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# Utilising mobile technologies for students with disabilities

## Book section (Accepted version)

# A POSITION PAPER ON THE DEVELOPMENT OF INCLUSIVE TECHNICAL CAPITAL BY STUDENTS WITH DISABILITIES THROUGH THE USE OF MOBILE TECHNOLOGIES

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## ABSTRACT

This paper proposes a model of inclusive technical capital, and its use in the evaluation of technology and education designed to include students with disabilities. This paper also examines the role of mainstream mobile technologies and m-learning in the inclusion of students with disabilities. A recent research project on the inclusivity of native settings and apps on Apple's iOS and Google's Android mobile operating systems is reviewed, and a model of evaluation is proposed as a starting point for future evaluations. The paper concludes that mobile technology has advantages over traditional assistive technologies as a tool of inclusive technical capital. However, more needs to be done to develop tablets and smartphones' native settings and apps to include students with disabilities. It is also found that mobile devices as a whole need to become cheaper in order to make them more socially inclusive.

Keywords: disability, inclusion, exclusion, assistive technology, inclusive technology, technical capital, cultural capital, pedagogy, m-learning, mobile technology, tablets, smartphones.

## INTRODUCTION

This paper is a position piece on the use of mobile technologies, such as smartphones and tablets, by students with disabilities to positively develop inclusive technical capital through the enhancement of study skills. It is argued that these study skills can be used to promote inclusion in classroom and individual revision settings. The model of inclusive technical capital discussed in this essay is based on a previous model of technical capital defined by Yardi (2010), which itself was a techno-sociological adaptation of Bourdieu's (2010) model of cultural capital. These previous models were designed to promote equality of opportunity through access to education, information, knowledge, etc.

This paper is particularly necessary at this time as the use of mobile devices is becoming ubiquitous by students in mainstream learning environments, thus the skills that are needed to access the information, data and knowledge they can deliver are vital for providing inclusion in mainstream culture. Exclusion from these devices places the non-user at a disadvantage and less able to access education and training, benefits, support, social status and democratic representation. Despite the increasing importance of mobile devices, little evaluation has been conducted on their use by students with disabilities in both mainstream and separate educational institutions (Hayhoe, 2013). In addition, inclusion of disabled people is felt to be established through access to mainstream institutional education. However, little has been written on the role of mainstream technologies in this process, even though they hold an important role in modern life (Hayhoe, 2014a). This paper therefore defines a need for the investigation of effective mobile technology use during class, lecture, seminar and individual study sessions, whilst also assessing whether there is an advantage of such technologies over traditional accessible technologies, such as custom zoom devices and adapted keyboards.

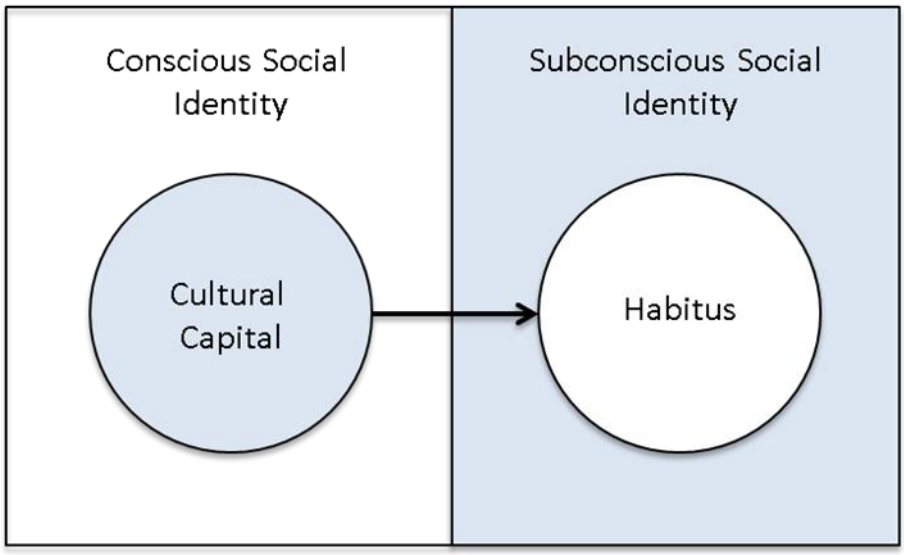
## THE DEVELOPMENT OF CULTURAL AND TECHNICAL CAPITALS

Bourdieu (2010) observed that cultural capital is learnt through social agencies such as the family, peer groups and institutions. Bourdieu described this process of learning capital as the internalisation of subconscious habits, which is what he termed habitus, or the "principles which generate and organise practices" (Bourdieu, 1990: P. 53). In the context of health analysis and psychological learning behaviour, habitus has been defined as the internalized traditions that lead to cultural practices, and are thus a deep seated, internalized structure of cognitive understanding beyond conscious language (Swartz, 2002; Lizardo, 2004). This approach seems particularly relevant to an analysis of inclusion in the education of students with disabilities, as habitus precedes the learning objectives of formal education and thus lacking habitus, such as basic study skills, can exclude students from becoming successful in education. This leads to the negative social identity of students who believe they cannot learn. Cultural capital also comprises the accumulation of conscious knowledge on the prevailing culture, including knowledge on the use of and access to prevailing technologies (Bourdieu, 2010).

The habitus of study skills can also lead to the development of cultural capital in other aspects of education too, which reinforces this habitus in more traditional forms of learning and the social identity of a student as one who can learn. This process thus becomes cyclical. For example, knowledge of the use of a computer can be defined as cultural capital. For students who are visually impaired or dyslexic, this cultural capital may allow them to develop the habitus of accessing audio formats of books, the capacity to change page colours or access enlarged artworks on the web. This in turn can make students develop further cultural capital,

such as knowledge from the contents of a book or artwork. This process thus becomes a cyclical process, and allows students to develop the identity of knowledgeable and successful students, and continue to develop inclusive technical capital in order to reinforce their social identity. This transformation is illustrated in Figure 1.

Figure 1: An illustration of cultural capital, habitus, and social identity




For example, Bourdieu argued that it was through this form of education that the practice of studying the field of art, which he called a field of study or knowledge, became part of the viewer's social identity. This resulted in practice of habitus and further development of cultural capital. This process Bourdieu formulated as follows:

"[(habitus)(capital)] + field = practice" (Bourdieu, 2010, p. 95)

Taking inspiration from Bourdieu's theory of cultural capital, Yardi defines technical capital as, "the availability of technical resources in a network, and the mobilization of these resources in ways that can positively impact access to information and upward mobility."

(Yardi, 2010: P. 1). Technical capital is often used as an instrument to analyse social network interactions, and the ability of people to function, develop and become included culturally within on-line communities. This use of capital increases the chances of developing further capitals, such as social and financial capitals. For example, the ability to work online allows the user to access certain forms of education, apply for certain types of employment, talk with people who may further their social status, and conduct business that will enrich them. Consequently, Brock, Kvasny & Hales (2010) find that the use of on-line social forums and discussions boards designed specifically for black women has enabled its users to empower themselves by communicating information that would otherwise be unavailable to them.

## A MODEL OF INCLUSIVE TECHNICAL CAPITAL AND ITS DEVELOPMENT THROUGH MOBILE TECHNOLOGIES

Inclusive technical capital can be defined as practice which uses inclusive mainstream technologies to promote inclusion in further forms of social, cultural and financial capitals, through enabled habitus in education and training. Traditionally, accessible or sometimes known as assistive technologies have been defined as, "any item, piece of equipment, or system, whether acquired commercially, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities." (Architectural and Transportation Barriers Compliance Board, 2000: P. 80504). Hayhoe (2014a, 2014b) argues that these traditional assistive technologies, such as hearing aids, separate electronic magnifiers and brailling devices, do not promote inclusion as they often:

- identify and draw attention to disabled students in educational settings;
- culturally separate and exclude students with disabilities from those who are able bodied;

- provide reasons not to include disabled students in mainstream education, as the skills needed by educators to use and teach disabled students are highly specialised. This necessitates students' removal from lessons in order to provide separate training.

It can thus be argued that inclusive technical capital appears to be more applicable to students' use of new forms of mainstream settings and apps that have been embedded in modern tablet devices and therefore, either purposely or accidentally, lend themselves to redefinition as inclusive technologies – i.e. mainstream technologies that can be used by people with disabilities with little or no adaptation (Hayhoe, 2014a, 2014b). These devices are powerful tools of social inclusion, have inclusive applications in educational settings, and are often used by students to create and share information (Hayhoe, 2013, 2012). Thus, it is argued that Bourdieu's equation on practice can be redefined in terms of inclusive practice and expressed as follows:

[(mainstream habitus)(inclusive technical capital)] + mainstream field = inclusive practice

More recently, digital technologies have provided inclusive help in making literature, communication and knowledge available to disabled students (Baga, 2012; Chen, 2012; Gkatzidou & Pearson, 2009), and advanced software has helped to overcome barriers to education through, for instance, the audio descriptions of books and art works, enlargement or recolouring of text on screen, and representation of sound as text (Hayhoe, 2012, 2014a, 2014b). Hayhoe (2014a, 2014b) also argues that such technologies have seen a paradigm shift, inevitably leading to a contemporary philosophy of inclusive technology, where accessible systems are unrecognisable from their mainstream counterparts. Examples cited of

this technology are Apple's iOS, which claims superior accessible features blended into mainstream apps and functions (Apple, 2015).

This redefinition has led to a need for adapted research methodologies and models of analysis for conducting evaluations of modern tablet devices for their inclusivity. These are only starting to be developed. For example, recent research in preparation for a university based study skills course observed that the functions and native apps of Android and iOS were more easily divided according to media formats (text, audio, and photographic / video formats) and gestures (Hayhoe, 2014b, 2015). The reason for this analytical subdivision were twofold: (1) the accessibility options of Android and iOS's features and native apps were themselves divided according to these media formats (see for example Apple, 2015), therefore trials were conducted on study skills according to the same internal logic; (2) early trials showed that study skills required a number of overlapping media functions, which themselves could be conducted using the same formats, therefore it seemed that applications of the hardware devices hosting the operating systems were also designed according to media formats rather than the pedagogical skills the devices were said to support.

Hayhoe's (2015) evaluation also observed that the division of functions and apps according to media and gestures was not apparently an issue with regards to traditional technical capital, as these skills would allow the user, if the functions were accessible, to create, manage and swap information in a number of different formats with people of similar cultural backgrounds. Additionally, as devices did not necessarily reveal the true identity of the user, they also allowed students to keep their disability anonymous and develop a socially and culturally ambiguous identity. For example, both operating systems allowed for the enlargement of text,

the reversal of colours and for the saving and changing of video files in order to increase their quality or ease of storage. Hayhoe concluded that they thus have the potential to increase disabled students' technical capital and therefore inclusion in mainstream education to a large extent. However, these findings were unbalanced and a number of other settings and functions make each operating system less useable than the other as tools of inclusion. For example, Android's native facilities allow for audio recording, organizing and sharing audio files whereas iOS's do not. Similarly, iOS has native apps that allow for the development of photo-negative images, time-lapse recordings and custom gestures, whereas these functions were not available in Android (Hayhoe, 2015).

## CONCLUSION

The development of inclusive technical capital for students with disabilities is particularly important for the development of social, cultural and financial capitals. Modern mobile devices can help in the development of inclusive technical capital, and can potentially lead to enhanced inclusion in mainstream educational settings where traditional assistive technologies continue to leave students excluded. However, students with disabilities, their teachers and those that support students with disabilities must evaluate systems according to individual impairments and educational needs, and judge which functions are important for the development of study skills given their particular impairments, contexts and environments. Furthermore, the most popular mobile operating systems still need to develop their functions in co-operation with educational institutions and students with disabilities, and developers also need to make mainstream native apps and usability for people with disabilities standardised. Furthermore, hardware manufacturers need to make devices more financially accessible in order to evaluate their potential as tools of inclusion and cultural

diversity. Only then will inclusive technical capital become more freely available through education, and students feel included.

## REFERENCES


Apple. (2015). Accessibility. Downloaded from https://www.apple.com/uk/accessibility/ios/ on the 20/1/2015.

Architectural and Transportation Barriers Compliance Board. (2000). Electronic and Information Technology Accessibility Standards (36 CFR Part 1194). Federal Register, 65, 246, 80500-80528.

Baga, J (2012): E-Resource Round Up: Emerging Technology As Assistive Technology: Conference Report. Journal of Electronic Resources Librarianship, 24, 1, 46-48.

Bourdieu, P. (1990). The logic of practice. Stanford, California: Stanford University Press.

Bourdieu, P. (2010). Distinction. London: Routledge Classics.

Brock, A., Kvasny, L. & Hales, K. (2010). Cultural appropriations of technical capital: Black women, weblogs, and the digital divide. Information, Communication & Society, 13/7/1040-1059.

Chen, L.L. (2012). Integrating iPad in a special education class: A case study, In T. Bastiaens & G. Marks (Eds.), Proceedings from the World Conference on E-Learning in Corporate, Government, Healthcare and Higher Education, 2012. Chesapeake, VA: AACE.

Gkatzidou, S. & Pearson, E. (2009). The potential for adaptable accessible learning objects: A case study in accessible vodcasting. Australasian Journal of Educational Technology, 25, 2, 292-307.

Hayhoe, S. (2012). Using an iPad with a blind student: A case study at Sharjah Women's College, In Dowling S. et. al. (Eds.). eLearning in action (Volume 1.): Opening up learning. Abu Dhabi: HCT Press.

Hayhoe, S. (2013). A review of the literature on the use of mobile tablet computing as inclusive devises for students with disabilities. Proceedings of the Current Trends in Information Technology 2013 Conference, Dubai, 11-12 December 2013. New Jersey: IEEE.

Hayhoe, S. (2014). A philosophy of inclusive technology for people with special needs, and its application in a course using mobile computing devices for undergraduates at the London School of Economics, UK. Proceedings of EDULEARN14: Education and New Learning Technologies. Valencia: IATED.

Hayhoe, S. (2014a). The need for inclusive accessible technologies for students with disabilities and learning difficulties, In L. Burke (Ed.). Research, Reflections & Arguments on Teaching & Learning in a Digital Age. Melton, Suffolk: John Catt Educational Publishing.

Hayhoe, S. (2015). A pedagogical evaluation of accessible settings in Google's Android and Apple's iOS mobile operating systems and native apps using the SAMR model of educational technology and an educational model of technical capital. INTED2015 Proceedings, 9th International Technology, Education and Development Conference. Valencia: IATED.

Lizardo, O. (2004). The cognitive origins of Bourdieu's habitus. Journal for the Theory of Social Behaviour. 34/4/375-401.

Swartz, D.L. (2002). The sociology of habit: The perspective of Pierre Bourdieu. The Occupational Therapy Journal of Research. 22/615-695

Yardi, S. (2010). A Theory of technical capital. Paper delivered to the TMSP Workshop, Georgia Institute of Technology, Georgia, US, February 11-12, 2010.