The Future of Mlearning Begins with a Baseline Pedagogy

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Abstract

Although the proliferation of mobile devices sets the stage for a revolution of education in some environments and the evolution of education in others, the development of an effective mlearning pedagogy remains a bit elusive. The process of discovery outlined in this qualitative study begins with identifying an appropriate learning theory and by evaluating the role of technology in the classroom. The mlearning pedagogy advanced here is no different than others in its focus on content, instructional assets, cognitive processes and evaluations, but with two parts harnessing the power of the internet and the other two parts pushing technology to the background the result is a convergence of vital human interaction with nearly world-wide reach. An LMS-less approach is the element missing from previous studies and it is also the element that puts the immediate application of the mlearning pedagogy within reach.
The Future of Mlearning Begins with a Baseline Pedagogy

Development of an effective mlearning pedagogy remains a bit elusive. Mlearning is a term that refers to using mobile devices to learn (Valk, Rashid, & Elder, 2010). It differs from elearning, which uses desktop and laptop computers to learn (Fisher & Baird, 2006), and from traditional learning, which is organized around a teacher in a physical classroom. Undeniably, advances in mobile technologies have improved student access to higher education (Valk et al., 2010), but integrating that same technology into the classroom design as an effective learning tool is much more challenging. It is important to differentiate between the role of mobile technology as a system for accessing the classroom and the role of mobile technology in learning. Based on the interplay of existing learning management systems (LMSs) and mobile devices, new technological hurdles exist to extend access to the current elearning students wishing to utilize mobile devices and to potential purely mlearning students that don’t possess computers. Presumably, adjustments by LMS developers and future advances in mobile technology will resolve these issues. Until then, an LMS-less approach both alleviates the need to access or maneuver current elearning classrooms and it promotes the development of a newly conceived mlearning classroom. An LMS-less approach also opens up more innate options for use in the pedagogy than are currently available to teachers in traditional or elearning classrooms. With current access issues resolved through an LMS-less approach, the purpose of this qualitative study is to identify a pedagogical model for mlearning.

This begins with identifying an appropriate learning theory. As the name implies, learning theories are strategies to promote learning, which is defined as “a change in a learner’s disposition and capabilities that can be reflected in behavior (Gagne, 1985)” (Wang, 2012, p. 10). These theories are often categorized based on common features, but they share the same
overarching goal of guiding a teacher’s pedagogy (Wang, 2012). Studying learning theories, then, is a necessary precursor to developing a pedagogy (Wang, 2012). Teacher’s should take note of the teacher’s role, the learner’s role and the relationship between the two (Wang, 2012) so that they can select the one that best fits the demographic of the student body and the topic of instruction. Two considered in this study are social constructivism and connectivism.

Social constructivism is often associated to elearning and connectivism is being debated as a learning theory to underpin mlearning (Anderson & Dron, 2011). However, connectivism hasn’t developed enough to stand alone as a learning theory (Kop & Hill, 2008) in part because it seemingly overlooks the role of foundational learning on a topic before networking can be used to create new learning. In social constructivism, building on foundational knowledge is a basic part of the construction of new knowledge (Anderson & Dron, 2011). Given the evolutionary nature of theories (Anderson & Dron, 2011; Baker-Eveleth, Chung, Eveleth, & O’Neill, 2011), a better way forward is to append a networking component into social constructivism until connectivism is either better developed or replaced by a new emerging theory. As a result, the learning theory being utilized here is social constructivism derived from its cognitive-behaviorist roots (Anderson & Dron, 2011; Baker-Eveleth et al., 2011) with networking components borrowed from connectivism (Anderson & Dron, 2011). Broadly, the resulting pedagogy is content and asset driven with social activities and the opportunity to network included.

Drawing on the social constructivism theoretical framework, this paper proceeds with sections on how social constructivism applies to mlearning, the specific role of technology in mlearning, the identification of a baseline mlearning pedagogy and conclusions. In short, mlearning has the potential to revolutionize learning through a convergence of the strengths related to the traditional and elearning classrooms: human interaction and nearly world-wide
reach. The LMS-less approach makes it relevant to today rather than at some unknown point in the future and the baseline pedagogy spans across academic disciplines. However, with so many innate options available for use in the baseline pedagogy, testing is needed to narrow them down for specific academic disciplines.

**Social Constructivist Theory**

Anderson and Dron (2011) identify social constructivism as the second generation of distance learning education and connectivism as the third generation. Advocates of connectivism like Siemens and Downes advance an argument that “learning is the process of building networks of information, contacts and resources that are applied to real problems” (emphasis added) (Anderson & Dron, 2011, p. 87). Information, so the theory goes, is found and applied when and how it is needed (Anderson & Dron, 2011). This fits with “just-in-time” learning (Cruz-Flores & López-Morteo, 2010), but it is more accurate to say that *once a foundation of learning on the topic has been achieved* building networks of information, contacts and resources that are applied to real problems results in new learning.

For example, a learner with very little understanding of physics could go through the process of building networks of information, contacts and resources that are applied to real problems without ever gaining a foundational level of understanding of physics. The ability to apply the information, which is contingent upon having a base level of understanding of it, is one link that is overlooked in connectivist theory. However, once that is achieved, the sources of information, contacts made and resources used that are associated to what is learned are kept by the learner, facilitated by technology, for future use and application, which should result in further learning. Networks create an opportunity for new learning, but connectivism is better described as a learning tool that is best applied once foundational learning has been achieved.
However, the notion that students create networks of information, contacts and resources for future use, at least in part through social interactions (Anderson & Dron, 2011), is appealing and should be subsumed into social constructivism until connectivism is better developed or replaced.

Specifically as it relates to distance education, social constructivist theory evolved in tandem with advances in technology (Anderson & Dron, 2011). As one-to-one communication evolved into one-to-many and then many-to-many, social constructivism found its place in the distance learning classroom (Anderson & Dron, 2011). Arguably, social constructivism in this respect could only evolve and appear in practice as fast as the supporting technologies allowed. Today, the opposite is true. The supporting mobile technologies already exist in an LMS-less mlearning classroom, but the theory and resulting pedagogy hasn’t evolved to take advantage of the opportunities at hand. Chief among them is better meeting the expectations of the net generation of students.

The net generation, the first generation to always have the internet, is substantially different than past generations of students that studied for tests and whose knowledge was based on teacher-centered modes for transferring information like lectures and handouts and the resources contained in local libraries (Fisher & Baird, 2006). The net generation seeks to learn on the spot, “just-in-time and just-in-place” (Cruz-Flores & López-Morteo, 2010, p. 10) as the need for the information develops and mlearning enables that paradigm shift (Fisher & Baird, 2006). Social constructivist theory applied to an mlearning classroom environment and corresponding pedagogy must account for the learning needs and social expectations of the net generation by wholly embracing a socially based student-centered pedagogy (Anderson & Dron, 2011; Fisher & Baird, 2006). As such, the application of technology in the pedagogy must allow
students to “communicate, negotiate, socialize and learn” and, thereby network, while “on-the-go” (Cruz-Flores & López-Morteo, 2010, p. 9).

Technology in the Course Design and Learning

Identifying how students access knowledge and the basic focal point of teacher interaction as it exists today determines the role of technology in learning. For example, in a traditional classroom it is very difficult to wholly deviate from a teacher centered delivery of knowledge and a content-driven approach since it is expected that students will access knowledge through the teacher. Social activities in that classroom environment may include informal student presentations or brainstorming sessions. In an elearning environment, access to knowledge isn’t centered on the teacher or the student, but rather on the learning management system (LMS) being used, the technology that underpins it and the classroom design. Students independently access and review the course materials prior to engaging in socially oriented activities like those on a discussion board.

Obviously, technology has always played an important role in distance education (Fisher & Baird, 2006). In the elearning environment, students work from a desktop centered application on a traditional or laptop computer (Fisher & Baird, 2006). However, that won’t work well in the mlearning environment because screen sizes are smaller (Fisher & Baird, 2006; Valk et al., 2010) and battery life and memory are limited (Fisher & Baird, 2006). A smaller screen size means that a text-based transfer of data is cumbersome for the student (Fisher & Baird, 2006). Instead the content should be geared toward specific devices (Fisher & Baird, 2006) and around the interplay of instructors/students, data/technology, and time control/session work integrity (Cruz-Flores & López-Morteo, 2010) by integrating the “human-to-human” and “human-to-computer” aspects (Lambropoulos, Faulkner, & Culwin, 2012, p. 297). Practically speaking
these can take the form of real-time chats, screen sharing, team rather than individual interactions and formats that showcase participation (Cruz-Flores & López-Morteo, 2010).

With the device limitations and social constructivist theory in mind, the course design should be socially based. It should account for data transmission and socially-based dialog between the course participants (Lambropoulos et al., 2012). The social presence of the participants (Aragon, 2003) and the social interaction of students with the instructor (Baker-Eveleth et al., 2011) are crucial to promoting a social learning environment or community. This social interaction can take shape in the form of mentoring sessions, practice sessions and debriefing sessions (Baker-Eveleth et al., 2011). The course design should provide opportunities for students to observe, imitate and model behavior as a part of the learning environment (Baker-Eveleth et al., 2011). Students should experience meaning and feel like they belong to the group, which in turn should become a part of their identity and result in increased involvement (Baker-Eveleth et al., 2011).

A critique of the technology used for elearning revolves around its use to disseminate information and organize the classroom environment through an LMS rather than on creating learning in students (Lambropoulos et al., 2012). Meaningful discussions, a crucial component of a successful pedagogy based on social constructivist theory, are difficult to orchestrate in an elearning environment (Lambropoulos et al., 2012) due to the limitations in the technology associated to the LMS. Social awareness, which includes both presence and copresence, is needed in an elearning environment, but current LMS’ provide a weak platform for students to observe themselves individually and in relation to other students (Lambropoulos et al., 2012). These weaknesses are demonstrated by nonparticipation, passive participation (reading only) and low participation in discussions (Lambropoulos et al., 2012). Two ideas studied by
Lambropoulos, Faulkner and Culwin (2012) to improve both the quantity and quality of posts by students are to add visualizations regarding individual participation and participation relative to the rest of the group (e.g. who is at the center of the conversation) and to create a collaborative elearning episode (CeLE) by having students use drop-down lists to label the content of a post (e.g. suggestion, question, agreement, etc.). This information, which showed the most promise in their study, can be used to show students what they contribute to class discussions along with their strengths and weaknesses (Lambropoulos et al., 2012).

The technology used for mlearning is a bit different. Mobile phones and tablets are used to gain access to the class and for new learning. Mobile phones differ from traditional phones due to their data (Valk et al., 2010) and video features. It is widely accepted that elearning via desktop and laptop computer increases student access to education and LMS-less mlearning via mobile phones and tablets increases that access even more (Valk et al., 2010). Without the need to purchase a computer and separate internet service, mlearning based on devices and services the student already possesses is less expensive and users are already familiar with them (Valk et al., 2010). They are expected to transform the student experience into one that is customizable and individual in ways that promote both situated and authentic learning (Valk et al., 2010). The ability to provide not just timely, but nearly continual feedback also promotes student learning and reflection (Valk et al., 2010).

LMS-less mlearning provides the opportunity to push the technology from the fore-front of the class like in is in elearning to the background. It allows teachers and students to connect and engage “just-in-time and just-in-place” (Cruz-Flores & López-Morteo, 2010), in ways that make the underlying technology largely invisible. This helps keep the orientation of the classroom design on the learning theory and pedagogy rather than on the technology.
Technology provides options for the application of the learning theory in the pedagogy, which is described by Anderson and Dron (2011) as a “hardening” of the pedagogy (p. 81). Undeniably, those options are rightly taken into consideration in the pedagogy (Anderson & Dron, 2011), but technology shouldn’t dictate it. Perhaps the best way to describe it is that the technology should be so invisible to the student that it is taken for granted. An elearning student today might describe the elearning classroom as being computer based or online. The goal of mlearning should be to have students describe it as person-to-person with adding that contact is facilitated through mobile technologies only as an afterthought.

If the real estate mantra is “location, location, location” then the mlearning mantra for LMS-less classrooms is “options, options, options”. There are so many options on how a teacher can leverage technology in an LMS-less mlearning classroom to create new learning that it is nearly overwhelming. For example, at least 16 well-known options exist for students to read an ebook associated to an mlearning classroom. A few of the most popular reader apps are Kindle, Nook and Google Play Books. Google Play Books is probably the most universal since it isn’t tied to a device like a Kindle or a Nook. To use this technology in an mlearning classroom, a teacher only needs to ensure that the course text(s) are available on those multiple apps. The student chooses which one to use.

**A Baseline Mlearning Pedagogy**

Anderson and Dron (2011) explain three generations of distance learning pedagogies as a “dance” between technology and pedagogy (p. 81). Although theory is well represented in the article, it is strangely absent from this dance. Imagine instead a dance between theory and pedagogy where technology cuts in. Theory provides strategic direction, the pedagogy applies those ideas and technology provides options for access and learning.
How students access knowledge determines the classroom type. For example, traditional, elearning, mlearning and hybrid classes are all ways to access knowledge in a formal, facilitated setting. These are different than a library, which is also an access point for knowledge, but it isn’t a formal one meaning that the transfer of knowledge isn’t facilitated by a teacher. Identifying how students will access the classroom environment is important because it impacts the application of the learning theory in the pedagogy.

A pedagogy includes content and its presentation, instructional assets, cognitive processes for the student and evaluation of the learning achieved (Nish, n.d.) and an mlearning pedagogy is no different. Pedagogies associated to traditional classrooms are content-driven, teacher centered (Anderson & Dron, 2011) and pedagogies associated to elearning classrooms are LMS driven, teacher guided (Anderson & Dron, 2011). In an mlearning classroom, the pedagogy is internet driven, socially centered. Content is identified by the teacher and available to the student through the internet. Presentation of the content depends on its form. Live, written,
audio and audio/video are all options. The instructional assets related to learning are also related to and provided by the internet. Cognitive processes can vary based on the topic and student demographics due to the flexibility provided by the internet and evaluations can include old techniques like quizzes and papers and new techniques like the “just-in-place” (Cruz-Flores & López-Morteo, 2010) application of new skills. Expressed in a formula an mlearning pedagogy looks like this: social constructivist theory (networking component) + internet content + internet assets + teacher-to-student/student-to-student cognitive processes + teacher-to-student/student-to-student evaluations = a baseline mlearning pedagogy. Leveraging the means and instruments available through the internet to deliver course content and the instructional assets provides more natural options to “harden” the pedagogy (Anderson & Dron, 2011) than are typically employed in traditional and elearning classrooms. Although the cognitive processes and evaluations also use the internet, the technology is pushed to the background. The focus in those two areas of the pedagogy is on teacher-to-student and student-to-student interaction. To better express this baseline mlearning pedagogy, the following tables identify a few of the options related to each of the four core areas of the pedagogy:
THE FUTURE OF MLEARNING

Cognitive Processes
Teacher-to-Student,
Student-to-Student
Focused

Live, written, audio,
audio/video

Discussions Peer Review Role Playing Team/Group Work

In original format;
Youtube; Skype; Email; Google Groups

Skype; Twitter; Youtube;
Facebook; PolarisOffice5/ Email; Google Groups

Wiki spaces classroom; Google Groups

ThinkingWorlds;
Youtube; Skype; Twitter

Diigo; Blogger
Mobile; Mobile Podcaster

Web 2.0 Activities
Sharing annotated research;
blogging; podcasts

Evaluations
Teacher-to-Student,
Student-to-Student
Focused

Live, written, audio,
audio/video

Papers/Reports Assignments Exams Presentations Quizzes

PolarisOffice5;
Google Quickoffice;
Youtube; Email

PolarisOffice5;
Google Quickoffice;
Youtube; Email

PolarisOffice5;
Google Quickoffice

Skype; Youtube;
Screencast

Google Forms;
Youtube; Email
**Strengths of the Pedagogy**

There are a few things that are easier or more convenient to do on a mobile device like a smartphone than they are on a laptop or desktop computer. For example, microblogging similar to Twitter could occur spontaneously rather than in a formal study session. Microblogging could be used in a number of ways in the classroom. For example, students could use microblogging to report, converse, archive items like sources related to a particular topic, brainstorm, vote on a debate or topic, or provide a running commentary like at the bottom of a news channel. Most of these shouldn’t stand alone as a cognitive processes or evaluations, but they can be useful tools in the classroom. Microblogging in particular helps close the gap between the life of the student outside and inside the classroom because participation isn’t limited to formal class or study times. Also, providing a running commentary of an event helps close the gap between the theoretical and the applied. For example, a student could attend a local political speech or even watch a documentary on something like the Rwandan genocide and tweet about it throughout, which could form the basis of a more formal and reflective cognitive process on that topic. Imagine forum discussions supplemented each week before it began by student reporting and impressions of events, documentaries and the like. It adds a whole new level of dynamism that would be hard to match with a laptop or desktop computer. Being less formal, it also adds to the social interaction among students as they respond to tweets about the topic and otherwise network with each other. This idea works in reverse too meaning that the teacher can tweet on an upcoming topic as the resident expert, which would improve the teaching, social and cognitive presence of the teacher all at once. Microblogging can add an element of continual discourse, however brief, outside of formally submitted and graded evaluations that currently don’t much exist in traditional or elearning environments.
Another major benefit of mobile learning is that it can occur in very small increments. Students can leverage short expanses of down time like an unexpected wait at a doctor’s office to learn. Given that mobile devices are often carried for other reasons, prior planning isn’t required. Students can decide spontaneously to learn because the mood struck or opportunity knocked. Mobile learning should result in increases in new learning as students increase the total amount of time spent on learning and learning activities like thinking and analysis because they are no longer tethered to a formal class or study space and time.

Keeping social constructivist theory with a networking component in mind, cognitive processes can take a number of forms. For example, using a flipped approach, students can review the course materials and submit questions or topics for discussion (Hanford, 2013). The teacher selects the one(s) for the discussion based on the course objectives for that week (Hanford, 2013). Drawing on the technological options available to “harden” the pedagogy (Anderson & Dron, 2011), the course materials could include written, audio or audio video components that are teacher generated or from experts in the field that already exist on the internet. The proposed questions or topics can be submitted by tweets and the discussion can be held synchronously via skype, or asynchronously via facebook or youtube. In another flipped example, students can review the course materials and take a quiz early in the week (Smith, 2013). The professor can orient the discussion based on areas of weakness identified in the quiz results (Smith, 2013). Technologically, the quiz can be administered via Google Forms in a written format or with the questions provided by the teacher in a youtube video. In that case, students could provide their answers by emailing the link to a locked youtube video back to the teacher. Another option is to administer the quiz via youtube, but have the students provide their answers to the teacher using Polaris Office 5 or Google Quickoffice via email. Still another
option is to email students a word document with the question and have them use Polaris Office 5 or Google Quickoffice to edit the document to include their answers and email it back. More options exist that can be selected as required.

Imagine hands-on projects captured in video or group projects supported by six or more underlying means of communication for research, coordination, application and submission. In short, the strength of the baseline mlearning pedagogy is in its ability to be individually tailored to particular disciplines and pedagogical needs. Unlike the traditional classroom that isn’t well set up to leverage the internet to its fullest potential and the elearning LMS that is limited by its underlying technology, the limitation factors here are related to the ability of the teacher to envision the possibilities.

**Weaknesses of the Pedagogy**

In spite of all of this, a couple of weaknesses exist. First, since an LMS-less mlearning classroom isn’t a place students go to, it could feel very abstract and unreal to students, which would presumably negatively affect their ability to successfully stay connected with and complete courses. A simple webpage to hold announcements and provide links to the course materials for that week could help alleviate this until students adapt to the environment. Also, students could receive announcements via RSS feed if the page provided that feature. Second, regulatory controls could be difficult given the number of options available. Third, abiding by laws like FERPA may not be readily achievable in an LMS-less classroom (Mastors, 2013). Finally, a campus for registration, etc. is still required so some form of software overhead is needed.

**Conclusion**
Mlearning has the potential to revolutionize learning through a convergence of: 1) human interaction - a strength in a traditional classroom; and, 2), nearly world-wide reach - a strength of an elearning classroom. Pedagogies related to mlearning should be driven by theory and LMS-less in order to take advantage of the demand for compatibility between devices in the civilian market. Two portions of the pedagogy, content/presentation and instructional assets, should leverage the options available on the internet. Doing so provides more options for use in the pedagogy than are currently available to teachers in traditional or elearning classrooms, which is what is behind the revolutionary potential of the pedagogy. The remaining two portions of the pedagogy, cognitive processes and evaluations, should focus on teacher-to-student and student-to-student interaction by pushing the technology to the background.

Significant testing across disciplines is needed to identify the best practices. Having a nearly unlimited number of options is great providing that cognitive processes are organized, scaffolded and result in new learning. Presumably, the options that create new learning in natural sciences aren’t necessarily the same options that create new learning in other fields like history. Likewise, the options that best fit one culture won’t necessarily be the same ones that best fit another culture.
References


