

Towards a theoretical mobile heutagogy framework

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Heutagogy is a relatively new learning and teaching framework. Heutagogy advocates student-centred learning and teaching strategies where the learning is directed and determined by the learner. At the time when heutagogy was conceptualised as a teaching framework (in 2000), the web was still in its infancy. More than a decade later, the web has evolved from being transmission focused (Web 1.0) to participatory in nature (Web 2.0). At the same time, mobile technologies such as smartphones and tablets have amplified the capabilities and ways Web 2.0 tools and technologies can be used. In this paper, we look at how mobile devices and social media can support and offer unique opportunities for using heutagogy as a pedagogical framework. A set of design principles is proposed resulting from a review of literature on heutagogy, social media and mLearning. The design principles provide educators with a guide on how to utilise the unique affordances of Web 2.0 tools and mobile devices in implementing learner directed and determined learning or life long learning.

Keywords: heutagogy, mlearning, pedagogical 2.0, design principles

Introduction

Learning and teaching practices, even today in the 21st century, generally remain predominantly embedded in traditional pedagogical practices and fail to leverage the affordances of current and emerging technologies (McLoughlin & Lee, 2008a; Sharples, et al., 2012). Learning is still perceived as a highly structured teacher-centred event that is situated within the four walls of the classroom. There has been an increasing call for the need to revisit the education system and to recognise the skills and knowledge needed by today's students living in an uncertain and ever changing world (Brown, 2001; Laurillard, 2002; Robinson, 2011). There is a growing body of literature that implicates the need to unlock student creativity and innovation by: enhancing student communication and collaborative skills (Bruno, 2007; Laurillard, 2002, 2007), providing authentic learning contexts and tasks (Herrington, Herrington, & Olney, 2012; Herrington, Reeves, & Oliver, 2010; Luckin, et al., 2011), promoting active learner participation (McLoughlin & Lee, 2008a, 2008c, 2010), and perpetuating pedagogies that are learner-centred where technology plays an important role in the process (Siemens, 2005). One way to achieve such innovation is to explore the use of mobile learning technologies within a heutagogical framework.

Heutagogy refers to self-determined learning. Hase and Kenyon (2000; 2003) postulate that heutagogy is learner-centric, and future focused, and the core tenet of the approach is for the learner to acquire life-long learning skills in preparation for an uncertain world. As such, heutagogy places an emphasis on high learner autonomy, and on the facilitation of a learning environment to build capability and capacity. It also advocates active learner engagement with authentic contexts for creating new knowledge (Blaschke, 2012; Hase, 2011), and provides a useful framework for the examination of mobile technologies in higher education contexts.

The growth and advancement of technology over the last two decades has changed the way we view the world and the way we communicate and interact with each other, and as a result has transformed the societies we live in (Lewis, Pea, & Rosen, 2010; Sharples, et al., 2012). Arguably, the biggest area of growth in this period has been the increased ownership of handheld mobile devices such as smartphones and tablets and the use of web services, namely social media such as YouTube, Facebook, and Twitter. The ubiquitous nature of mobile devices empowers the user with the ability to interact with different contexts over a time continuum, and to manipulate and create instances of engagement in that space at any given time, through pictures, audio, videos and geotags (geographical coordinates) (Cochrane & Bateman, 2010; Cook, Pachler, & Bradley, 2008; Luckin, 2010). While mobile devices enable user engagement in different spaces, the experience remains an individual one, an interpretation that could be vastly improved and enhanced if it were shared with others for input and critique (Luckin, et al., 2008). The lack of social presence or peer presence is compensated by the use of social

media that can enhance learning by enabling communication, collaboration and co-creation (McLoughlin & Lee, 2008a). The use of social media on mobile devices is commonly referred to as *mobile social media* (MSM). MSM are web applications or applications specifically designed for use on mobile devices that enable the affordances of mobile devices and social media (Cochrane & Bateman, 2010).

Heutagogy as a pedagogical approach

Heutagogy is a holistic adult learning and teaching approach that implies fundamental changes in the learning and teaching process. In a heutagogical approach, the focus is on the learner developing life- long learning skills through active, and proactive learning processes, where the learner is ‘the major agent in their own learning, which occurs as a result of personal experiences’ (Hase & Kenyon, 2007, p. 112). The heutagogical approach thus challenges established pedagogical practices and beliefs by advocating increased learner autonomy over where, when and how learning occurs. And critically, it readdresses the role of the teacher who ‘relinquishes ownership of the learning path and process to the learner, who negotiates learning and determines what will be learned and how it will be learned’ (Blaschke, 2012, p. 59).

A key differential factor of heutagogy from other pedagogical approaches is the idea of ‘double-loop learning’ (Hase & Kenyon, 2000). In double-loop learning, the learner when faced with a problem contemplates possible solutions and acts upon it, thereby challenging ‘the theories in use, values and the assumptions rather than simply reacting to problems’ (Hase & Kenyon, 2000, p. 2). This results in action and outcomes, in addition to this, reflecting on the resolution process challenges the learner’s knowledge, perception, and actions (Blaschke, 2012; Hase & Kenyon, 2000).

At the heart of the heutagogical learning approach as Hase (2011), outlines are the issues that relate to the learners having the openness to be able to negotiate the curriculum, enabling the learner to be able to create contextually relevant content, enabling true collaboration between the students and the student and teacher with regards to content and the process, and creating opportunities for situated and serendipitous learning (Hase, 2009; Hou & Hase, 2004; Kenyon & Hase, 2010). In having a deeper look into the intricate makings of heutagogy, it could be argued that learner ubiquitousness (or the learner’s ability to weave the physical and digital landscape according to his/her learning need at the time) is the central tenet governing effective use of heutagogy as a framework for learning and teaching. Learner ubiquity enables learning in context and allows the learner to create contextually relevant content that could also sometimes lead to serendipitous learning (Hase, 2011; Traxler, 2010). However, learner ubiquity at the same time creates problems with regards to other critical elements of heutagogy. How does a ubiquitous learner create meaningful content to capture his/her learning on the move? How does the ubiquitous learner engage in true collaboration for deeper learning when the peers and the teachers who are not always centrally located? In this paper, we argue that this is where technology and social media plays a role in helping bridge these gaps (Blaschke, 2012). We are particularly interested in exploring and critiquing the role smart devices (smartphones and tablets) and social media (MSM) could play in helping educators facilitate a heutagogical learning experience. In exploring the use of MSM as an agent in enabling heutagogy, there are three key areas of literature and research that we will focus on and enables ubiquitous learning: (1) Heutagogy, (2) Pedagogy 2.0, and (3) mobile learning (mLearning). In the section that follows, we provide an overview of design principles for heutagogy derived from an extensive literature review. We then provide a review and critique of the affordances of social media and mLearning. And finally an overview of the design principles for Pedagogy 2.0 and mLearning is presented.

Design principles of heutagogy

Hase (2011) himself, as one of the original proponents of the construct, is cautious of the acceptance of heutagogy as a teaching practice and states ‘.... it is the notion of the flexible and negotiated curriculum that might pose the biggest problem’ (p. 4). Blaschke (2012) in a review of heutagogical practice and literature proposes that heutagogy is perhaps most appropriate for postgraduate studies, providing numerous examples of its application in engineering, nursing, and education. A heutagogical approach, however, has also been successfully implemented and evaluated in multiple undergraduate courses, for example, a vocational foundation degree (Canning, 2012), landscape architecture, product design, contemporary music, performing and screen arts, and architecture (Cochrane & Bateman, 2010). An approach called Reggio Emilia that has striking resemblance to the notion of heutagogy has also been successfully applied in teaching children in preschool (Reggio Emilia approach, 2014). Cochrane (2012) argues that the appropriateness of the application of heutagogy is not dependent on the level of the course being taught but the pedagogical design and facilitation of the course and the learning process.

The characteristics of the heutagogical approach were initially proposed by Hase and Kenyon (2007), and further work on developing the model has been completed by Hase (2011). The underlying principles of the approach (derived largely from the work of Blaschke, 2012; Hase, 2011; and Hase & Kenyon, 2007) are provided below. The heutagogical approach comprises:

1. An open or flexible curriculum that recognises the fluid nature of learning.
2. The learner as the driver in determining his/her learning path, context, activities and journey not just the teacher.
3. The learner is involved in the design of the assessment or ensures flexibility for the learner to be able to apply it within his/her context.
4. Learning is collaborative.
5. Coaching and scaffolds are provided to the learner when needed.
6. Learner directed questions; this provides an opportunity for true collaboration between the teacher and the learner with regard to the content and process. The questions also provide clarity on what guidance, scaffold, and support is needed by the learner.
7. The learner creates contextually relevant content according to his/her knowledge and learning needs.
8. Encourage reflective practice for deep learning through:
 - learning journals;
 - experiential learning or action research within real world context; and
 - formative and summative assessment with the view of ‘assessment for learning’ to provoke thinking and reflection.

These central tenets of heutagogy provide guidelines for design that could be used in a range of learning contexts, including more traditional face-to-face and blended approaches. The guidelines do not, however, fully consider the particular learning affordances offered by Web 2.0 tools, and these are discussed in more detail in the next section.

Pedagogy 2.0

Pedagogy 2.0, or pedagogy for the use of Web 2.0 tools (McLoughlin & Lee, 2007), focuses on capitalising on the affordances of Web 2.0 tools or social media and is firmly grounded in social-constructivist approaches (Vygotsky, 1978). Social constructivist approaches to learning and teaching advocate active learner participation, and learning is observed as a social product that is co-constructed together in a community (Conole, Dyke, Oliver, & Seale, 2004; Mayes & de Freitas, 2004).

Web 2.0 is characterised by its ability to enable communication, collaboration, co-creation, user empowerment, participation, connectedness, openness, and pervasiveness over geographical and time barriers (Anderson, 2007; Bryant, 2006; McLoughlin & Lee, 2007, 2008a, 2008b, 2008c). Web 2.0 tools offer educators an opportunity to move beyond providing students with pre-packaged content to engaging them in an active learning process where learner-generated content is an explicit outcome, moving the student role from being consumers (passive) to producers (active) (Bruns, 2007; McLoughlin & Lee, 2007). This change in the learner’s role within a social or community environment enables the exchange of ideas and negotiations over differing opinions on a topic. As a result, the final output resulting from mixing and remixing different learner artifact benefits all members engaging in the process (Borthick, Jones, & Wakai, 2003; Bruns, 2007; McLoughlin & Lee, 2007).

Pedagogy 2.0 as a framework for learning and teaching attempts to provide educators a guideline of how to foster and capture the essences of Web 2.0 (social media) affordances for learning and teaching. McLoughlin and Lee (2008a, 2008b, 2008c) outline the central tenets for designing and facilitating effective learning and teaching with Web 2.0 tools as:

1. The *content* for learning is provided by the teacher to provoke thinking and cognition. However, the students could also generate this content by sharing, creating, and remixing ideas to advance their own learning.
2. The *curriculum* is open and negotiable for learner input and should recognise formal and informal learning.
3. The *communication in the course* is enabled by the use of a social platform or forum for the students to use for interaction with peers, teacher and the expert and for sharing resources and ideas.
4. The *learning process* allows for learner autonomy, is contextualised, encourages reflection and is dynamic and iterative.
5. The role of the learner in the process is characterised by personalisation, participation, and productivity.
6. The *resources* in the course are open resources readily available in the public domain (formal and informal)

and accessible to the learner.

6. The learner is provided *scaffolding* in terms of support, guidance, and advice in the learning process and is inclusive of the teacher, peers, other experts available outside the class and input from communities the learner may belong to.
7. The *learning tasks* are embedded in the learning process and integrated with the assessment events. The tasks should be authentic, learner driven, experiential and should encourage learner-generated content. (McLoughlin & Lee, 2008c, p. 15).

Such principles enable teachers to more fully capitalise on the affordances of web-based learning opportunities. The following section provides further guidelines on the role a mobile device can play in learning and teaching.

Mobile learning (mLearning)

A person's interaction in this world is no longer limited by time or space; it is a 'mobile act' that transcends these barriers (Traxler, 2010). Arguably, it is a person's interaction in different time and space that shapes understanding of the world and defines identity (Dewey, 1916; Sharples, Taylor, & Vavoula, 2010). Mobile devices such as smartphones and tablets have hence become an important appendix to human anatomy in the modern era to the point where, the number of mobile internet enabled devices (smartphones, tablets and laptops) will outnumber people in the world before the end of 2013 (Arthur, 2013; Kukulska-Hulme & Traxler, 2013).

The principal foci of mobile learning or mLearning theory are mobility and context. Unlike traditional teaching practices where learning is seen as an event within a defined space and time, mLearning 'examines how learning flows across locations, time, topics and technologies' (Sharples, Milrad, Arnedillo, & Vavoula, 2007, p. 4). Sharples et al. (2007) elaborate further on the notion of mobility in relation to learning, pointing out:

1. The mobile nature of humans: as such learning happens on the 'go' and fits into the 'gaps of daily life' (p. 3), where location is the enabling factor or a backdrop for reflection.
2. The mobility of technology: the learner is able to connect to, create, share, and carry resources needed and also being able to work across different or alternate platforms. For example, iPad for creating and a laptop for editing.
3. The mobility in conceptual space: a learner may go through several conceptual changes in a short duration that is driven by curiosity, learner interest, and commitment.
4. The mobility in social space: a learners' interaction in different social settings such as family, work and classroom.
5. Learning over a continuum of time: learning eventuates through the learners' engagement in formal (classroom) and informal (in the real world) contexts. (p. 3).

Sharples et al. (2007) unpack *context* 'not as a container through which we pass like a train in a tunnel, but as an artifact that is continually created by people in interaction with other people, with their surroundings, and with everyday tools' (Sharples, et al., 2007, p. 4). The meaning of context thus moves beyond the perception of physical space or location to 'that which weaves together' (Sharples, 2005, p. 6) and is also referred to as a learner-generated ecology of resources or learner-generated context (Luckin, 2008, 2010; Luckin, et al., 2011). While mLearning perpetuates learner engagement in context (physical) it also helps learners create context (learner-generated context) for learning. Learner-generated context could also take the form of social network and digital artifacts resulting from ongoing interaction and collaboration between the learners (Borthick, et al., 2003; Whitworth, Garnett, & Pearson, 2012). Dewey (1916) explained that the underpinning processes through which we create meaning are exploration and discussion. Sharples (2007) argues that exploration, as a process, is 'mobile' in nature and it transcends the physical and conceptual boundaries that allows the learner to build a link between experience and concept in order to create new knowledge or meaning. mLearning thus enhances the exploration process by enabling conversation (Laurillard, 1993) and learning across different contexts (Cochrane & Bateman, 2010; Sharples, 2002; Vavoula & Sharples, 2009).

The use of mobile devices in learning and teaching is not to push content on small screens but to facilitate the learning process by encouraging conversations and dialogue between the learner and teacher across authentic learner-generated contexts (Cochrane & Bateman, 2010; Herrington, Herrington, & Mantei, 2009; Sharples, et al., 2007). While mobile devices are ubiquitous and enable the potential to learn across contexts, other mobile affordances such as location awareness, ability to create (pictures, videos, audio and text), share, connect, communicate, collaborate, and co-create through social media provides a powerful 'mobile ecology' for enhanced learning and teaching opportunities (Cochrane & Bateman, 2010; Narayan, 2012; Traxler, 2007).

In order to facilitate effective mLearning and teaching, a significant paradigm shift is needed in how a course is designed and the role the teacher plays in the process (Cochrane & Bateman, 2010; Traxler & Kukulska-Hulme, 2005). Cochrane (2012) proposes a set of critical success factors having implemented multiple longitudinal mLearning projects between 2006-2011 as:

1. Pedagogical embodiment of technology in course design.
2. Pedagogical modeling of the tool by the teacher.
3. Establishment of a learning community for facilitating conversations as a catalyst for change, both for the student, and the teacher.
4. Appropriate choice of tools (mobile and social media) for use within the course context.
5. Continued pedagogical and technology support within the learning community and is inclusive of the teacher.

In this section, we have provided an overview of three underpinning frameworks that in our understanding weaves the elements of heutagogy for use in learning and teaching in a Web 2.0 and mobile learning context. Implementing heutagogy in the design and facilitation of a course requires a fundamental change in pedagogical practice observed over decades i.e. from teacher-centred pedagogies to learner-centred pedagogies. The involvement of technology such as mobile devices and social media complicates this process even further. For educators, grappling with the conceptual change needed is difficult enough. Now, they are faced with an even tougher job of mixing and making sense of pedagogical transformation, the intricate workings and affordances of mobile devices and social media, and the knowledge of designing an effective course that makes maximum use of all the elements in the mix. This is addressed in more detail below.

Designing for heutagogical learning and teaching with mobile social media

In this section, we explore the relationship between the three governing frameworks of mobile heutagogy and propose a preliminary set of design principles that could be used to help guide educators in designing a course or learning environment (cf. Herrington & Reeves, 2011). Figure 1 provides an illustration of the interplay among these three frameworks. The model is heavily influenced by the 3Ps of pedagogy proposed by McLoughlin and Lee (2008) but it is wider than their initial description and includes the mobile and heutagogical dimensions. The central **Learning and teaching** element in Figure 1 represents both aspects as interchangeable, meaning the ‘learner as teacher’ and ‘the teacher as learner’ and helps to indicate the change in both learning style for the students (from passive to active) and the teaching style for the teachers (from transmission to social constructivist) (Hase & Kenyon, 2007).

The **Participation** overlap between heutagogy and pedagogy 2.0 (Figure 1) outlines the collaborative and communicative aspect of the mobile heutagogy framework. The implicit elements here are the affordances of social media that facilitates ‘true collaboration’ between the teacher and the student and between the students. True collaboration here implies that the interaction between the teacher and the student is to inform, scaffold and co-create new knowledge relating to an issue impeding on the students ability to learn (Hase, 2011). True collaboration between the students or the student and the teacher eventuates when the learner is situated out in the real world facing a problem and requires help or assistance in order to make new meaning. Some mobile social media tools that could facilitate this are Google Communities, Google Docs, Evernote, Twitter, Facetime, Google Hangout, Skype, and instant messaging.

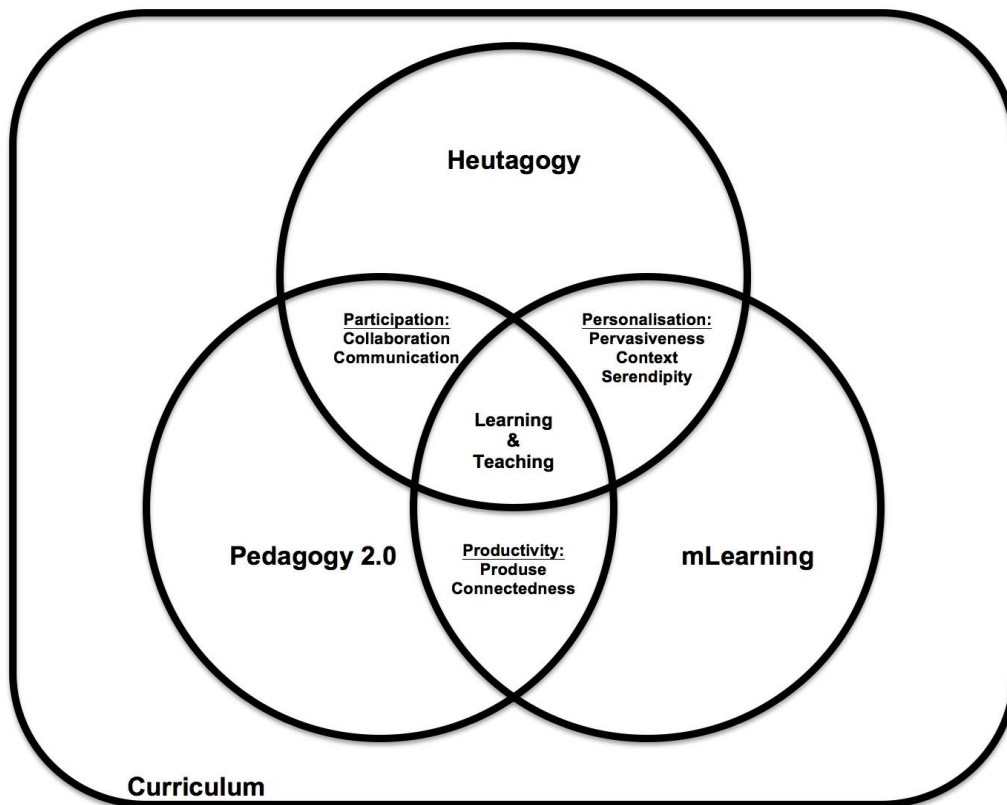


Figure 1: Underpinning frameworks for mobile heutagogy

The **Productivity** overlap between Pedagogy 2.0 and mLearning relates to the learner's ability to create and consume contextually relevant content as required to advance its own learning. As such, the learners' role is that of a producer and consumer (*produser*) (Herrington, Herrington & Mantei, 2009). The production could be in collaboration with other learners and may include conversations, videos, photos, audio, ad hoc social media groups and artefacts and geographically aware data (geotagging). Mobile social media platforms that can enable these capabilities include, Vimeo, YouTube, Vyclone, Vine, Twitter, Blog, Picasa, Flickr, SoundCloud, AudioBoo, Google Maps and Augmented reality such as Wikitude.

The third dimension, **Personalisation**, in the overlap of heutagogy and mLearning, relates to the learner and learning as being ubiquitous. This enables the learner and the learning to eventuate across different technological, time and geographical continuum. This affords the learner the opportunity to choose a context that meets their current need, to access learning resources that scaffolds the learner, and to allow for real world learning. The definition of context here moves beyond physical space and also includes virtual or digital spaces such as forums and communities (Luckin, et al., 2011). The applications and factors that support personalisation include online communities, YouTube, resources available on the Internet suitable at the time and situations arising as part of everyday life. Implicit in this design is the double loop learning where the learner thinks about possible solutions to a problem then acts on it rather than simply acting without thinking (Hase & Kenyon, 2000).

Preliminary design principles

In order to facilitate a course that embodies heutagogy in its learning and teaching processes, we view the elements of *participation*, *productivity* and *personalisation* (McLoughlin & Lee, 2008c) as crucial in the design of the curriculum. In this regard, we propose a set of tentative design principles that could help guide in the design and facilitation of a heutagogical learning and teaching process. Table 1 provides an overview of the preliminary design principles.

Table 1: Design principles for the use of heutagogy in mobile learning

	Design principle	Curriculum integration	How it could be used	Useful MSM tools	Source/ Reference
Participation	Design a learning environment that is community driven for social and collaborative scaffolding and learning.	Structure the learning to actively involve the learner in the process through communication, collaboration and content creation.	Pedagogical integration of the characteristics (communication, collaboration, creation and co-creation) identified in the learning process.	Google Communities, Google Docs, Evernote, Twitter, Facetime, Google Hangout, Skype, and instant messaging	(Blaschke, 2012; Cochrane, 2012; McLoughlin & Lee, 2008a, 2008b, 2008c)
Productivity	Include activities that encourage student participation in the learning process.	The learner is the main agent in the learning process and learning as an individual or as a group/community.	Explore these opportunities during the design phase and implement them in the solution.	Vimeo, YouTube, Vyclone, Vine, Twitter, Blog, Picasa, Flickr, SoundCloud, AudioBoo, Google Maps and Augmented reality	(Hase, 2011; McLoughlin & Lee, 2008c)
Personalisation	Situate and enable learning in ‘real world contexts’ decided by the learner.	The learner creates contextually relevant content according to his/her need and knowledge enabling ‘true’ collaboration between the learner and the teacher (passive scaffolding).	Present problems that bridge the formal (in class) and informal (real world) learning gap by enabling learner-generated content and context.	Online communities, YouTube, resources available on the Internet suitable at the time and situations arising as part of everyday life	(Blaschke, 2012; Cochrane, 2012; Hase, 2011; Hase & Kenyon, 2007; Herrington, et al., 2009; McLoughlin & Lee, 2008a, 2008b, 2008c)
	Create opportunities for learner input and choice in the curriculum.	The learner has choice in directing his/her learning path.	Ensuring the design of the curriculum empowers the learner by allowing them to build on their prior knowledge and interest. For example, having the ability to negotiate a project as part of the assessment.		
	Design learning tasks that require the use of mobile affordances.	The learner makes use of mobile capabilities/affordances to inform his/her learning across different space and time.	Identify and integrate appropriate mobile affordances in learning design, process and solution.		

In Table 1, each design principle is listed together with a definition of its meaning in general terms, a description of how each principle could be embodied in the design and facilitation of a course or learning environment, together with the original sources and references.

Further research and conclusion

As highlighted by the literature reviewed, technology has the potential to play a critical role in transforming pedagogical practice for the education of a twenty-first century learner (Traxler, 2010). While heutagogy, as an educational construct, has been in existence for over a decade, it had failed to capture the attention of educators until now. Blaschke (2012) in concluding her work in reviewing heutagogy and heutagogical practices states that heutagogy is beginning to capture the attention of educators mostly due to the 'ubiquitousness of Web 2.0 and the affordances provided by technology' (p. 56). Blaschke (2012) further identifies that 'research on the use of social media and its role in supporting heutagogy is limited, indicating that this is an area for further investigation' (p. 63).

In this paper, we have focused on mobile devices as the technology that mediates the learning between the learner and heutagogical principles (Traxler, 2010; Beddall-Hill & Raper, 2010). Through a review of literature, and the further development of a model of underlying frameworks (Figure 1), we have proposed a set of preliminary design principles (Table 1) for embodying heutagogy in learning and teaching practices, particularly as it relates to web-based and mobile learning. The set of proposed design principles will be implemented in the design of a Journalism course and implemented over two iterations, in two full semesters, using a design-based research approach (Reeves, 2006). The design principles will be refined and repurposed over the two iterations and will be informed by the analysis of qualitative data collected over the period. The research aims to explore the relationship between mobile devices, social media and heutagogy. In particular, it seeks to explore the ways in which mobile devices and social media can be used in enabling heutagogical learning processes.

Heutagogy as a pedagogical framework moves the focus from 'learning the content' to 'learning to learn'. Through this research, it is hoped that a model or framework of heutagogical learning, with accompanying design principles, can be developed to guide the design, development and evaluation of learning environments that focus not only on content, but are also more appropriate to learners in the age of Web 2.0 and ubiquitous mobile devices.

References

- Anderson, P. (2007). What is Web 2.0? Ideas technologies and implications for education. Retrieved 10 October, 2010, from <http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf>.
- Arthur, C. (2013, 7 February). Mobile internet devices 'will outnumber humans this year'. *The Guardian*. Retrieved from <http://www.guardian.co.uk/technology/2013/feb/07/mobile-internet-outnumber-people>
- Beddall-Hill, N. L., & Raper, J. (2010). Mobile devices as 'boundary objects' on field trips. *Journal of the Research Center for Educational Technology (RCET)*, 6(1), 28-46. Retrieved from <http://www.rcetj.org/index.php/rcetj/article/view/84/195>
- Blaschke, L. M. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distance Learning (IRRODL)*, 13(1), 56-71. Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/1076>
- Borthick, A. F., Jones, D. R., & Wakai, S. (2003). Designing learning experiences within the learners' zones of proximal development (ZPDs): Enabling collaborative learning on-site and online. *Journal of Information Systems*, 17(1), 107-134. <https://doi.org/10.2308/jis.2003.17.1.107>
- Brown, J.S. (2001). Learning in the digital age. Retrieved from <http://net.educause.edu/ir/library/pdf/FFPIU015.pdf>
- Brown, J. S., & Alder, R. P. (2008). Minds on fire: open education, the long tail, and learning 2.0. *EDUCAUSE Review*, 16-32. Retrieved from <http://www.johnseelybrown.com/mindsonfire.pdf>
- Bruns, A. (2007). *Beyond difference: reconfiguring education for the user-lad age*. (Ed.), Proceedings of the ICE 3: Ideas, Cyberspace, Education. Retrieved from [http://snurb.info/files/Beyond Difference \(ICE 3 2007\).pdf](http://snurb.info/files/Beyond%20Difference%20(ICE%203%202007).pdf)
- Bryant, T. (2006). Social software in academia. *EDUCAUSE Quarterly*, 29(2), 61-64.
- Canning, N. (2012). Playing with heutagogy: Exploring strategies to empower mature learners in higher education. *Journal of Further and Higher Education*, 34(1), 59-71.
- Cochrane, T. (2012). Critical success factors for transforming pedagogy with mobile Web 2.0. *British Journal of Educational Technology*. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8535.2012.01384.x/full>
- Cochrane, T., & Bateman, R. (2010). Smartphones give you wings: Pedagogical affordances of mobile Web 2.0. *Australasian Journal of Educational Technology*, 26(1), 1-14. Retrieved from <http://www.ascilite.org.au/ajet/ajet26/cochrane.pdf>

- Conole, G., Dyke, M., Oliver, M., & Seale, J. (2004). Mapping pedagogy and tools for effective learning design. *Computers & Education*, 43, 17-33.
- Cook, J., Pachler, N., & Bradley, C. (2008). Bridging the gap? Mobile phones at the interface between informal and formal learning. *Journal of the Research Center for Educational Technology (RCET)*, 4(1), 3-18.
- Dewey, J. (1916). *Democracy and education. An introduction to the philosophy of education*. New York: Free Press.
- Hase, S. (2009). Heutagogy and elearning in the workplace: Some challenges and opportunities. *Impact: Journal of Applied Research in Workplace E-learning*, 1(1), 43-52.
- Hase, S. (2011). Learner defined curriculum: Heutagogy and action learning in vocational training. *Southern Institute of Technology Journal of Applied Research, Special Edition: Action research and action learning in vocational education and training*. Retrieved from <http://sitjar.sit.ac.nz/SITJAR/Special>
- Hase, S., & Kenyon, C. (2000). From andragogy to heutagogy. *ultiBASE*, 5(3). Retrieved from <http://ultibase.rmit.edu.au/Articles/dec00/hase2.htm>
- Hase, S., & Kenyon, C. (2003). *Heutagogy and developing capable people and capable workplaces: strategies for dealing with complexity*. (Ed.), Proceedings of the The Changing Face of Work and Learning Conference. Retrieved from http://epubs.scu.edu.au/cgi/viewcontent.cgi?article=1123&context=gcm_pubs
- Hase, S., & Kenyon, C. (2007). Heutagogy: A child of complexity theory. *Complicity: An International Journal of Complexity and Education*, 4(1), 111-118. Retrieved from <http://wigan-ojs.library.ualberta.ca/index.php/complicity/article/viewFile/8766/7086>
- Herrington, A., Herrington, J., & Mantei, J. (2009). Design principles for mobile learning. In J. Herrington, A. Herrington, J. Mantei, I. Olney & B. Ferry (Eds.), *New technologies, new pedagogies: Mobile learning in higher education* (pp. 129-138). Wollongong: UOW. Retrieved from: <http://ro.uow.edu.au/newtech/>.
- Herrington, J., Herrington, A., & Olney, I. (2012). *Mobile learning in higher education: Authentic tasks, assessment and Web 2.0*. In T. Amiel & B. Wilson (Ed.), Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications 2012. Retrieved from <http://www.editlib.org/p/41020>
- Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.
- Herrington, J., & Reeves, T.C. (2011). Using design principles to improve pedagogical practice and promote student engagement. In G. Williams, P. Statham, N. Brown & B. Cleland (Eds.) *Changing Demands, Changing Directions. Proceedings ascilite Hobart 2011* (pp. 594-601). Hobart: Ascilite.
- Hou, T. B., & Hase, S. (2004). Role of action research in workplace PhD research. *ALAR Journal*, 9(1), 81-92. Retrieved from http://www.alara.net.au/files/ALAR_V9_No1.pdf
- Kenyon, C., & Hase, S. (2010). Androgogy and heutagogy in postgraduate work. In T. Kerry (Ed.), *Meeting the challenges of change in postgraduate education*. London: Continuum Press.
- Kukulska-Hulme, A., & Traxler, J. (2013). Design principles for mobile learning. In H. Beetham & R. Sharpa (Eds.), *Rethinking pedagogy for a digital age: Designing for 21st century learning* (2nd ed.) Kindle. Retrieved from <http://www.amazon.com/Rethinking-Pedagogy-Digital-Age-Designing/dp/0415539978>
- Laurillard, D. (1993). *Rethinking university teaching: A framework for the effective use of educational technology*. London: Routledge.
- Laurillard, D. (2002). Rethinking teaching for the knowledge society. *EDUCAUSE Review*, 37(1), 16-25.
- Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed.), *Mobile learning: Towards a research agenda* (Vol. 1, pp. 33-54). Available from http://eprints.ioe.ac.uk/627/1/Mobile_C6_Laurillard.pdf
- Lewis, S., Pea, R., & Rosen, J. (2010). Beyond participation to co-creation of meaning: Mobile social media in generative learning communities. *Social Science Information*, 49(3). Retrieved from <http://ssi.sagepub.com/content/49/3/351>. doi:10.1177/0539018410370726
- Luckin, R. (2008). The learner centric ecology of resources: A framework for using technology to scaffold learning. *Computers & Education*, 50, 449-462. <https://doi.org/10.1016/j.compedu.2007.09.018>
- Luckin, R. (2010). *Re-designing learning contexts: Technology-rich, learner-centred ecologies*. New York: Routledge. <https://doi.org/10.4324/9780203854754>
- Luckin, R., Clarke, W., Garnett, F., Whitworth, A., Akass, J., Cook, J., et al. (2011). Learner-generated contexts. In M. J. W. Lee & C. McLoughlin (Eds.), *Web 2.0-based e-learning: Applying social informatics for tertiary teaching*. New York: Information Science Reference.
- Luckin, R., Logan, K., Clark, W., Graber, R., Oliver, M., & Mee, A. (2008). *Learners' use of Web 2.0 technologies in and out of school in key stages 3 and 4*. Coventry, UK: Becta.
- Mayes, T., & de Freitas, S. (2004). JISC e-learning models desk study. Stage 2: Review of the e-learning theories, frameworks and models. *Joint Information Systems Committee*. Retrieved from <http://www.jisc.ac.uk/epedagogy/>
- McLoughlin, C., & Lee, M. J. W. (2007). *Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era*. In R. J. Atkinson, C. McBeath, S. K. A. Soong & C. Cheers

- (Ed.), Proceedings of ascilite 2007. Retrieved from <http://www.ascilite.org.au/conferences/singapore07/procs/mcloughlin.pdf>
- McLoughlin, C., & Lee, M. J. W. (2008a). Future learning landscapes: Transforming pedagogy through social software. *Innovate Journal of Online Education*, 4(5). Retrieved from http://innovateonline.info/pdf/vol4_issue5/Future_Learning_Landscapes-__Transforming_Pedagogy_through_Social_Software.pdf
- McLoughlin, C., & Lee, M. J. W. (2008b). Mapping the digital terrain: New media and social software as catalysts for pedagogical change. In R. Atkinson & C. McBeath (Ed.), *Proceedings of the Hello! Where are you in the landscape of educational technology?* Retrieved from <http://www.ascilite.org.au/conferences/melbourne08/procs/mcloughlin.pdf>
- McLoughlin, C., & Lee, M. J. W. (2008c). The three Ps of pedagogy for the networked society: Personalisation, participation and productivity. *International Journal of Teaching and Learning in Higher Education*, 20(1), 10-17.
- McLoughlin, C., & Lee, M. J. W. (2010). Personalised and self regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software. *AJET*, 26(1), 28-43.
- Narayan, V. (2012). Augmented learning: Spreading your wings beyond the classroom. *ALT-C 2012 - A confrontation with reality*, 20 (Supplement: ALT-C 2012 Conference Proceedings).
- Reggio Emilia approach. (2014). *Wikipedia*. Retrieved from http://en.wikipedia.org/wiki/Reggio_Emilia_approach.
- Robinson, K. (2011). *Out of our minds: Learning to be creative* (2nd ed.). Westford, MA, USA: Courier Westfords, Inc. <https://doi.org/10.1002/9780857086549>
- Sharples, M. (2002). Disruptive devices: Mobile technology for conversational learning. *International Journal of Continuing Engineering Education and Life Long Learning*, 12(6), 504-520. Retrieved from <https://http://www.tlu.ee/~kpatata/haridustehnoloogiaTLU/mobilesharples.pdf>
- Sharples, M., McAndrew, P., Weller, M., Freguson, R., FitzGerald, E., Hirst, T., et al. (2012). *Innovating pedagogy 2012: Open University innovation report 1*. Milton Keynes, UK: The Open University.
- Sharples, M., Milrad, M., Arnedillo, S. I., & Vavoula, G. (2007). Mobile learning: Small devices, big issues. In N. Balacheff, S. Ludvigsen, T. de Jong, A. Lazonder, S. Barnes & L. Montandon (Eds.), *Technology enhanced learning: Principles and products*. Berlin: Springer.
- Sharples, M., Taylor, J., & Vavoula, G. (2010). A theory of learning for the mobile age: Learning through conversation and exploration across contexts. *Medienbildung in neuen Kulturräumen*, 87-99. Retrieved from <http://www.open.ac.uk/personalpages/mike.sharples/write.htm>
- Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3-10.
- Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having writ *The International Review of Research in open and Distance Learning (IRRODL)*, 8(2). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/Article/346/875Gode>
- Traxler, J. (2010). Will student devices deliver innovation, inclusion and transformation? *Journal of the Research Center for Educational Technology (RCET)*, 6(1), 3-15. Retrieved from <http://rcetj.org/index.php/rcetj/article/viewFile/56/177>
- Traxler, J., & Kukulska-Hulme, A. (2005). *Evaluating mobile learning: Reflections on current practice*. Paper presented at the mLearn 2005: Mobile technology: The future of learning in your hands. Retrieved from <http://oro.open.ac.uk/12819/1/>
- Vavoula, G., & Sharples, M. (2009). Meeting the challenges in evaluating mobile learning: A 3-level evaluation framework. *International Journal of Media and Blended Learning*, 1(2), 54-75. Retrieved from http://www.open.ac.uk/personalpages/mike.sharples/documents/IJMBL_Evaluation_Preprint.pdf
- Whitworth, A., Garnett, F., & Pearson, D. (2012). Aggregate-then-curate: How digital learning champions help communities nurture online content. *Research in Learning Technology*, 20. Retrieved from <http://www.researchinlearningtechnology.net/index.php/rlt/article/view/18677>

Please cite as: Narayan, V., & Herrington, J. (2014). Towards a theoretical mobile heutagogy framework. In B. Hegarty, J. McDonald, & S.-K. Loke (Eds.), *Rhetoric and Reality: Critical perspectives on educational technology. Proceedings ascilite Dunedin 2014* (pp. 150-160). <https://doi.org/10.14742/apubs.2014.1072>

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