is always help available from the Dyslexia Access People. (Kim, studying for an engineering and architecture degree)

The importance placed on time by disabled students also reflects the importance of temporal resources as identified by van Dijk (2005) who argued that the level at which we engage with technology will be influenced in part, by the time we have available to spend on different activities in life. This finding, combined with those of Draffan, Evans and Blenkhorn (2007) who found that almost 25% of the disabled students they surveyed turned down the opportunity for training because they felt confident about their IT skills, support the arguments made by Selwyn (2006) that non-use should not be automatically equated with digital exclusion without first attempting to understand the many factors that influence non-use. From the results of this study we have hints of a potentially complex picture, whereby both lack of resources (time) and available resources (IT skills) influence decisions regarding non-use.

Approaches to decision-making

As we have seen from results presented so far, a wide range of factors appear to influence students' decisions about technology use and the circumstances surrounding these decisions can sometimes be complex. This complexity appears to be reflected in two separate, but related approaches to decision-making: using general criteria or questions to make qualified judgements about the benefits of technology and using specific "critical" criteria to make decisions based on a cost-benefit analysis.

Making qualified judgements about the benefits of technology using general criteria or questions

In making decisions about whether or not to use technology, some students adopt approaches to their decision-making where judgements about the potential benefits are qualified against general criteria or questions. For example Andy L asks himself: "is this the right tool for the job?"; Guenevere assesses whether or not the technology works, whilst Tracy says she gives a technology a chance to impress, but then if it fails to do so, she looks for something else:

> The thing that I came to do some time ago was there isn't this thing 'all or nothing' – you either have technology or you haven't. I use my computer. I use my word processing on the computer, but I still draw my mind-maps on paper because it is easier and quicker for me. I am a firm believer in using whatever tool that is appropriate for the job. Sometimes that is the technology, but not always. (Andy L)

> I try to use it (technology) for everything – giving it a chance to see what it brings up for me. Then if I'm not successful, I'll go elsewhere. (Tracy)

> I have no problems using technology to help me learn, as long as that technology is … useful and …It's got to work. For the first week half the stuff I got from the ATS didn't work. I had to phone up Microsoft and create […](Guenevere)

Making decisions based on a cost-benefit analysis, using "critical" criteria

Some students in the LEXDIS study appeared to be adopting a cost-benefit analysis approach to their decision-making, where judgements regarding potential benefit were qualified against specific and quite "critical" criteria. For example, nine students talked about their decisions being influenced by time considerations, six students mentioned cost as a deciding factor and two mentioned perceptions of risk. Time however, seemed to be particularly critical in relation to decisions made regarding use of assistive technologies and social networking applications. Students were aware of the benefits or pleasures that use of these technologies might bring them, but were making a decision about whether the benefits (learning or social) outweighed the costs in terms of time, where time was predominantly mentioned in relation to taking time away from study.

> I can't be bothered (to use social networking tools). It takes me twice as long as anyone else to study. It's really annoying as everyone had done it (study) and I am still doing it. (Nikki)

> I have got Dragon 8 voice recognition software, which is OK but it takes ages to get used to and I haven't got the time. […] And, that's why I never really got to grips with Dragon 8 too much, because it was quite good, but I didn't have the time. It was only now and then that I had an essay, and when I did have it, I had to get on and do it. I didn't really have time to learn it […] (Sarah B)

Time is a critical criteria when making decisions, because answers to questions such as "how much time will I have to commit to learning to use this technology?", and "can I afford to divert this time away from studying?" might override answers to questions such as "is it the right or appropriate technology to use?" or "does it work?" The approaches to decision-making identified here and the complexity of factors that influence these decisions suggest that disabled students are capable of the kind of "strategic fluency" identified by Parker and Banerjee (2007) as important for disabled students. Whether such fluency guarantees successful learning outcomes, needs to be explored in more detail however.

Conclusions

In this article we have argued that viewing digital inclusion in higher education solely in terms of access and accessibility does little to further our understanding of the role technology plays in the learning experiences of disabled students. In applying a new, expanded conceptual framework to the analysis of a study designed to explore the e-learning experiences of disabled students we have identified and described two useful concepts: digital agility and digital decision-making. These concepts help to illuminate how digital inclusion in higher education is influenced by a complex inter-play of factors and reveal important implications for teaching and learning support services in terms of empowerment.

The digital agility of the students, identified in the study, is significant in terms of encouraging practitioners not to view all disabled students as helpless victims of exclusion. Digital inclusion does not always have to be understood through the dual lenses of deficits and barriers. Digital inclusion in higher education therefore, will not always be about practitioners opening the door and/or teaching disabled students how to step over the threshold. Sometimes, digital inclusion might be about disabled students using their considerable digital agility to "break and enter" on their own terms. However, we do not wish to use the LEXDIS results to argue that accessibility barriers do not need to be resolved or that digital literacy skills should not be taught where needed. Instead we would argue for e-learning policy and practice to be guided more strongly by an empowerment model (Hunter-Carsch and Herrington 2001). The empowerment model encourages us to move away from thinking about the deficits of disabled students and positioning them as passive, reliant recipients of diagnosis and remediation services and to instead move towards an approach whereby the strengths of disabled students are recognised and the focus is on supporting learners in pursuing their goals. In the context of this study, adopting the empowerment model would involve recognising the digital agility of disabled students as well as their strategic fluency in negotiating complex decisions, are acknowledged and utilised.

The digital decision-making of the students, identified in the study, is significant because it encourages practitioners to acknowledge the agency of disabled students in terms of making choices regarding their use of technology. What Abbott (2007) claims as invisible, has become visible, particularly in relation to disabled students' decisions *not* to use technology or technology related support systems. For Selwyn (2006) decisions not to use technology can be seen as evidence for empowerment, provided those decisions involve genuine choice. The

data from the LEXDIS study suggests areas that would be worthy of further exploration in terms of understanding whether or not the decisions made by students were empowered ones or not. A good example of this would be the decision not to access support to learn how to use assistive technologies. If the decision is influenced solely by an erroneous fear that spending time learning to use an assistive technology will take valuable time away from studying, then it is perhaps not an empowered decision. If the fear, however has some foundation, in that the training on offer is the wrong kind of training, offered at the wrong time for students (thus wasting time) then empowerment and digital inclusion may be facilitated by changing the training on offer to disabled students.

A detailed examination of the theoretical generalisation of the results from the LEXDIS study was conducted by Seale, Draffan and Wald 2008b. This examination included a comparison of the accounts of the LEXDIS participants to the results of formal studies of disabled learners as well as to less formal public accounts (e.g. case studies published on teaching and learning websites) of disabled learners experiences. From this examination, Seale, Draffan and Wald 2008b concluded with some confidence that the results of the LEXDIS study could be generalised to other disabled students in Higher Education.

Finally, when comparing the results of our study to similar "learner experience" studies involving largely non-disabled students, the results of our study suggest that disabled students can be as digitally agile as non-disabled students. For example, the confidence and comfort levels reported by LEXDIS participants reflect those observed by Conole *et al.* (2006) who describe the learners in their study as "evidently comfortable". However, we would argue, that for the most part, disabled students in the LEXDIS study expressed their digital agility in different ways to non-disabled students particularly through the personal strategies that they

develop to cope with the individual tasks required by their courses and the decisions that they make regarding technology use.

Word Count: 8,107

Notes

[1] Disabled Students' Allowance is a UK government grants to help meet the extra course costs students can face as a direct result of a disability or specific learning difficulty. They are aimed at helping disabled people to study on an equal basis with other students. Such grants can include provision of computer equipment, specialist technologies and some training in how to use them. See: http://www.direct.gov.uk/en/DisabledPeople/EducationAndTraining/HigherEducation/DG_10034898

References

Abbott, C. 2007. *E-inclusion: learning difficulties and digital technologies*. Bristol: Future Lab.

Burgstahler, S. 2002. Distance learning: the library's role in ensuring access to everyone, *Library Hi Tech*, 20, 4, 420-432.

Castells, M. 2001. *The Internet galaxy: reflections on the Internet, Business and Society*. Oxford: Oxford University Press.

Ching, C.C., J.D, Basham, and E. Jang. 2005. The legacy of the digital divide: Gender, socioeconomic status and early exposure as predictors of full-spectrum technology use in young adults. *Urban Education*, 40, 4, 394-411.

Cobham E., C. Coupe, E. Broadbent, and S. Broadbent. 2001.Evaluation of the process of identifying the provision of assistive technology, study strategies and support for students with disabilities in higher education and the value of this intervention on their education and their lives, *The Skill Journal*, 69, 4 – 11.

Conole, G., de Laat, M., Dillon, T. and Darby, J. (2006) *JISC LXP Student experiences of technologies Draft final report*, http://www.jisc.ac.uk/media/documents/programmes/elearningpedagogy/lxp_project_final_report_nov_06.pdf

Communities and Local Government. 2008. *Delivering Digital Inclusion: An Action Plan for consultation*. HM Government. http://www.communities.gov.uk/publications/communities/deliveringdigitalinclusion

Crawford, J., and C. Irving. 2007. Information literacy: the link between second and tertiary projects and its wider implications. *Journal of Librarianship and Information Science*, 39, 17-26

Creanor, L., K. Trinder, D. Gowan, C. Howells. 2006. LEX: *The learner experience of e-learning final project report.* JISC. http://www.jisc.ac.uk/uploaded_documents/LEX%20Final%20Report_August06.pdf

Draffan, E. A., D.G.Evans, and P. Blenkhorn. 2007. Use of Assistive Technology by Students with Dyslexia in Post-Secondary Education. *Disability and Rehabilitation: Assistive Technology*, 2, 2, 105-116.

Draffan, E. A., and P. Rainger. 2006. A model for the identification of challenges to blended learning, *ALT-J*, 14, 1, 55-67.

Fichten, C. S., J.V. Asuncion, M. Barile, M. Fossey, and C. de Simone. 2000. Access to educational and instructional computer technologies for post-secondary students with disabilities: lessons from three empirical studies, *Journal of Educational Media*, 25, 3.

Fichten, C.S., J.V.Asuncion, C. Robillard, M.E. Fossey, and M. Barile. 2003. Accessible Computer Technologies for Students With Disabilities in Canadian Higher Education, *Canadian Journal of Learning and Technology*, 29,2. http://www.cjlt.ca/content/vol29.2/cjlt29-2_art-1.html

Fuller, M., M. Healey, A. Bradley, and T. Hall. 2004. Barriers to learning: a systematic study of the experience of disabled students in one university, *Studies in Higher Education*, 29, 3, 303-318.

Goode, J. 2007. ‘Managing' disability: early experiences of university students with disabilities, *Disability & Society*, 22, 1, 35 – 48.

Goodman, G., D. Tiene, and P. Luft. 2002. Adoption of Assistive Technology for computer access among college students with disabilities, *Disability & Rehabilitation*, 24,1/2/3, 80-92.

Hunter-Carsch, M., and M Herrington. 2001. *Dyslexia and effective learning in secondary and tertiary education*, London: Whurr.

Livingstone, S., and E. Helsper. 2007. Gradations in digital inclusion: children, young people and the digital divide. *New Media and Society*, 9, 4, 671-696

Mortimore, T., and W.R. Crozier. 2006. Dyslexia and difficulties with study skills in higher education, *Studies in Higher Education*, 31,2, 235-251.

Newland, B., J. Pavey, and V. Boyd. 2004. Disabled students and VLES. Accessibility Issues in Learning Environments and Research Technologies Project Bournemouth University. http://www.bournemouth.ac.uk/alert/guidelines/word/alert_allVLEguidelines.doc

Oblinger, D. 2003. Boomers, Gen-Xers and Millenials: Understanding the new students. *Educause Review*, July/August, 37-45.

Parker, D.R., and M. Banerjee. 2007. Leveling the digital playing field. *Assessment for Effective Intervention*, 33,1,5-14.

Prensky, M. (2001) Digital Natives, Digital Immigrants, *On the Horizon*, October, 9 ,5, 1-6.

Seale, J.K. (2006) *E-learning and disability in higher education: accessibility research and practice*. Oxford: Routledge.

Seale, J., E.A.Draffan, and M.Wald. 2008a. *An evaluation of the use of participatory methods in exploring disabled learners' experiences of e-learning. LEXDIS Methodology Report to JISC.* University of Southampton. http://www.lexdis.ecs.soton.ac.uk/project/reports

Seale, J., E.A.Draffan, and M. Wald. 2008b. *Exploring disabled learners' experiences of learning*, LEXDIS Final Report to JISC. University of Southampton. http://www.lexdis.ecs.soton.ac.uk/project/media/LEXDIS_ProjectReport_Dec08final.doc

Selwyn, N., S. Gorard, and S. Williams. 2001. Digital divide or digital opportunity? The role of technology in overcoming social exclusion in U.S Education. *Educational Policy*, 15,2 258-277.

Selwyn, N. 2006. Digital division or digital decision? A study of non-users and low-users of computers, *Poetics: Journal of Empirical Research in Culture, Media and the Arts*, 34, 4-5, 273-292.

Selwyn, N., and K. & Facer. 2007. Beyond the Digital Divide: Rethinking digital inclusion for the 21st Century. FutureLab. http://www.futurelab.org.uk/resources/documents/opening_education/Digital_Divide.pdf

Shevlin, M., M. Kenny, and E. Mcneela. 2004. Participation in higher education for students with disabilities: an Irish perspective, *Disability & Society*, 19,1,15-30.

Steyaert, J. 2005. Web based higher education, the inclusion/exclusion paradox. *Journal of Technology in Human Services*, 23,1/2, 67-68.

Van Dijk, J. 2005. *The deepening divide: Inequality in the Information Society*. London: Sage.

Warschauer, M. 2003. Demystifying the digital divide. *Scientific American*, 289,2, 42-47.

Warschauer, M., M. Knobel, and L. Stone. 2004. Technology and equity in schooling: deconstructing the digital divide. *Educational Policy*, 18, 4, 562-588.

Waterfield, J., West, B., Parker, M. (2006) Supporting Inclusive Practice. In M. Adams and S. Brown eds. *Towards Inclusive Learning in higher education: Developing curricula for disabled students*. London: Routledge.

Wessels, B. 2008. Creating a regional agency to foster eInclusion: the case of South Yorkshire, UK. *European Journal of ePractice*, No 3, May 2008.

Wimberley, L., N. Reed., and M. Morris. 2004. Postsecondary students with learning disabilities: barriers to accessing education-based information technology, *Information Technology and Disabilities*, 10,1, EASI (Equal Access to Software and Information) http://people.rit.edu/easi/itd/itdv10n1/wimberly.htm

Strands of Digital Inclusion	Technology	Personal	Context
Resources	Disabled students are using both generalised and specialised technologies (Mortimore and Crozier 2006; Fichten et al. 2000)	Disabled students express high levels of comfort and fluency with regards to some technologies and low levels for others (Parker and Banerjee 2007)	There is a perceived lack of support or training to enable disabled learners to become fluent users of specialised assistive technologies (Shevlin, Kenny and Mcneela 2004; Cobham et al. 2001; Goodman, Tiene and Luft 2002)
	Technology provision by institutions is regarded by students as variable (Draffan, Evans and Blenkhorn.2007; Fichten et al. 2003)		The system for assessing and funding assistive technology is frustrating for disabled students (Goode 2007; Shevlin, Kenny and Mcneela 2004)
	The location of IT facilities and a lack of specialised software presents barriers for disabled students (Fuller et al. 2004)		Not all students take up the technology support that is offered (Draffan, Evans and Blenkhorn. 2007)
Choices			

Table 1: Mapping the proposed digital inclusion conceptual framework against what is currently known about disabled university students' relationship with technologies

Disability	Frequency
Specific Learning Differences (e.g. dyslexia)	14
Blind	1
Visual impairment	3
Hearing impairment	3
Wheelchair user and dexterity issues	4
Mobility/dexterity issues	3
Autistic Spectrum/Asperger's	1
Mental Health difficulties	3
Other	3

Table 2: Range of disabilities represented across the 31 participants

Strands of Digital Inclusion	Technology	Personal	Context (Social)
Resources	Use and experience of technology negatively influenced by accessibility issues	Digital Agility: Use and experience of technology influenced by use of a wide range of strategies; levels of familiarity with technology and confidence levels	Use and experience of technology positively influenced by a range of formal and informal support network, in particular friends and family
Digital Decisions	Decisions about technology use, influenced by perceptions of affordances and properties of technology	Decisions about technology use influenced by personal circumstances	Decisions about technology use influenced by fear of being stigmatised by through using specialist technologies in public

Table 3: Mapping the LEXDIS results against the proposed digital inclusion conceptual framework

Strategy category	Number of different strategies within each category	Example
Icon changes	2	Making own icons
Menu changes	3	Using Quicklaunch bar
Recording data	10	Using DS40 for podcasts
Spell-checking and vocabulary	4	Using dictionary & thesaurus online with medical addition
Using Blackboard	9	Jumping between Blackboard, web & Sussed (university portal)
Note making	7	Using Onenote for jottings
Using search engines	6	Adding Internet search to Word
Browser options	8	Using Opera
Using electronic resources	10	Using Google books & Google Scholar
Remote access	2	Using VPN from home
Backing up data	7	Using hard drive and university server
Folder, file and document management	5	Using Groove to share files
Mouse options	8	Using a quill mouse
Keyboard options	14	Using keyboard shortcuts for Moodle and other programs
Speech recognition	4	Using Dragon Dictate for transcribing recorded notes
Scanning and OCR (Optical Character Recognition)	3	Using Kurzweill and scanner to read handouts
Alternative output options	2	Text to OCR for text to speech in OneNote with Narrator
Online presence	6	Putting course photos on FaceBook
Mobile phones	11	Uing mobile phone for recording
Synchronous communication	9	Using MSN in FaceBook
Planning and organisation	9	Using IPAQ synchronisation with calendar, contacts & documents
Remembering items	7	Using StickyNotes
Font changes: size and type	5	Enlarging fonts on menus
Colour	7	Choosing Windows themes
Multimedia	11	Using Impatica to revisit lectures
Viewing items	11	Viewing items on two screens
Using Presentation tools	11	Using Inspiration with PowerPoint
Language	5	Using Google to search for complex words
Word processing	14	Using the prediction in OpenOffice
Referencing	7	Using Word tables to manage references
Accessing pdf's	7	Using a scanner with IrisPro

Table 4: Overview of the types of strategies adopted by disabled students when using technologies