

Delivering User-Centered Content on an Inclusive Mobile Platform: How to Produce It and Use It!

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Abstract. The adoption of mobile learning in higher education is facilitating new avenues for inclusive and accessible learning. The bedrock for these learning environments is the accessible software/hardware included in newer smart devices. Non-traditional learners such as those from diverse racial, cultural, and linguistic backgrounds as well as learners with disabilities are gaining access to higher education using these technologies.

Even though inclusive technology is opening doors to the non-traditional learner, reliance on the access features within technology is still causing barriers to education. One barrier is that technology continues to evolve rapidly and with each upgrade new interface issues arise. The second barrier is that the dependence on smart devices to provide access to education does not address inaccessible course design and delivery of educational content.

Keywords: Mobile learning · Inclusive learning · Accessibility · Inclusive content · Productivity tools · Synergistic Learning Theory (S.L.T.)

1 Introduction

Mobile Learning is re-shaping education today. Using mobile technology to participate in educational environments not only offers new options for flexible learning it also promotes educational opportunities to non-traditional learners. The Pew Research Institute stated that smart devices offer affordable access to the internet and other mobile applications to non-traditional users from various cultures and economic backgrounds.¹

Another component of mobile learning is the use of smart technology by learners with disabilities. A great deal of positive attention has been centered on the smart devices that have accessible technologies and applications embedded within them. The accessibility hardware in smart phones and tablets is changing how users with disabilities interact with co-workers and social peers.

The problem is that access to higher education still relies heavily on the capacity of assistive technology and other devices to support learning. Pedagogy and content delivery is often not being taken into account when evaluating the accessibility of

¹ Smartphone Ownership 2013. (2013, June 4). Retrieved March 1, 2015, from <http://www.pewinternet.org/2013/06/05/smartphone-ownership-2013/>.

learning environments. Technology changes so rapidly that expecting the smart devices alone to promote educational inclusion is becoming a barrier to learning. Initial efforts to promote academic accessibility in the mobile learning realm were addressed by designing accessibility based on the assistive capabilities of a specific device.² Further research has shown that learners with disabilities prefer to use their own device since they are more comfortable with them and discover their own work-around to deal with access barriers.³

The primary focus of this paper will be on how content can be developed and presented in ways that can support diverse learners in a mobile environment. A theoretical framework for inclusive learning will be discussed along with showcasing some practical tools for creating inclusive content.

This paper will be divided into three parts. The first section will discuss how to design an inclusive mobile learning platform. The second part will describe how to incorporate Synergistic Learning Theory into pedagogy and how to develop accessible/inclusive content. The final section will showcase learner productivity tools that can be applied to a learning environment in order to support learner engagement.

1.1 Developing an Inclusive Mobile Learning Platform

In her investigation toward developing an inclusive definition of mobile learning Rebecca J. Hogue asserts there needs to be a balance between device-centric and learner-centric learning in the mobile –environment (Fig. 1):

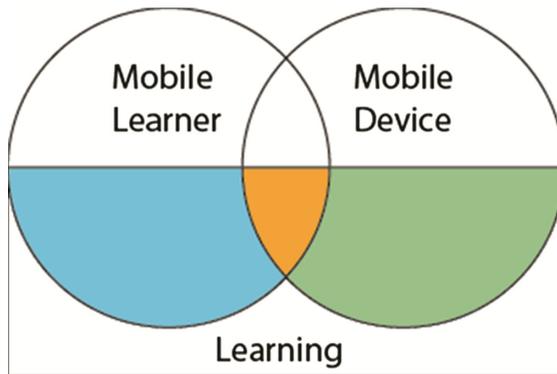


Fig. 1. Two-circles indicating the intersection of learner-centric and device-centric learning

“The first aspect of mobile learning, represented by the left circle, is the mobility of the learner. A mobile learner is a learner that is not in a classroom or in front of a desktop computer (home office, lab, etc.). The learner need not physically be moving, but they

² (n.d.). Retrieved March 6, 2015, from <http://www.irrod.org/index.php/irrod/article/view/965/167>.

³ (n.d.). Retrieved March 2, 2015, from <https://mobilelearninginfokit.pbworks.com/w/page/.../Accessibility>.

are learning in a situation that is not considered a traditional learning environment. I call this type of mobile learning, learner-centric mobile learning...The second aspect of mobile learning, represented on by the circle on the right, is learning that takes place using mobile devices. This includes learning that takes place in the classroom or other traditional learning locations. It is the use of the mobile device that makes it mobile.”⁴

Hogue’s definition points to the need for developing a framework for evaluating balance between the device-centric and learner-centric aspects of mobile learning. Developing an inclusive mobile platform incorporating her definition could emphasize flexible use of technology and pedagogy that supports personalized learning.

Developing an Inclusive Mobile Learning Platform. The JISC TechDis organization developed criteria for evaluating the accessibility of mobile platforms. The four areas of consideration are the interface,

The cultural capital (is this way of learning culturally appropriate), accessibility of both tasks and content. “Accessibility needs to be seen in relation to:

- The whole learner experience – what they do and how they do it.
- The alternative learner experiences – what they would otherwise do to achieve the same learning objectives.
- The alternative resources – whether m-learning offers more flexibility than traditional resources or pedagogies e.g. handouts.”⁵

For our purposes the “interface” could be any on-ground or on-line platform that qualifies as accessible under the terms of U.S. 508 compliance. Creating an inclusive learning environment is much more involved with the accessibility/usability of the course design and content. Designing a course delivery system using a simple web site can be just as effective as building a course in one of the nationally recognized learning management systems (LMS).

Once the overall accessibility for the LMS is established the first recommendation for building an inclusive m-learning platform is to Store content in a cloud-based storage vehicle. Uploading materials to a cloud-based storage repository such as Drop Box provides learners with more flexibility in retrieving materials. Cloud-based repositories can be utilized by both mobile devices and hard drives. Cloud-based repositories are also often simpler to access than an LMS shell and therefore can reduce the time and complexity of reviewing content.

The second recommendation is to push out course information in small increments. This can be done effectively using either an instant messaging system or using email. There are also applications that allow for a multi-modal presentation of information using both visual and auditory components. Sending a text message with a voice recording attached supports diverse learning styles as well as promotes fuller comprehension.

⁴ An inclusive definition of mobile learning. (2011, July 17). Retrieved March 6, 2015, from <http://rjh.goingeast.ca/2011/07/17/an-inclusive-definition-of-mobile-learning-edumoooc/>.

⁵ A Model of Accessible m-Learning. (n.d.). Retrieved March 2, 2015, from <http://www.jisc-techdis.ac.uk/techdis/technologymatters/mobilemodel>.

The third recommendation is adding scaffold support to the course. This can be done in several ways. This author uses an avatar named, “The Tour Guide.” The tour guide provides supplementary information on things ranging from due date reminders for assignments, recommendations for research, and techniques for studying more effectively. Another option is to establish learning pods among the learners. These are groups that can work together on course activities, provide learning assistance to one another or simply be a source of personal connection.

Nicole Krueger suggests that faculty teaching in a mobile learning environment also form support collaborates. Connecting with other teaching faculty can help address the technological shifts within the learning environment and provide resources for effective practice.⁶

Incorporating the above recommendations will set the stage for further discussion on what constitutes inclusive learning. By reducing the technical barriers present in m-learning and incorporating tools and techniques that foster personalized learning not only will learners with disabilities learn more easily many barriers that other learners experience will also be resolved (mobile learning access).

1.2 Synergistic Learning Theory (S.L.T.) as a Possible Starting Place for Learner-Centric Engagement

Synergistic Learning Theory (S.L.T.) applies the engineering principle of “synergy” to the use of technology in higher education. It acknowledges the constant evolution of technology and its effect on social engagement. The main premise is that technology needs to be taken into account as an active participant in a given learning environment. The authors assert there are three categories of participant in any given learning environment. The facilitator, the learner and the technology is being used within the course. The authors further develop S.L.T. into a framework using the principle that the three individual participants merge into the gestalt of the learning event where the technology emerges as an active participant. The advantage of this is that both the facilitator and the participants can select the technology that would assist their participation the most and through this action social engagement is maximized resulting in personalized learning.

According to Boundless.com, personalized learning is defined as, “Personalized learning is the tailoring of pedagogy, curriculum and learning environments by learners or for learners in order to meet their different learning needs and aspirations. Typically technology is used to facilitate personalized learning environments.”⁷ Personalized learning allows the individual learner to choose for him or herself what resources and tools will accomplish their educational goals. Productivity tools may be added to a learning platform from which individuals can choose to support their learning or to help minimize barriers.

⁶ (n.d.). Retrieved March 2, 2015, from <https://www.iste.org/explore/articleDetail?articleid=167>.

⁷ Personalized Learning - Boundless Open Textbook. (n.d.). Retrieved March 6, 2015, from <https://www.boundless.com/education/textbooks/boundless-education-textbook/working-with-students-4/teaching-strategies-21/personalized-learning-66-12996/>.

Personalized learning also helps course facilitators and administrators provide the foundation for inclusion without having to understand the individual learning needs of each participant. It can also decrease the need for a learner with a disability to have to self-identify their disability in order to engage fully in a course.

Many learners with disabilities prefer the on-line environment because the parameters of social engagement shift. Learners who are uncomfortable self-identifying or want the chance to engage with their co-learners in a different way can do so. Many learners with disabilities are also comfortable using technology and find they can be successful in an on-line academic role.

Developing Inclusive Content for the Mobile Environment. We have arrived at the crux of this article. As stated earlier, educational inclusion is less about designing an LMS in an accessible format than it is in creating and delivering content that can be apprehended and comprehended easily. Some formats on how to deliver content were presented in section one of this paper.

There are two aspects to creating inclusive content. One is to prepare materials in ways that can be read and understood easily. The second aspect is to format materials ways that can be downloaded and managed on mobile devices. The first aspect relates to Hogues's learner-centric feature of her definition and the second relates to the device-centric feature.

Neuro-Science Research on How Storytelling Affects our Brains. Telling a story not only creates synchronicity between the teller and the hearer of the story, a well-crafted narrative lights up multiple areas of the brain resulting in greater comprehension of the narrative.⁸ Describing something that tastes good lights up our sensory cortex and telling an exciting moment of a football game activates our motor cortex. Storytelling is not limited to conveying information in an auditory format. Writing narrative in ways that activate different areas of the brain is also effective.

Obviously using a narrative format will not work for all content presentation, but inserting active descriptive language where possible will enhance the comprehension of mobile content.

Now, let's discuss the second aspect of creating various reading formats. Converting the materials into various formats so that, they can be utilized in a personalized learning environment. In the past converting content into multiple formats has been time-consuming and expensive. Recently new technology and techniques to support content conversion have become available that make presenting materials in an inclusive format much easier.

The first step is to prepare written text so they can be converted into formats for diverse learning styles. The best way to begin preparing printed text is by making an electronic copy of it. There is software like Adobe Professional that can create electronic files such as a PDF (portable document file), but the software has to be purchased and

⁸ What Storytelling Does to Our Brains. (2012, November 29). Retrieved March 6, 2015, from <https://blog.bufferapp.com/science-of-storytelling-why-telling-a-story-is-the-most-powerful-way-to-activate-our-brains>.

the learning curve can be time-consuming. Later version of Microsoft Word can also convert a Word document into a PDF.

One very efficient way to make a PDF file is by scanning a text file on a copy machine that has the capability to send a PDF as an attachment to an email. Many of the newer copy machines have optical Character Reader (O.C.R.) software in it. If this is available the file can be tagged for accessibility before it is sent as an attachment. If the copy machine does not have OCR software in it there is another resource academics can use to produce multiple formats of content.

SensusAccess is an organization in Denmark that produces cloud-based accessible documents in multiple formats. Once text has been saved as a PDF file it can be uploaded to the SensusAccess web site for further conversion. If the file was not tagged for accessibility by the copy machine adding the tags can be selected as an option.

There are other formats one can select for conversion. Electronic documents can be converted into MP3 audio files, Rich text Format, E-books, electronic braille as well as a number of other options. The web Site detects what type of file is uploaded and a dropdown list appears with the available conversion choices for the type of document.

After the file is uploaded and the format conversion choice is selected the file is sent to SensusAccess's server and the conversion is done. The converted file is then sent back to the person who uploaded the file via his or her email address. If the server was not able to convert the file for some reason an explanation of the problem will be sent back as a message so the problem can be corrected and re-submit it.

SensusAccess offers free use of its service to individuals with disabilities and other print limitations. It also offers a fee-based yearly subscription for educational institutions and other organizations that could benefit from the service. The URL for the free service is <http://www.robobrain.org>.

By offering documents in multiple formats learners can choose which format will support his or her learning style. It also permits selection of the type of file that will interface smoothly with the mobile device the learner is using.

Converting materials into multiple formats also has an advantage for the facilitator. Some materials have pictures and graphs in them which make downloading to a smart device a problem. Using SensusAccess or another conversion program would allow a facilitator to retain the photos and tables in documents while still offering a version of the document without the visual content for ease of download and comprehension.

The University of Massachusetts, Boston purchased a subscription two years ago and is using it with great success. UMass made the service available to the students, faculty, and staff on the campus. Registration with the disability services office is not required to use the service. The only requirement is that the person uploading documents use a dedicated campus email address.

Exploring Pedagogy Using S.L.T. By providing tools and software applications to support learning as well as social engagement learners can craft their own self-directed learning. This can be supported further by creating various activities and assignments from which learners can choose to demonstrate competency. Using audio/video and the other applications inherent within smart devices and other mobile hardware can also be very useful.

Group work is highly recommended to accomplish learning objectives. Group assignments allow for flexibility among the group members to assume learning tasks according to their individual skills and interests.

S.L.T. implies that the professor is also a learning participant within the learning environment. Communicating personal responses while assigning grades can foster greater communication with learners and can spark continued discussion on a more personal level.

1.3 Embedding Productivity Tools in the Mobile Environment

The term, “productivity tools” is being used intentionally by this author to make the addition of resources originally designed for people with disabilities more inclusive in the learning environment. Many of the open source and freeware available for diverse learners with disabilities are not utilized by other groups of learners because of the perception that they are meant for only one group. Some learners also feel that they are labelling themselves if they take advantage of these tools and that may cause discomfort.

The tools designed for learners with disabilities can be presented in the course as productivity tools to support different learning tasks. Instead of indicating that a tool such as Natural Reader assists people with learning disabilities that cannot read easily without support this excellent tool can be posted in the course shell as a resource to support reading on-line.

The one drawback to some open source and freeware tools is that they tend not to have any technical support. Before uploading a tool it is recommended that the facilitator try using it to be sure it is working properly and that he or she has some understanding of how it works. If the facilitator has a teaching assistant or other support staff that individual may be able to provide basic assistance.

Here are Some Examples of Productivity Tools. Note Pad in the Cloud is a single blank web page that can be used for taking notes or sharing work assignments among participants. It can be password-protected and it generates its own URL. The most valuable aspect of these resources is that any text added to the web page is automatically saved when the web page is closed. Learners can open the page from any computer or mobile device: <http://notepad.cc>.

Natural Reader Natural Reader is web-based reading software that is cross-platform. There is both a free and for purchase option of the application. Learners can read visually and listen to text at the same time. <http://www.naturalreaders.com>.

View Pure is a web site that supports viewing YouTube videos on a blank screen. Videos can be watched in either black or white without distraction. this saves bandwidth making the images sharper. Just paste in the video URL and begin watching.⁹

The Zen Productivity Guide: Tools and Tips for Distraction-free Work. This web site has a number of resources for reducing distraction while studying or working.

⁹ ViewPure/ videos without clutter. (n.d.). Retrieved March 6, 2015, from <http://www.view-pure.com>.

Resources include ways to use white noise to minimize sound to web site blockers that prohibit surfing on the internet.¹⁰

There are numerous resources of this type available on the internet. Other kinds of resources include writing applications, information organizers, and screen enlargement programs, and virtual keyboards.

2 Conclusion

Higher education in the mobile environment is going to continue to evolve. The technology will also continue to move forward in development. Establishing flexible open-personalized education resources which support an individual's pursuit of knowledge will support all learners in the most inclusive way possible. By pre-purposing the tools developed specifically for learners with disabilities the sense of separation will diminish between learners with disabilities and other diverse learners.

Creating content that is accessible and usable in the mobile format will allow the facilitator to communicate his or her learning objectives more effectively with greater ease since learner comprehension will increase significantly.

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¹⁰ The Zen productivity guide: Tools and tips for distraction-free work. (n.d.). Retrieved March 3, 2015, from <http://www.pcworld.com/article/2099744/the-zen-productivity-guide-tools-and-tips-for-distraction-free-work.html>.