

Investigating Learning Challenges Presented by Digital Technologies to Universities in the 21st Century: A Case Study

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Abstract— There is now widespread recognition that digital technologies, particularly portable hand held devices capable of Internet connection, present opportunities and challenges to the way in which student learning is organized in schools, colleges and institutions of higher education in the 21st Century. Traxler (2010) suggests such devices are pervasive and ubiquitous, conspicuous and unobtrusive, noteworthy and taken-for-granted with everyone typically owning one, using one and often having more than one. As a consequence it has been argued that the availability of such devices, controlled mainly by the student and not the teacher, has the potential to change the traditional dynamics and pedagogical patterns of the learning environment (Burden et al, 2012). Education institutions, however, typically remain organized around spatial and temporal considerations such as buildings, timetables, calendars and internal structures which are designed to classify and manage students. In the case study reported here students and faculty teaching staff from the College of Education in the University of Kuwait were surveyed in order to assess their access to such technologies, their capability to use them effectively in support of achieving planned learning outcomes and the implications for change that could emanate from such findings.

Keywords: digital technologies; pedagogy; learning; higher education

DIGITAL TECHNOLOGIES AND LEARNING

The term 'digital technologies' in this regard refers primarily to multi-functional equipment or devices with Internet connectivity capable of using Web 2.0 tools or applications and particularly to devices that are handheld and portable, a definition which generally means smartphones and tablet computers. In its original form (Web 1.0) the Internet was used by a small elite in a 'delivery and receipt structure' as it only permitted a one-way flow of information and service to the end user (Crook, 2008).

This provided limited opportunities for individual or communal knowledge creation and sharing since it required high levels of technical expertise and understanding (Greenhow et al, 2009). These characteristics have fundamental epistemological implications as knowledge was created and validated by a relatively limited number of experts who based their authority and validity on formal evidence-based argumentation (Dede, 2008). Web 1.0 is comparable, therefore, to an encyclopaedia in its library-like structures and procedures and is portrayed as a repository for growing amounts of information and data, generated and authenticated by credentialed authors and experts (Nagy and Bigum, 2007). Users are able to read the content or information in the database (akin to borrowing a volume from a library), but are generally unable to contribute or add to this knowledge repository. In this sense it remained epistemologically traditional since knowledge was created and maintained by a relatively small group of privileged authors (Dede, 2008).

Burden (2012) argues that in contrast to the closed repository metaphor which characterized Web 1.0, however, Web 2.0 is personified as a 'read and write', democratic and highly participatory publishing model. It is not just access to greater volumes of content which is radically changing the Internet, but rather the fact that users could access a greater volume of people and therefore potential communities (Crook, 2008). Burden (2012) concludes that user participation is the activity which most accurately sets Web 2.0 apart from its predecessor Web 1.0. Where Web 1.0 was essentially a one way 'read only' channel, Web 2.0 embraces 'read-write' along with a host of benefits that enable access to

both services and resources and provide opportunities to build learning communities. Additionally, Web 2.0 has moved away from the mainly text-based architecture and has begun the process of fostering social interaction and knowledge representation based on multi-modal representations including images (e.g. Flickr), video (e.g. YouTube), audio (e.g. Podcasts) and combinations of these various media. This in turn has transformed the kind of social interaction possible over the Internet making it feasible to undertake discourse and dialogue without having to rely on text based mediation.

In examining these changes the American Society for Training and Development (2009) not only reflected the way in which the 'millennials' (those born between 1977 and 1997) approach learning, but also identified the need to incorporate these digital technologies into the workforce of the future:

The online world has redesigned communication in and outside the workplace; anyone can access almost anything about a topic, so [young people] are now accustomed to accessing multiple open sources of information for solutions. As a result there are more collaborative technologies that have enabled the learning process to evolve from a fixed series of discrete training events into an informal, ongoing experience. Learning can easily occur anytime, anywhere and in a variety of formats. (p 3)

Web 2.0, therefore, offers the potential for different forms of learning and teaching to occur both synchronously and asynchronously. This has the potential to be hugely beneficial to students in higher education who could have greater (and more detailed discourse) with both their professors and fellow students in a real-time environment. Additionally asynchronous communication affords learners greater time for consideration and reflection than traditional face-to-face spaces where responses and feedback are expected more immediately (Ziegler, 2001). Web 2.0 technologies thus generate new opportunities and challenges for how learners undertake personal research or inquiry in the face of unprecedented access to information and sources of data (Crook, 2008). They provide greater choices for how learners undertake and co-collaborate in an inquiry, but they also raise new challenges around the selection, interrogation and validation of the data they locate.

IMPLICATIONS FOR PROVIDERS OF HIGHER EDUCATION

Web 2.0 technologies are a core feature of the 21st Century, therefore, which thus presents the possibility for a fundamental change to education, shifting from passive acquisition of someone else's ideas to active learning experiences that empower people to inquire, critique, create, collaborate, problem solve, and create understanding (Dede & Barb, 2009). With new technologies information is continually being developed, distributed and acquired and has become a paradigm that cannot be ignored within educational organizations (Courville, 2011). Selwyn (2007: 91) makes the case that these digital technologies could allow universities to reinvent themselves, requiring institutions to make a shift "from the representational capabilities of ICTs (i.e., their ability to represent commoditized informational delivery modes of higher education) to their more expansionist and relational potentials".

The rapid and wide-spread adoption of these services and technologies are the result of an evolving media narrative in which human interaction and engagement has evolved from traditional face to face conversations, through symbolic representation systems (e.g. print and books) to audio visual transmission (e.g. radio and television), and through into digital networked formats (e.g. computers) (Dabbagh and Reo, 2011). Web 2.0 technologies are the most recent variation of this continuing and evolving trend and are deemed to be one that offer enhanced learning opportunities, often referred to as 'pedagogical affordances'. The term 'affordances' was first used to describe "an *action possibility* (emphasis added) available in the environment to an individual, independent of the individual's ability to perceive this possibility" (Gibson, 1982). Recently the term has begun to be used in educational technology contexts to explain and predict the potential of individual technologies for teaching and learning, (Burden & Atkinson, 2008; Greeno, 1994; Conole & Dyke 2004).

The concept of pedagogical affordances illustrates how professors and students can change or transform their perspectives and meanings as a result of their interactions and use of Web 2.0 technologies. Pedagogical affordances contingent upon digital technology often only emerge through the imagination and creativity of the individual user as they conceptualize an educational problem or puzzle and

recognize a technology related solution. The process of blogging (the writing of a personal story on the Internet – a Web Log), for example, entails simple typing and editing which are not affordances in themselves, but which might lead to sharing, participation and interaction between teachers and learners (or amongst learners themselves) (McLoughlin & Lee, 2008: 3). It has been predicted that the Internet will transform learning in the twenty-first century, in the same way electrification transformed social practices in the twentieth century (Brown & Duguid 2000). Furthermore, Male & Burden (2013) suggest the implications for education caused by the development of such technologies are enormous and the anticipated change probably ranks alongside the introduction of the printing press in terms of historical importance.

O'Reilly (2005), seemingly the first person to use the phrase 'Web 2.0', recognized the enormous potential inherent within contemporary computer technologies to enable the emergence of user-generated content (UGC), with participation identified as a key feature or affordance. Web 2.0 technologies have considerable potential value to support the processes of knowledge construction and co-construction within social groups with obvious implications for learning and education. The 'push-pull' architecture of the Internet invites participation, generating symmetry between production and consumption which is not evident in traditional 'broader-casting' mediums such as television or traditional models of formal learning. Tools such as wikis, social networking software (e.g. FaceBook) and aggregator services (sites which bring together artefacts from other places) are identified as the means by which educators might shift the emphasis of their teaching by empowering the student to see themselves as knowledge co-constructors rather than passive recipients of information provided. In an era when knowledge is no longer fixed and is subject to challenge on the very public platform of the Internet students need the skills to explore and synthesise data in order to determine knowledge and construct meaning. The benefits of Web 2.0 technologies, largely based on the use of social networking, have been identified through the iLANDS project, which charted the impact of social networking technologies across all sectors of formal and informal education in Europe (Redecker, et al, 2008), include:

- (1) greater and easier access to content and potential learning resources afforded through aggregator services (e.g RSS feeds and portals such as iTunesU), recommender tools (e.g. social book marking) and 'push' type technologies such as podcasts;
- (2) the ability to build and manage one's own personal learning network using tools to classify, rate, recommend, comment upon and share resources found on the Internet;
- (3) tools and services such as 3D immersive worlds (e.g. SecondLife), media sharing platforms (e.g. YouTube and Flickr), and educational games which can aid the development of subject specific skills when used to create simulations and challenge-based learning scenarios;
- (4) applications or tools which serve to develop and reinforce a variety of educational social and affective skills such as digital literacy, basic literacy, foreign language skills and personal skills;
- (5) the development of metacognition and higher order skills such as critical reflection through the careful and structured use of tools such as blogs and personal wikis.

POTENTIAL CHANGES TO LEARNING ENVIRONMENTS

Students are increasingly becoming active web 2.0 users and their interactions through these digital technologies have been argued to be altering their social identities, styles of learning, and interactions with others and the world in general (Facer, Furlong, Furlong & Sutherland, 2003). Models of learning based on behaviourism and cognitive approaches are being overtaken in this emerging digital age by constructivism and connectivism. Constructivism states that learners create knowledge in their attempt to understand experiences. Crook (2008: 31) argues that:

Learners should be deeply involved in the 'construction' of knowledge, such that it becomes their *own* understanding and it is derived from their own activity or exploration [...] Web 2.0 resources clearly position the learner to take up these tools and to adopt this exploratory and creative position.

Connectivism has emerged as a learning method to use digital connections as it presents the advantages of informal learning, which can, at some point or another,

meet individuals' needs. Connectivism defines learning as a continual process which occurs in different settings, including communities of practice, personal networks and work places.

The theory of connectivism is based on the following principles:

1. Learning is a collection of opinions;
2. The learning process consists of connected information nodes or sources;
3. Learning can be stored in computers and non-human objects;
4. Learning occurs when the student's capacity to comprehend knowledge is greater than what the student knows;
5. Learning should help students understand the decision-making process;
6. The availability of timely, accurate and current knowledge is paramount to the success of the learning program. (Siemens, 2004: 5).

Connectivism allows teachers to shift focus from their textbooks and presentation to the actual student. Knowledge is emphasized by this theory, which stresses the need to help students gather, access, synthesize and publish knowledge in print or in online media. This knowledge is no longer under the control of experts, but has been distributed and is accessible to average students. In connectivist-based learning, the role of the teacher has changed from that of providing material and presenting lectures to one of helping students create, publish and share knowledge using Internet-based technologies. Web 2.0 technologies support the connectivist learning theory because they provide tools for distributing the vast knowledge in the Internet to students in the classroom. Web 2.0 further supports the theory by providing services for collaboration, participation and sharing, interaction and motivation and socialization.

Consequently connectivism suggests that designing ecologies should replace designing instruction. Such a system gives the learner the control to explore objectives defined by that learner (Giesbrecht, 2007). In order to facilitate the interaction within ecologies, both synchronous and asynchronous tools are essential as extensions of course environments. It has been suggested that in many ways, connectivism is a return to the basics: learning from one another, trust in the

creative process, and a strong sense of mentorship between teacher and student. With connectivism, active participation is required by all involved in the learning process. As such, the theory serves as an excellent model for life-long learning. (Darrow, 2009). Teaching in such contexts, it is suggested by many commentators, requires a change from 'sage on the stage' to 'guide on the side' although Crook (2008: 35) cautions, however, that "any shift towards learner-centredness need not imply a reduced or secondary role for the teacher", suggesting that their 'new' role may be motivating and organizing learners to draw upon (and contribute to) the spaces of Web 2.0.

A FRAMEWORK FOR LEARNING IN A DIGITAL ERA

The open architecture of Web 2.0 (Owen, et al, 2006) invites collaborative knowledge construction, therefore, in ways which were previously difficult or impossible. Collaborative editing tools (e.g. GoogleDocs; EtherPad) enable individuals and groups to work both in real time and asynchronously to construct shared meaning. Inherent in the architecture of collaborative software is the opportunity to share a common goal or purpose by forming Communities of Practice (Wenger et al., 2009) or Affinity Spaces (Gee, 2004) where the focus is collegial and practice orientated. Various digital technologies support the construction and activities of these groups which are frequently distributed rather than face-to-face in nature, enabling the concentration of different perspectives and expertise which would not otherwise be feasible (Redecker, 2008). Both Seely Brown (2000) and Davies and Merchant (2009) identify communities of practice as potentially one of the most significant developments facilitated by Web 2.0 technologies. Typically, therefore, teaching and learning strategies should lend themselves to supporting that transition from teacher control through student self-management of learning to collaborative communities.

Based on the above discourse in regard to student learning in a Web 2.0 context we devised a model which seeks to guide learning in higher education beyond self-managed learning and, in this instance, an approach to student learning that makes full use of digital technologies (see Figure 1, below). As Crook (2008) indicates, the learning process in higher education requires greater self-management of learning as they progress from entry stage to graduation and on to postgraduate level and, in a digital age, engagement

with other students in a collaborative mode. We argue that in addition student learning potential will be enhanced by use of digital technologies that are now readily available and foresee the ultimate aim of higher education as being the creation of effective learning environments through interdependency, a state often seen as ideal in the world of work where problem solving and creativity are the product of collaboration rather than independent contributions.

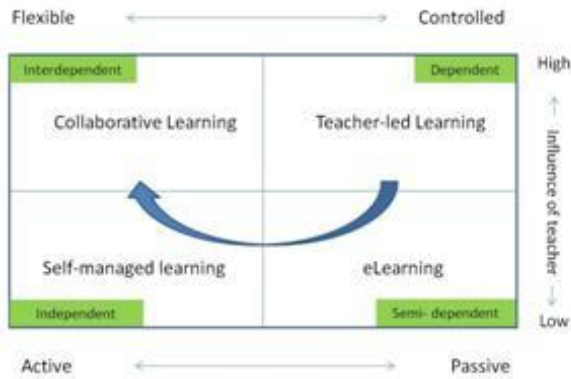


Figure 1- Learning in a Digital Age © Aldhafeeri & Male (2014)

THE RESEARCH

As argued above most students are now equipped with personal mobile devices that offer the potential for continued contact with the Internet in teaching situations. Research in publicly maintained schools in the UK demonstrated, however, that whilst students and teachers typically have the necessary equipment, knowledge and capability to transform the learning environment there are barriers which mean for most their digital world remains one of “access denied” (Male & Burden, 2013). This project sought, therefore, to explore ways in which mobile digital technologies are owned and used by staff and students within the College of Education at the University of Kuwait and, in particular, to determine the extent to which they are capable of using web 2.0 technologies.

Data collection firstly established a baseline of participant access and capability to use Web 2.0 technologies though use of a bespoke on-line questionnaire for students and teaching staff. 43 members of academic teaching staff and 443 undergraduate and postgraduate students completed an on-line questionnaire in May 2013 in order to establish to establish their perceived experience, capability and

attitudes to use computers and mobile technologies in support of student learning on their degree programmes. The questionnaire was developed from a series of baseline surveys undertaken by Burden et al (2012) in their study of the use of iPads in Scottish Schools and was adapted for context, translated into Arabic by the first author and constructed using SurveyMonkey.

The outcomes of the survey produced an interesting finding in that academic staff not only indicated a higher level of ownership of personal mobile digital devices than the student body, but also perceived themselves to be at least as capable as students in the use of such equipment to support teaching and learning in the college. This finding was not as expected in that there was no evidence of a digital divide (for example, such as the idea of digital ‘natives’ and ‘immigrants’ offered by Prensky, 2001) between staff and students in current provision that was anticipated both from hypotheses and personal observations by both researchers. Consequently a second stage of research was instigated in terms of a group interview that was held in spoken English with 10 students in January 2014. The group was evenly split in numbers between undergraduates and postgraduates from the College of Education. Of the five undergraduates three were in their second year and the other two in their third year. The interview was audio recorded and subsequently analyzed through repeated playback to establish core themes and issues. Participants were advised that their names and/or identities would not be revealed at any stage of the subsequent analysis and reporting and were provided with a copy of the conclusions drawn for verification purposes. Seven of the original interview group responded to this invitation and indicated full agreement with the conclusions.

OUTLINE OF RESEARCH FINDINGS

The data to be reported to this conference will show the perceived levels of ownership and competence of staff and students as demonstrated through the self-completion questionnaire. These findings will be qualified and evaluated in comparison with other related research studies in the field of education and through use of the qualitative data emerging from the focus group interview.

REFERENCES

- American Society for Training and Development (2009). *Transforming Learning with Web 2.0 Technologies*. ASTD Research: Virginia, USA.
- Brown, J. and Duguid, P. (2000). The Social Life of Information. *First Monday*, 5 (4).
- Burden, K. (2012). *Crossing the Transformation Horizon: Conceptualizing Teachers' Learning with the Affordances of Web 2.0*. Unpublished PhD thesis, University of Hull. England.
- Burden, K., & Atkinson, S. (2008). Evaluating Pedagogical Affordances of Media Sharing Web 2.0 Technologies. Proceedings *ascilite, Melbourne*. Available at: <http://hull.academia.edu/KevinBurden/Papers/> Accessed July, 2012
- Burden, K., Hopkins, P., Male, T., Martin, S. and Trala, C. (2012). *iPad Scotland Evaluation*. Hull: University of Hull.
- Conole, G. and Dyke, M., (2004). What are the Inherent Affordances of Information and Communication Technologies?' *ALT-J*, 12 (2), 113-124.
- Courville, K. (2011). Technology and its use in Education: Present Roles and Future Prospects. *Online Submission: ERIC*. Accessed March, 2012.
- Crook, C. (2008). *Web 2.0 Technologies for learning: The Current Landscape – Opportunities, Challenges and Tensions*. London: BECTA Research Reports.
- Dabbagh, N., and Reo, R. (2011). 'Back to the future: Tracing the Roots and Learning Affordances of Social Software'. In M.J.W. Lee and C. McLoughlin (Eds.), *Web 2.0-based e-Learning: Applying Social Informatics for Tertiary Teaching* (pp. 1-20). Hershey, PA: IGI Global.
- Darrow, S. (2009). *Connectivism Learning Theory: Instructional Tools for College Courses*. Masters Dissertation, Western Connecticut State University, Danbury.
- Davies, J., & Merchant, G. (2009). *Web 2.0 for Schools: Learning and Social Participation* (First printing.). New York: Peter Lang Publishing.
- Dede, C. (2008) A Seismic Shift in Epistemology. *Educause Rev* 43(3):80–81.
- Dede, C. and Barb, S. (2009). Emerging Technologies for Learning Science: A Time of Rapid Advances. *Journal of Scientific Educational Technology*, 18: 301–304.
- Facer, K., Furlong, J. Furlong, R., and Sutherland, R. (2003). *ScreenPlay: Children and Computing in the Home*. London: RoutledgeFalmer.
- Gee, J. P. (2004). *Situated Language and Learning: A Critique of Traditional Schooling*. New York, NY: Routledge.
- Gibson J. (1982). *The Theory of Affordance and the Design of Environment*. In E. Reed and R. Jones, (Eds.) 'Reasons for Realism: Selected Essays of James J. Gibson'. Hillsdale, NJ: Erlbaum, p.413-416.
- Giesbrecht, N. (2007). *Connectivism: Teaching and Learning*. Available at: http://sites.wiki.ubc.ca/etec510/Connectivism:_Teaching_and_Learning – accessed July, 2012.
- Greenhow, C., Robelia, E., & Hughes, J. (2009). Web 2.0 and classroom research: What path should we take now? *Educational Researcher*, 38 (4), 246-259.
- Greeno, J. (1994). Gibson's Affordances. *Psychological Review*, 101 (2), 336-342.
- Male, T. and Burden, K. (2013). Access Denied? Twenty-first Century Technology in Schools. *Technology, Pedagogy and Education*. Published Online First on 16 December, 2013 - ID: 864697 DOI:10.1080/1475939X.2013.864697
- McLoughlin, C. and Lee, M. (2008), 'Future Learning Landscapes: Transforming Pedagogy through Social Software', *Innovate*, 4 (5): 1-9.
- Nagy, J. and Bigum, C. (2007). Bounded and Unbounded Knowledge: Teaching and Learning in a Web 2 World. *Turkish Online Journal of Distance Education*. Available at: https://tojde.anadolu.edu.tr/tojde27/articles/article_5.htm - accessed August, 2012.
- O'Reilly, T. (2005). *What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software*. O'Reilly Media Inc. Available at: <http://www.oreillynet.com> – accessed July 2012.
- Owen, M., Grant, L., Sayers, S., & Facer, K. (2006). *Social Software and Learning*. Bristol:Futurelab.
- Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon*, 9 (5).

Redecker, C., Ala-Mutka, K., Bacigalupo, M., Ferrari, A., Punie, Y. (2009). *Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe*. Final Report. European Commission. Available at: <http://ftp.jrc.es/EURdoc/JRC55629.pdf> - accessed July, 2012.

Seely Brown, J. (2000). Growing up Digital: The Web and a New Learning Ecology. *Change*, March/April, 10-20.

Selwyn, N. (2007). The Use of Computer Technology in University Teaching and Learning: A Critical Perspective. *Journal of Computer Assisted Learning*. 23, 83-94.

Siemens, G. (2009). *Connectivism: A Learning Theory for the Digital Age*. Available at: <http://www.elearnspace.org/Articles/connectivism.htm> - accessed July, 2012.

Traxler, J. (2010). Will Student Devices Deliver Innovation, Inclusion and Transformation? *Journal of the Research Centre for Educational Technology*, 6 (1), 3-15.

Wenger, E., White, N., & Smith, J. (2009). *Digital Habitats; Stewarding Technology for Communities*. Cpsquare.

Ziegahn, L. (2001). Diversity and Intercultural Communication in Continuing Professional Education. *Adult Learning*, 12 (1), 11-12.