Making space in higher education: disability, digital technology, and the inclusive prospect of digital collaborative making

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ABSTRACT

This paper explores the ways that the intersection between disability and digital technology in higher education unfolds collaborative experiences that include disabled students through what I call 'Digital Collaborative Making'. Students who participate in Digital Collaborative Making collaborate on multimedia video projects that tell stories about their relationship with digital technology. As a *research-creation* approach that weaves academic research and artistic practices together, Digital Collaborative Making invites students to devise creative methods of critiquing the social and cultural impact of digital technology. While digital technology can improve accessibility in education, ableist dynamics and 'disabling' ideologies remain pervasive in universities. By engaging students with different identities and lived experiences, Digital Collaborative Making presents opportunities for students with disabilities to openly express their creativity and subvert normative perspectives that stigmatise disability as a deficit. In turn, non-disabled students can learn what it means to be open to the presence of disability and difference. To illustrate these points, this paper considers the inclusive prospect of Digital Collaborative Making in *Digital Lives*, an undergraduate communications course at the University of Waterloo.

Introduction

In this era of technological and cultural flux, expressions of ableism continue to permeate the social, cultural, and structural environment of higher education. In *Academic Ableism,* Dolmage (2017) investigates how disability is constituted in and by higher education. 'Disability,' Dolmage argues, 'has always been constructed as the inverse or opposite of higher education' (2017, 3). Looking at North American universities, Dolmage notes that disability is construed as a problem that needs solving and a deviation from the core ethic of higher education, which privileges ability and perfection while stigmatising any sign of intellectual, mental, or physical frailty. Amid these ableist structures and perspectives that seek to dissociate disability from higher education, there is an urgent need to

develop inclusive pedagogical approaches that offer opportunities for disabled students to collaborate with their classmates on the discovery of new ideas that challenge market-driven assumptions about the value of human life in a digital age. Commenting on the relationship between education, technology, and the digital humanities, Koehler (2017, 64) invites us to 'consider how our institutional practices […] frame an understanding of and scholarship regarding how our craft and practices as teachers/writers demands new theorisation in light of digital technologies'. If we are committed to fostering inclusion and mobilising access in education, we will need to devise new pedagogical approaches that present all students with opportunities to collaborate on creative enterprises that stimulate critical reflection on the effects of digital technology.

This paper explores the ways in which the intersection between disability, digital technology, and higher education unfolds collaborative relationships among students with different identities and lived experiences through what I call 'Digital Collaborative Making'. Students who participate in Digital Collaborative Making are encouraged to collaborate on multimedia video projects that tell stories about their relationship with digital technology. As a *research-creation* approach, which Canada's Social Science and Humanities Research Council defines as the combination of 'creative and academic research practices' (SSHRC 2018), Digital Collaborative Making encourages students to devise creative methods of critiquing the social and cultural impact of digital technology. In recent years, advanced digital media technologies, such as voice-to-text applications and gesture recognition software, have made education more accessible to persons with disabilities. But despite the promises that digital tools may present in terms of improving accessibility in education, ableist dynamics and 'disabling' ideologies still appear to shape the spaces in which teaching and learning occur.

The term 'disablism', according to Kumari (2009, 4), describes 'a set of assumptions (conscious or unconscious) and practices that promote the differential or unequal treatment of people because of actual or presumed disabilities'. Spaces that are inflected with the ideological imprint of 'disablism' could undermine accessibility, as these disabling spaces tend to exclude people whose bodies and cognitive functioning detract from societal 'norms'. Yergeau (2014), in her analysis of disability rhetoric in digital culture, animates the interplay between accessibility and space by characterising 'access [as] *a way to move*' that is 'focused on not only disabled bodies, but disabled spaces, and how bodies and spaces move and interact with each other'. In an era that is saturated with digital devices and applications, bodies and spaces – including disabled bodies and disabled spaces – have to move and interact in the presence of digital technologies that are interconnected in a networked environment. By engaging students with different identities and lived experiences in the design and production of multimedia video projects, Digital Collaborative Making presents opportunities for students with disabilities to openly express their creativity and subvert normative perspectives that stigmatise disability as a deficit. Turning our attention to the application of Digital Collaborative Making in *Digital Lives*, an undergraduate course that I teach at the University of Waterloo, this paper will attend to the inclusive prospect of Digital Collaborative Making as a pedagogical approach that fosters greater inclusion and access in the university classroom. What follows is an overview of this paper.

I begin the discussion by exploring what inclusion means in education, particularly for students with disabilities. I will then consider the potential of 'critical making' as a

pedagogical process that operates in temporary makerspaces, before explaining how the research-creation pedagogy, which I term 'Digital Collaborative Making', recognises the presence of different identities and lived experiences in the higher education classroom and encourages collaboration between all students. Finally, I will look at the inclusive prospect of three student projects from the *Digital Lives* course, each of which features disabled students who collaborate with their classmates on the making of a performance video that explores the effects of digital technology. With respect to these three student projects, I would like to briefly address some ethical considerations pertaining to their inclusion in this paper.

Students who signed up for the Spring 2016 and Winter 2018 sessions of the *Digital Lives* course were informed that I would make informal observations about the application of Digital Collaborative Making as a research-creation pedagogy in the class. These observations were meant to improve the inclusivity of this pedagogical approach in future sessions of the same course. I also informed the students that the course was not conceived as a formal research study. When the Spring 2016 term came to a close, I sought the advice of two project groups that included disabled students, and we discussed the possibility of showcasing their projects in an academic paper on the inclusive prospect of Digital Collaborative Making. Subsequently, when I taught the course in the Winter 2018 term, there was only one project group comprising of disabled students. I consulted the students in this third project group about the possibility of featuring their project in the aforementioned academic paper. Upon receiving the students' consent to discuss the three projects in an academic context, I proceeded to incorporate their work into the final section of this paper. For privacy reasons, the students' real or full names were excluded from the paper. It is hoped that this paper will contribute to ongoing discussions about inclusive education and its impact on the intersection between disability and digital technology. Our conversation begins in the next section with a reflection on the multiple definitions of inclusion in education.

Approaching inclusion in education

What might an 'inclusive education' entail? 'The meaning of "inclusion"' in educational contexts, as Armstrong, Armstrong, and Spandagou (2011, 30) observe, 'is by no means clear and perhaps conveniently blurs the edges of social policy with a feel-good rhetoric that no one could be opposed to'. It is important to distinguish between the 'feel-good rhetoric' used to promote inclusion as education policy and the implementation of inclusive educational design and processes that are accessible to all students, regardless of background. Slee (1998) argues that the theorisation of special education has been reduced to 'inclusion' as a label that seems ambiguous and insubstantial in terms of enhancing access and diversity in education. Material changes in the school environment do not, as Slee (1998, 130) contends, 'excise the deep culture of exclusion' that pervades the educational landscape in many countries. As such, Slee (1998, 134) invites educators and school leaders to consider the possibility of celebrating and supporting difference in education by devising new pedagogical strategies and teaching approaches that foster inclusive learning cultures. Yet, fostering inclusive educational practices goes beyond the legal affordance of 'rights' for students with disabilities and special needs.

While adopting a 'rights' approach to inclusive education could facilitate the provision of accommodation and support services to students who need them, such an approach might not account for the underlying cultural currents that shape the prejudicial attitudes of non-disabled people towards disabled students and students living with illness, including mental illness. Addressing the reactionary tendencies of universities towards diversity and inclusion in higher education, Dolmage (2017, 78) observes that, 'the only time disability is spoken or written about in class is in the final line of the syllabus, when students are referred to Disability Services should they desire assistance'. Dolmage (2017, 78) contends that the message that higher education institutions seem to be sending to students is that 'disability is a supplementary concern' that only appears 'at the back door of the syllabus'. By relegating disability to the 'back door' of the syllabus and excluding it from the educational experience, universities seem to be paying 'lip service' to inclusion. 'Inclusion,' Dolmage (2017, 84) cautions, 'can be used as a panacea, a word that might register the presence of difference, while keeping its participation delayed'. Delaying the participation of disability in the higher education experience obscures the presence of different identities and lived experiences, which, in turn, forestalls the recognition of students with disabilities as contributing members to the learning environments of universities.

The problem with promises of diversity and inclusion in educational settings, as Ahmed (2012, 65) argues, is that such promises are predicated upon the disembodied representation of inclusion in institutional discourse, which could serve to conceal signs of exclusion and other structural inequalities that may be pervasive within the institution. 'Inclusion,' Ahmed (2012, 163) suggests, 'could be read as a technology of governance' through which 'those who in being included are also willing to consent to the terms of inclusion'. Operating as a technology of governance, inclusion sustains and reproduces 'a politics of exclusion,' whereby the inclusion of some people as part of the institution, community, or nation might entail the exclusion of others (Ahmed 2012, 163). Thus, Ahmed (2012, 183) reminds us of the need to pay attention to the *processes* of inclusion rather than focusing only on the *promise* of inclusion, which is capable of concealing and extending the exclusionary practices of an institution by giving the impression that those practices are 'overcome or undone'. By insisting on a 'rights' approach to inclusive education, we might inadvertently reduce disability to an individual 'problem' and abdicate all responsibility to address the cultural prejudices against disabled students. We could move beyond a 'rights-based' approach to inclusive education by discovering new ways for students with different identities and embodied experiences to be included as agents for positive change.

Gibson (2015), in calling for a 'post-rights inclusive pedagogy,' situates the discourse on disability and education within ongoing discussions about social justice and diversity by making connections to issues of hegemony, institutionalisation, and suppression of minority voices and identities. Gibson (2015, 876) contends that 'meaningful forms of post-rights pedagogy for inclusion can evolve' as long as 'individuals and institutions' are willing to 'engage with the conflict' surrounding the nurturing of inclusive practices and cultures in education, and to do so by 'coming to difference with openness and questions as opposed to established ideas on how to make that difference, the "other", fit'. Rather than seeking to change the 'other' by forcing them to become more 'normal,' Gibson (2015) encourages us to recognise the hegemonic power that underpins the institutional logic of educational systems that treat disability and illness as individual

'problems' that require technological fixes. This flattening out of differences among students complicates the rhetoric of inclusion in education.

As Slee (2008, 108) argues, the most significant and consequential 'reductive act' in inclusive education is 'an unwillingness to engage with the cultural and institutional grammar of schooling to identify the social nature of disablement'. By treating disability as a medical issue and ignoring the social and cultural currents that shape perceptions of disabled people, educational institutions conceal their complicity with the construction of disability as a deficit. Moving beyond the 'rights' perspective of inclusive education would require educators to make space for critical engagements with what Gibson (2015, 885) calls 'cultures of difference' and for difficult political conversations about inclusion and access in educational contexts. In that regard, Gibson (2012, 356) encourages academics to take 'a more critical look at their students' overall experience, to see and attempt to understand their different values, attitudes and knowledge'. Fostering inclusion in the higher education classroom requires critical engagement with different identities and lived experiences. As such, those of us who teach in higher education cannot rely on the academic accommodation process that universities provide for students with disabilities as the *only* means of attending to the diverse learning needs of all our students.

Indeed, making space for inclusion in the higher education classroom involves more than the signing of academic accommodation forms for students with disabilities. Given the diversity of identities and lived experiences among students who enrol in university courses, a 'rights-based' approach that prescribes administrative fixes through the academic accommodation process cannot adequately address the diverse learning needs of students. Instead, educators need to devise inclusive pedagogical approaches that recognise and embrace individual differences among students. The next section explores the inclusive prospect of a pedagogical approach that encourages students to collaborate and learn from the process of making something in temporary makerspaces that transform the classroom into a 'critical making' space.

Critical making in temporary makerspaces

The course, *Digital Lives*, invites students to engage in a 'critical making' process that involves the design and development of a digital media object that examines the social and cultural effects of digital technology on the human condition. The term 'critical making,' as Ratto (2011, 253) defines it, points to 'a desire to theoretically and pragmatically connect two modes of engagement with the world that are often held separate – critical thinking, typically understood as conceptually and linguistically based, and physical "making," goal-based material work'. When framed as a pedagogical practice, critical making opens up an experimental environment that facilitates the making of things through which critical concepts could emerge. However, as Ratto (2011, 254) observes, the goal of critical making 'is not to create objects that in their apprehension open new visions and possibilities for observers'. Instead, the practice is focused on 'the act of shared construction itself as an activity and a site for enhancing and extending conceptual understandings of critical sociotechnical issues' (Ratto 2011, 254). Critical making emphasises the collaborative act of shared construction rather than the final product of the endeavour. Ratto (2011, 253) explains that participants who collaborate on 'critical

making exercises together' are able to 'perform a practice-based engagement with prag-matic and theoretical issues' by engaging in 'an ongoing critical analysis of materials, designs, constraints, and outcomes' that pertain to the creative process. As such, Ratto's theorisation of critical making distinguishes between Dewey's (1938) 'constructivist' approach towards learning and Papert and Harel's (1991) pedagogical practice of 'constructionism'.

Dewey's 'constructivist' approach, according to Ratto (2011, 254), emphasises lived, individual, socially embedded experience as key to the learning process, whereby concepts and abstract ideas are generated to explain the phenomena experienced. In contrast, Papert and Harel's 'constructionist' approach goes a step further by emphasising the active making of things as an embodied mode of learning, or what Papert and Harel (1991, 8) describe as 'learning-by-making'. Detracting from Dewey's 'constructivist' approach to learning, critical making shares common ground with Papert and Harel's 'constructionist' approach, which promotes the active making of things as a pedagogical process. I should note that Ratto's definition of 'critical making' primarily involves the design and construction of physical objects. In my *Digital Lives* course, I adopt a broader interpretation of 'critical making' that includes the creation of performance videos in which students perform their critique of digital technology and its impact on the human condition. Although these videos are digital 'objects' that do not exist in three-dimensional space, they do require the assemblage of technological tools to produce. Indeed, I share Ratto's belief in the educational value of actively making things in order to generate new concepts. The establishment of temporary makerspaces can encourage students to collaborate on the making of digital media objects like perform-ance videos, and to critically reflect on the creative process.

'Makerspaces,' according to Sheridan et al. (2014, 505), 'are informal sites for creative production in art, science, and engineering where people of all ages blend digital and phys-ical technologies to explore ideas, learn technical skills, and create new products'. In other words, makerspaces are neither digital nor physical in character. Instead, they are *hybrid* spaces in which the interweaving of digital and physical technologies can help to generate creative outcomes. The 'performative' aspect of makerspaces is rendered salient when the 'makers' share their projects with other 'makers' while engaging in informal conversation about the concepts and production techniques behind their products. According to Anderson (2012, 13), the former editor of *Wired* magazine and the author of *Makers: The New Industrial Revolution*, 'we are all Makers'. In fact, Anderson (2012, 13) believes that 'we are born Makers [...], and many of us retain that love in our hobbies and pas-sions'. The act of making something, as Anderson understands it, is an innate human attri-bute that is fuelled by our passion for doing interesting things. However, it appears that Anderson's claim that we are all 'makers' rides on the assumption that all human beings have *equal access* to the tools and venues that facilitate their participation in maker-spaces and are thus *equally able* in their capacity to make things. As makerspaces become popular in our schools, public libraries, and universities, it might be tempting to assume that the physical and perceptual conditions that apply to an individual's experience of a makerspace would necessarily apply to how others experience that space.

While participants in makerspaces are encouraged to tinker with existing things and create new ones in the process, the act of making things prefigures the potential breaking of those things in order to modify their structure and alter their significance. This dual-act

of making and breaking is often characterised as 'hacking' – not just in the sense of disrupting computer systems but also the modification and subversion of existing technologies, spaces, and ideas. If we are all 'makers,' as Anderson suggests, then we are probably 'hackers' as well. In her critique of 'hackathons,' which are computer-programming competitions that seek a technological fix for disability and illness, Yergeau (2014) presents a refreshing interpretation of hackers: 'Hackers are *makers* (and sometimes *breakers*).' For Yergeau (2014), hacking involves creative subversion, as there is always 'resistance and tinkering involved in any act of hacking'. Hacking an app, a video, or a digital device not only modifies its structure but also disrupts the prevailing 'norms' that endow that thing with social, cultural, and political significance. Hacking-as-making involves not only the hacking of things but also the hacking of ideas and spaces. Yergeau (2014) sees hacking as a 'process' that impels us to re-examine 'disabled spaces, and how bodies and spaces move and interact with each other'.

As mentioned in the introduction to this paper, Yergeau (2014) animates the interplay between accessibility and space by characterising 'access [as] *a way to move*'. We can mobilise access in makerspaces, so that anyone, regardless of ability, age, gender, and ethnicity, can move through that space together in order to make and hack things. For Yergeau (2014), hacking-as-making is thereby also 'a way to move,' wherein the focus is not on particular software or technological interventions that seek to 'cure' disability but on the evolution of a creative process that fosters critical reflection on the spatial relations between different bodies. Mobilising access in makerspaces, hacking-as-making occurs as a collective movement through space. Yet, it is worth noting that access, as Yergeau (2014) reminds us, is not an end in itself but a verb – it is 'what we *do*, not what we are or where we arrive'. Access is not a destination but an ongoing process. 'Hacking as making' allows us to *do* accessibility by unravelling a process through which individuals with different identities and lived experiences can come together to participate in the collective act of making and hacking. The collaborative practice of hacking-as-making disrupts normative assumptions about disability as an affliction that needs to be tackled or even eradicated. Such collaborations that include disabled students in the higher education classroom might resemble what Chandler (2012) refers to as 'crip community'.

Dwelling with disability

In her discussion of 'crip community,' Chandler (2012) elucidates a nuance between the use of 'crip' as an identifier and 'crip' as a verb. 'To crip,' Chandler (2012, 1) writes, 'is to open up desire for what disability disrupts'. Thinking with the word 'crip' as both an identifier and a verb, Chandler describes the 'crip community' as a community that is 'enacted through mutual motivation or desire to dwell with disability' (2012, 1). It is the mutual desire among disabled and non-disabled people to 'dwell with disability' that can 'crip' community and bind its people together. It is worth noting that the term 'crip', as the disability scholar Sandahl (2003, 27) clarifies, 'include not only those with physical impairments but those with sensory or mental impairments as well'. Framing the collaborative relations between disabled students and their classmates in a temporary makerspace as an expression of 'crip' community could potentially subvert what McRuer (2006, 35) describes as the condition of 'compulsory able-bodiedness', which reinforces a

normative perspective that stigmatises disability as a deficit that requires fixing. By including students with disabilities in makerspaces as 'makers' and creative agents, we are shifting the conversation from a clinical context that treats disability as a problem waiting to be solved to an inclusive environment that unfolds the possibility for all students to engage with the mutual desire to 'dwell with disability' – to borrow Chandler's turn of phrase – and collaborate on multimedia 'maker' projects, such as the performance videos in the *Digital Lives* course. Perhaps in this way, students with disabilities will no longer be compelled to hide or downplay their disability in order to be accepted as contributing members of a makerspace, thus 'making space' for the presence of disability and difference while improving the accessibility and inclusivity of the higher education classroom.

Making space with digital collaborative making

In an effort to foster inclusion and mobilise access in higher education, Digital Collaborative Making encourages students to work collaboratively on the creation of multimedia projects. This research-creation approach to experiential learning facilitates the critical examination of the impact of new technologies on the human condition. Responding to the rhetoric of progress and autonomy that tends to accompany the development of new technologies, Goggin and Newell (2003, 9) argue that the treatment of technology as autonomous 'conceals the political and social contradictions and conflict associated with […] digital technologies – especially in relation to how disability is constructed with these technologies'. Goggin and Newell observe that technologies such as the wheelchair and hearing aids tend to be framed within an ideology of progress and increased autonomy that privileges efficiency over the social, cultural, and psychological effects that these technologies might bring to bear upon persons with disabilities. As a result, persons with disabilities are 'excluded or marginalised in the friction-free supposed utopia of cyberspace,' which is often due to the inaccessibility of digital applications and networking sites on the Internet (Goggin and Newell 2003, 9). To avoid romanticising the affordances of the Internet and other media technologies, students will need to be aware of the disabling effects of digital technology.

While the Internet and other communication technologies may present new work and leisure opportunities for persons with disabilities, Jaeger (2012, 25) notes that disabled people 'are also uncomfortable with their reliance on technologies' that are supposed to facilitate their participation in the activities of daily life. In other words, we need to pay attention to the ways in which digital technology constructs disability as a category that deviates from the norm, so much so that persons with disabilities may feel uncomfortable about the public perception of their interactions with digital devices. As Watson (2015) points out, 'what is needed is a theory of digital technology that recognises its democratising and liberating potentials while at the same time taking into account the political and managerial outcomes of their application on peripheral users'. Building on Watson's observation, Digital Collaborative Making seeks to foster a sense of critical awareness about the social and cultural implications of digital technology. As such, the principles of access and inclusion are situated at the heart of Digital Collaborative Making, more generally, and the *Digital Lives* course, in particular. Devised as a form of research-creation pedagogy, Digital Collaborative Making encourages students to collaborate on an

applied media project (e.g. a performance video) that critiques the impact of digital media technologies on the human condition.

Collaboration, in the context of Digital Collaborative Making, entails a willingness among all participants in the making process to be open to conflict, contradiction, and the presence of different identities and lived experiences in the classroom. The aim of the creative enterprise is not to seek perfection. Rather, it is the *process* of making an applied media project that embodies the collaborative ethos of Digital Collaborative Making. In the *Digital Lives* course, students perform their critique of digital technology and its impact on society, culture, and the human condition by working together to create a performance video. Instead of avoiding conflict and contradiction, the critical making process emphasises negotiation, compromise, and the willingness to learn from other students.

Besides creating the performance video, every student must submit an individual reflection paper that reviews their experience working alongside fellow group members on the project. In their reflection, students are invited to respond to these questions:

(1) What did you do to foster inclusion and access within your group?
(2) What steps did you take to ensure that every group member feels valued and respected?
(3) How would you improve the interpersonal dynamics in your group?

The reflection paper offers students the opportunity to consider what it means to be in the presence of classmates who may look different and have different beliefs and experiences. At the same time, the collaborative process of making the performance video allows students to be engaged with different forms of digital technology and digital production techniques. Today's youth, as Groff (2013) observes, are not passive consumers of digital technology and digital media products but 'prosumers' of multi-modal and multi-media content. 'As a result of new media arts education instruction and DIY digital culture,' Groff (2013, 23) explains, 'we are reaching a period where it is just as easy for young people to reproduce that multimodal, multimedia content as consume it'. Given that this creative agency is evident on social media platforms, such as YouTube, Instagram, and Facebook, Digital Collaborative Making actively encourages the generative impetus to produce meaningful digital media projects. The next section will examine how Digital Collaborative Making fosters inclusion by looking at three student projects that include students with disabilities as creative agents.

Fostering inclusion: a review of student projects in *Digital Lives*

In the Spring 2016 and Winter 2018 terms, I taught the course, *Digital Lives*, which examines the social and cultural impact of digital technology on the human condition. In each term, there were two students (out of a class of thirty students) with a documented disability. In Spring 2016, there was one student with a physical disability and another student with an undisclosed disability. In Winter 2018, there were two students with an undisclosed disability. In the first class, students were allocated some time, known informally as 'speed-dating,' to acquaint themselves with the personality and background of their peers before deciding to join a project group. Students with disabilities can choose to

reveal their disabilities to their classmates. Once the project groups were finalised, the students could start designing a performance video that examines an issue pertaining to digital culture and the impact of digital technology on the human condition. Apart from the video, they had to document the creative process on a Development Blog by posting photos, personal reflections on the project, as well as research articles that were relevant to the topic of inquiry in the performance video. For every class, students were given thirty minutes of 'workshop time' to develop their video projects using the digital media tools and other materials, such as crayons, coloured paper, and Bristol boards, that they have gathered for their projects. As this was a student-led endeavour, my principal role was to facilitate the creative process by suggesting ideas and appropriate digital media tools that the students could use to create their videos. In order to illustrate how the emergence of a temporary makerspace fosters inclusion through Digital Collaborative Making, I will look at three projects in the *Digital Lives* course.

The **first project** complicates the idea of access by imagining what it is like to live without Internet connectivity for a day. The group behind the project consisted of Sarah, a student with a physical disability, two non-disabled female students, and one non-disabled male student with an immigrant background. Set in the digital era where access to the Internet and mobile communication networks seem ubiquitous, the project seeks to understand how the loss of access to these digital communication technologies might affect such marginalised social groups as the elderly, people with disabilities, immigrants, and individuals with comprehension difficulties. To that end, the group produced a performance video that explores a scenario in which the sudden loss of Internet access could cause immense difficulties for persons with mobility issues and learning disabilities.

The beginning of the video introduces the audience to Sarah, a student with a physical disability who travels across campus in an electric wheelchair. In the following scene, Sarah meets up with her non-disabled classmate who needs help locating the schedule for the bus service that will take them to the local mall. Without hesitation, Sarah takes out her mobile phone and tries to access the digital app for the local transit system. It doesn't take long before she discovers that the Internet connection is down. She tries repeatedly to connect her mobile device to the network, but nothing seems to work. Meanwhile, her classmate is visibly frustrated about the sudden loss of Internet connection, which has derailed her plans to go to the mall to purchase new clothes for an upcoming job interview. Feeling undeterred, Sarah and her classmate decide to head over to a local bus stop where a hard-copy schedule is on display. When they arrive at the bus stop, they discover that the printed schedule has not been updated for months and the information provided is incomplete. They are forced to cancel their trip to the mall.

The fictional scenario that the group's video depicts problematises the topic of 'access' on two levels: First, there is the issue of Internet access, whereby the sudden loss of network connectivity can throw our daily plans into disarray. In many Canadian cities today, the most accurate bus schedules are available only in digital format, whereas the physical-copy versions are oftentimes inaccurate or incomplete. Besides, public transit apps do offer real-time information about the location of buses in the city. Such convenient features allow users to plan their travel routes more efficiently. On the second level, the accessibility of the public transit system is rendered salient when there seems to be a lack of proper alternatives to the digital applications on which the system is

reliant. This issue implicates the accessibility of social spaces on both the physical and virtual levels. Titchkosky (2011, ix) approaches the question of access by conceptualising 'access as a complex form of perception that organises socio-political relations between people in social space'. The inaccessibility of the transit system only becomes perceptible when access to Internet connectivity is curtailed, as processes of inclusion and access 'can arise only insofar as exclusion has already become an issue and is already perceivable' (Titchkosky 2011, ix). As Sarah (2016), the student with a physical disability, explains in her Reflection Paper, the use of paper bus schedules as a 'back-up' for transit users who cannot access the Internet 'does not consider the needs of some of the most vulnerable people in our society, who may, in fact, be prone to experiencing limited Internet access'. Sarah uses an electric wheelchair, and she travels around the Waterloo region by public transit. But while all public buses in the region do feature access ramps, persons with disabilities have to rely on published bus schedules that contain limited and inaccurate information. As such, Sarah has been advocating for greater accessibility across the public transit system.

When the storyboard for the performance video was being developed, Sarah persuaded her group members to explore the accessibility of digital communication networks and its impact on the public transit system in Waterloo. As the group members negotiated their roles in the project, Sarah volunteered to take charge of the technical aspects of making the video, while her group members focused on gathering props and selecting suitable locations for filming. Through trial-and-error, Sarah taught herself to use a digital camera to capture moving images. Along the way, she also learned to use digital editing software to edit the footage in which she and her group members appear as performers. As a result of the Digital Collaborative Making process, Sarah became acquainted with digital media production and exercised creative agency by editing a performance video, while her group members discovered new perspectives regarding the accessibility of digital communication and public transit systems that many people take for granted. This creative process required negotiation and compromise among the group members.

The aim of the video project was not to attain technical perfection or to idealise a person's ability in video production. Instead, Sarah's appearance in the performance video as a student with a physical disability gestures towards the possibility of celebrating disability, perhaps in the hope of fostering a mutual desire among disabled and non-disabled students to, as Chandler (2012) puts it, 'dwell with disability'. 'Disability,' as Dolmage (2017, 85) contends, 'must be seen as socially negotiated' rather than being seen as 'something one person diagnoses in another'. Fostering an inclusive environment in which people with disabilities are regarded as 'the agents of negotiation,' the collaborative process of making the performance video encourages all students to 'claim difference without fear of discrimination' (Dolmage 2017, 85). Having seen how Sarah, a student with a physical disability, can participate meaningfully as a creative agent in a temporary makerspace, let us turn our attention to another student project.

Through the artistic collaboration between Irene (not her real name), a student with an undisclosed disability and a minority ethnic background, and two non-disabled female classmates, this **second project** examines the material effects of digital representation on social media. Focusing on the image-sharing platform, Instagram, the project explores the ways in which the digital representation of people's lives on social media might differ from their actual life in reality. In an effort to 'hack' the seemingly non-material existence

of social media profiles, the group's video presents a surprising twist. Instead of depicting a typical Instagram account on the Internet, Irene and her group members made use of markers, coloured paper, printed photographs, and a Bristol board to create a physical Instagram profile page as a means by which to 'hack' the idea of a digital social media profile. In addition to hacking the conventional appearance of the typical social media profile on the Internet, the physical rendering of a fictional Instagram profile on a Bristol board constitutes a hacking of spatial relations, as digital space and physical space appear to converge and the distinction between these spaces becomes ambiguous. The fraught distinction between digital space and physical space is juxtaposed with the tension between visibility and invisibility that Irene encounters while working alongside her non-disabled group members, Vivian and Margot (not their real names), on the collaborative making of their performance video.

In a video that traces the evolution of a young woman's 'digital life' on Instagram, Vivian plays the role of a self-styled social media celebrity who is eager to portray an idealised image of her personality on her Instagram profile, which contains photographs of her in sophisticated clothing and make-up, while Margot plays the role of a famous photographer who knows how to realise her client's desire for fame. As for Irene, she is seen at the start of the video pasting photographs of Vivian on the Bristol board that mimics an Instagram profile page. Even though Margot and Vivian have encountered Instagram in real life, they have minimal experience working with digital video editing applications. Given Irene's experience in digital art production, she volunteered to be in charge of filming and editing the performance video. She experimented with several video-editing applications before settling on Final Cut Pro, which she used to infuse the video footage with a filmic quality. Indeed, it is through Irene's eyes that we come to visualise and experience the possibility of hacking a digital social media profile with the construction of a physical Instagram profile. But despite the visibility of her editorial role in the project, Irene's undisclosed disability remains invisible throughout the video, as is the case in real life. This tension between visibility and invisibility is significant, as persons with non-apparent disabilities often have to contend with public scepticism towards their experience and their calls for greater access to resources that can support their learning needs. By 'dwelling' with disability and the presence of different identities and lived experiences among the group members, the group's video foregrounds the tension surrounding the digital representations of disability on social media. But even as this tension is rendered salient in the video, the collaborative process of making a performance video presents Irene and her group members, Vivian and Margot, with an opportunity to 'dwell with disability' while learning about their experiences with social media.

Whereas the second project reconfigures the digital manifestation of the social media profile into a material object that exists in physical space, the **third project** attends to the interactions between humans and digital media technologies like Augmented Reality (AR) in order to examine the accessibility of such technologies. This project makes creative use of an existing physical space to make an argument about how players of the AR video game, *Pokémon Go*, are engaged with the virtual game-world that appears on their smartphones while they remain situated in the physical world. *Pokémon Go* is an AR video game that straddles the border between virtual reality and physical reality, a border that is marked by the presence of the touch-screen surface on a smartphone. As such, the group's performance video foregrounds the interface

between the virtual elements that unfold on the screen of the players' smartphones and the physical reality that surrounds them in the real world. In turn, this interface between the spaces of virtual reality and physical reality draws attention to the ways in which digital media technologies like AR could affect the accessibility of these technological innovations.

Right from the beginning, the group's video reveals the camaraderie between Stefanie and her friend as they interact with the virtual elements in *Pokémon Go* using their smartphones. Both are students with undisclosed disabilities. Throughout the video, they are seen traversing the university campus in search of virtual characters using their smartphones. These are virtual entities that other players of the video game have hidden at various parts of the precinct. By showcasing the students' engagement with *Pokémon Go*, the group's video transforms the university campus into a space of possibility for making an argument about the interface between physical and virtual spaces and its impact on the lives of persons with disabilities.

At one point in the video, the protagonists encounter a common space where students seem to be busy interacting with their smartphones rather than engaging in conversation with each other. While it is unclear if these students are playing *Pokémon Go* on their smartphones, the video gives the impression that the students are engaging in the same gaming activity as the two protagonists by superimposing a screenshot depicting an active *Pokémon Go* session onto the scene. Through this clever overlay of virtual and physical spaces in the same scene, the video conveys a sense of solidarity between the protagonists, who are students with undisclosed disabilities, and the students with whom they share the common space. The argument here seems to be that all students, regardless of differences in identity and lived experience, can partake in the same activities and enjoy similar experiences, despite being engaged with the digital devices in their hands, and not with each other. By dwelling with disability and the presence of students with different identities and lived experiences on the same university campus, the group's performance video celebrates disability and the diversity of human experiences in an augmented reality social space that straddles virtual and physical realities. This inclusive message is reflective of the social dynamics and spatial relations between the two students with disabilities and their non-disabled group members.

In an ethnically diverse group, with members identifying with different minority backgrounds, every student had the opportunity and space to express their views on the project. Although all four members were interested in *Pokémon Go*, the non-disabled members wanted to address the socio-economic implications of the game, as anyone who wanted to play it would need access to a smartphone and wireless Internet connectivity. In contrast, the disabled members in the group wanted to investigate the prospect of fostering inclusion through an augmented reality game. A compromise was needed in order for the group to move forward with their project. Such a compromise required the students to negotiate their differences and adapt to the contrasting perspectives of their peers.

'To foster inclusion in our group,' as Stefanie, the student with an undisclosed disability, explains in her 'Reflection Paper' on the project, 'we made sure to have open communication throughout the project and to give everyone's idea equal ground'. Besides ensuring equity in the delegation of responsibilities, the group members embraced the principle of 'fair consideration' for every idea. As Stefanie (2018, 2) elucidates: 'Though not all my ideas made it into the video, I felt like they were all considered, and when we decided

against them it was because there was another idea that could improve our project'. After a few brainstorming sessions, the group decided to explore the social accessibility of *Pokémon Go* and the ways that the augmented reality game could influence the player's embodiment with digital technology through the interface between virtual and physical spaces. To that end, the students with disabilities took charge of crafting the artistic vision and delineating the production process for the video, while the non-disabled students managed filming decisions and post-production editing. As a result, the group could collectively conceptualise the project and divide their responsibilities in an equitable manner that draws on their personal interests and experiences. In an effort to foster inclusion and mobilise access in higher education through Digital Collaborative Making, the performance video assignment, as all three student projects reveal, cultivates an environment that includes disability and encourages students to 'claim difference without fear of discrimination' (Dolmage 2017, 84). By situating the principles of access and inclusion at the heart of the *Digital Lives* course, students with disabilities become agents of negotiation and creativity.

Conclusion

In this paper, I have explored the meaning of inclusion in education and its effects on students with disabilities. I also discussed the need for academics and educators in higher education to move beyond a 'rights-based' approach to inclusion by devising inclusive pedagogical approaches that actively encourage collaboration between students. Turning to 'critical making' as a pedagogical process that operates in temporary makerspaces, I considered the different ways that the research-creation pedagogy that I refer to as 'Digital Collaborative Making' recognises the presence of students with different identities and lived experiences in the higher education classroom and encourages collaboration between them. Looking closely at three student projects from the *Digital Lives* course, I examined how disabled students could collaborate with their classmates on the making of performance videos that critique the impact of digital technology on society. Nevertheless, there are lessons to be drawn from my attempt at fostering inclusion through the use of Digital Collaborative Making as a research-creation pedagogy and the creation of temporary makerspaces that are accessible to all students.

One significant drawback in the application of Digital Collaborative Making in the *Digital Lives* course has to do with the limited number of groups that featured students with disabilities. While students in those groups without disabled students were aware of the presence of disability in the class, they did not enjoy many opportunities to interact with their disabled classmates. In a future application of Digital Collaborative Making, it might be possible to assign several small 'maker' projects that allow every non-disabled student in the class to have at least one opportunity to collaborate with a disabled classmate. Such an arrangement could improve the inclusive prospect of Digital Collaborative Making and enhance the accessibility of the course.

It is worth noting that there are different ways in which the course could become more inclusive and accessible. Every approach should remain open to further improvement, as inclusion and access are processes that continually evolve. Perhaps we would do well to recall Yergeau's (2014) interpretation of access as '*a way to move*' that focuses on 'disabled spaces, and how bodies and spaces move and interact with each other'. Yet these disabled

spaces are not meant for the exclusive use of persons with disabilities. As Yergeau (2014) reminds us, non-disabled people are not 'exempt or prevented from doing the work of disability rights'. What we need to do, however, is to move away from the use of narratives of overcoming and such disability tropes as mystery, heroism, and charity when considering the inclusive prospect of Digital Collaborative Making and the accessibility of makerspaces. Fostering inclusion in a makerspace that embraces the presence of different identities and lived experiences among university students would entail the hacking of existing ideas about disability as well as those spaces that continue to inhibit or exclude the creative agency of persons with disabilities.

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Disclosure statement

Note on contributor

Stephen Fernandez is a lecturer at the University of Waterloo, where he teaches rhetoric, disability studies, and digital media studies. He has published peer-reviewed work on the topics of disability, performance, and digital media. His current research explores the inclusivity and accessibility of critical making as a research-creation pedagogy that fosters collaborative relationships between disabled and non-disabled students.

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