Edward Frison   OLTD 508   April 15, 2016

Personal Inquiry: Is there significant current research that examines the efficacy of using educational apps on mobile devices for classroom instruction?

Critical Challenge Question: How can mobile technologies augment formal knowledge and assist both the student and the teacher with their learning?

It is my hope that the sources cited in this Annotated Bibliography contain sufficient insight to begin answering both these questions.

1.) Brown, J. and Haag, J. (2016). *ADL Mobile Learning Handbook*. Retrieved 26 March, 2016, from https://sites.google.com/a/adlnet.gov/mobile-learning-guide/home

The US Government sponsors the Advanced Distributed Learning (ADL) Initiative. This handbook provides an in-depth resource covering a wide range of topics and considerations for advancing the cause of using mobile technology for educational / training purposes. Their mandate is to provide access to the highest quality training and education that is focused on individual needs. These initiatives must be able to be delivered anytime and anywhere as cost effectively as possible. Mobile technologies look like the best means to provide training where the need is independent of time, location, and space. The handbook is divided into nine relevant sections. This is a must-have resource for any school or district looking to implement mobile learning into their curricula. The material presented is well organized and well researched with links to various learning theories. Just the

Resources section on its own is worth having this handbook for. I highly recommend keeping this handbook handy.

2.) Chan, T, Roschelle, J, Hsi, S., et al. (2007). One-to-one technology-enhanced learning: an opportunity for global research collaboration. *Research and Practice in Technology Enhanced Learning*, 1(1), 3-29. Retrieved 9 April, 2016, from http://hal.univ-grenoble-alpes.fr/file/index/docid/190632/filename/A132_Chan-et-al2006_OneToOne.pdf

This paper takes a detailed look at what is happening to education as technology becomes cheaper and internet connectivity more ubiquitous globally. This has created a unique pressure on schools to adopt digital learning devices. The question is asked on whether students will come to expect that their personal mobile, connected, devices used outside the school can be used in the school and how this will connect classroom life to everyday life. This paper likens this to a new evolutionary phase in education. The authors coin a new term to describe this condition. Rather than use E-Learning or M-Learning to describe this evolution, the authors use technology-enhanced learning (TEL) to describe when a student uses at least one digital device to access learning. The paper is sorted into seven chapters covering discussions about definitions and properties of TEL, research into this evolutionary mode of learning, moving to adoption-based research, the digital divide, potential downsides of TEL, and collaborative research on a global level. I

would not use this resource as light or expected reading as we move toward implementing something like TEL. It is quite detailed and heavy reading, but very useful in identifying areas of note. This was particularly true with the discussions in the chapters on the digital divide and potential downsides, especially in areas in the North and remote/small rural areas where bandwidth and inability to keep up with technological change are very visible. This is an excellent resource for a literature review when looking to develop mobile learning initiatives.

3.) Chen, B and Denoyelles, A. (2013). *Exploring Students' Mobile Learning Practices in Higher Education*. Retrieved 26 March, 2016, from

http://er.educause.edu/articles/2013/10/exploring-students-mobile-learning-practices-in-higher-education

This peer reviewed article examines the results of a campus-wide survey of students at the University of Central Florida. The survey examined the use and ownership of mobile technologies amongst the student population with two questions looking at what mobile devices students have for accessing digital content and how they use these devices for academic purposes. Results of the survey indicate that mobile phones are most prevalent followed by tablets and that the top uses of these devices by students were for social networking, music, and games. Educational and productivity use gained the lowest results in the survey. The data gathered in the survey resulted in several recommendations around increasing the use of mobile technology into the academic courses by integrating apps into the various curricula

and making tablets more accessible for student use. This is an excellent article as it would have similar results to secondary school students in terms of the accessibility and use of mobile devices. The recommendations are in line with what we see being made for K-12 education and would support proposals being made to integrate mobile learning into planning secondary courses instructional methods.

4.) Decker, M. (20 December 2013). From E-Learning to M-Learning: A Different Beast. [Weblog]. Retrieved 26 March 2016, from http://www.business2community.com/business-intelligence/e-learning-m-learning-different-beast-0721429

Decker gives a comparison of the main similarities and differences between E-Learning and M-Learning. She emphasises that even though they both end in learning they are not the same. The article explains how learning activities differ in terms of the devices each use, the amount of time spent on each, and how to organize content for each. Mobile learning is meant for time of need support and not for lengthy lessons. The article finishes with recommendations for mobile app design listing 7 considerations. This article is useful for early discussions around introducing M-Learning to teachers, administrators, and district staff. The brief discussion of the differences between 'E' and 'M' Learning is a good starting point for broader and more detailed conversations.

5.) Diamantini, D. & Pieri, M. (2009). From E-learning to Mobile Learning: New Opportunities. In Ally, M (Ed), *Mobile Learning Transforming the Delivery of Education and Training* (pp. 183 - 194). Edmonton, Alberta, Canada: AU Press. Retrieved 1 April, 2016 from

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.475.2163&rep=rep1&type=pdf

This particular chapter looks at how the methodologies associated with blended learning models can be used to initiate mobile learning situations. The study looks at blending M-Learning and face-to-face methodologies and comparing results to similar E-Learning results using the same type of modalities. This occurred on four levels: Needs analysis; design of interventions; training delivery; and assessments. The results showed that for the test group, blending M-Learning as a training method was better received than a similar blended E-Learning model. These results can be used in discussions about using M-Learning models in our K – 12 schools as well. This entire book has been devoted to looking into aspects of M-Learning. Each chapter examines different topics. As it is a very academic style publication, it would be a good resource for use as a textbook in training programs for professionals engaged in the study of digital learning environments.

6.) Drinkall, D & Kneebone, F. (2012). *2012 M-Learning Teacher and Trainer Guide*. (3rd ed.). Retrieved 5 April, 2016, from http://e-standards.flexiblelearning.net.au/implementation/mobile_technology.php

This document was developed as a training manual for educators working in the field of Vocational Education Technologies. The manual is produced as part of a series of information and training manuals and guides for modernizing education in Australia as a national initiative. This guide explores current definitions of M-Learning and looks at why teachers would want to use this modality for teaching and learning. It emphasises the desire of mobile device owners to use them for education where they are and when they want it. The manual explains that good M-Learning is still linked to using good teaching and learning practices, but designed for mobile technologies. The need for cross-platform programming that is designed to be responsive, adaptive, and allow for progressive enhancement and disclosure. The increased variety of learning activities is a major consideration for mobile delivery along with the consideration of using/developing browser-based or native apps. There is a very good comparison of mobile technologies and their capabilities. These are followed by six case scenarios showing possible uses of mobile technologies. I really liked this guide for informing me about where I am at in my own understanding of mobile technology use in schools. I was particularly glad to see an exploration and acknowledgment of the effects of the digital divide on acquisition of devices and the availability of programming if apps have personal costs associated with their use. This is another great training manual from the Government of Australia and well worth having as part of anyone's E-Learning and M-Learning library.

7.) Elearningindustry.com. (2013). *Top Tips to Make Your Mobile Learning Engaging*. Retrieved 26 March, 2016, from http://elearningindustry.com/top-tips-to-make-your-mobile-learning-engaging

The overall heading for this site is, "*Top Tips to Make Your Mobile Learning Engaging".* The site is a compilation of recent posts on ways to engage in, and make the most of, mobile learning. The first article deals with making mobile learning engaging and delivers six tips to that end. The second article deals with the six best practices for delivering mobile learning. This included examining lessons designed for 2 minute, 5 minute, and 10 minute sessions. Third in the series of articles is one that looks at making mobile learning design responsive to the learner and gives five reasons to make online courses mobile friendly. The series of posts goes on with many more articles discussing mobile learning trends and best practice. This is a great resource for a variety of reasons. The content is delivered in mobile friendly manner so they demonstrate how content can be delivered this way. The information is very current which makes the discussions credible in how they reference their information and suggestions to practice as well as research being done today.

8.) El-Hussein, M. O. M., & Cronje, J.C. (2010). *Defining Mobile Learning in the Higher Education Landscape*. Educational Technology & Society, 13 (3), 12–21. Retrieved 29 March, 2016 from: http://www.ifets.info/journals/13_3/3.pdf

This article looks at the emergence of mobile technologies and defining mobile learning in the context of post-secondary students. Mobile learning is examined

under three broad areas: mobility of the technology; mobility of the learner; and mobility of the learning process and flow of education. The article seeks to define M-Learning in, and against, the context of the rapid rate of change in learning technology versus the ponderous rate of change in educational learning theories. The article goes on to look at the two terms, *mobility,* and *learning* in depth as to what they mean on their own and what they mean when used to describe a mode of learning. It is pointed out that although modern smart phones have multiple functionalities ranging from telephone, camera, organizer, book reader, music player and GPS, the most popular functions continue to be short message service (SMS) or texting, and multimedia messaging service (MMS) or picture/video messages. Although this study takes place in South Africa amongst college students, the data is transferable to Canadian learning situations. What was interesting is that the vast majority of students in the sample did not identify themselves through E-Learning technologies such as email, but rather through mobile contact information with their cell phone number and automatically looking at messaging for return information rather than email or even a phone call. I think this is very much applicable to a Canadian context.

9.) Gutierrez, K. (2015, 01 September). Understanding The Difference Between e-Learning and m-Learning. [Weblog]. Retrieved 27 March 2016, from

http://info.shiftelearning.com/blog/difference-between-elearning-and-mlearning

Gutierrez discusses how E-Learning developed as a form of distance learning via computer applications. Once this occurred, the learner was no longer tied to a desk

in a school so moving to learning done on mobile devices was a natural outgrowth of E-Learning. She provides an info-graphic that delineates what she sees as the major differences between E-Learning and M-Learning. The graphic identifies 4 major categories which she explores in more detail in the article. They are: Purpose; Medium of Delivery; Design; and Duration. The article points out that even though M-learning is a subset of E-Learning, they are quite different. That being the case, they are not in competition, they do different jobs. Once again, I chose this article because it is a good introduction into understanding the origins of M-Learning and where the major differences are between the two modalities. This makes for quick reading which will help keep deeper discussions on track.

10.) Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. *Research In Learning Technology, 20*. doi: Retrieved 29 March, 2016 from: http://dx.doi.org/10.3402/rlt.v20i0.14406

This journal article provides an in-depth study of three features of mobile learning; authenticity, collaboration, and personalization. From this, the authors created a pedagogical framework which was then tested in two mobile learning projects through various activities such as the use of Twitter at a conference; geometry in the field using an angle app; a Fractions app for smartphones; Augmented learning using an augmented app in a museum; the game, Statecraft X played on phones; and podcasts of lectures downloaded onto phones. The results of testing their framework provides a focus on the examination and critiquing of the pedagogical impact of various M-Learning contexts. This resulted in identifying three constructs

integral to teaching using M-Learning. They were: authenticity, highlighting contextualized, participatory, and situated learning opportunities; collaboration, which shows the socially connected aspects of M-Learning; and personalization, which shoed how M-Learning provides for ownership and autonomous learning. I have included this article, as the framework the authors developed is very applicable in looking at ways K-12 educators can design and implement M-Learning opportunities into public school curricula. The field tests showing the highest engagement in gaming and social media is very interesting and suggests a possible focus in developing or choosing apps for M-Learning in our own situations.

11.) Kokkalia, G & Drigas, A. (2016). Mobile Learning for Special Preschool Education. *International Journal of Interactive Technologies*, 10(1), 60-67. Retrieved 6 April, 2016, from http://dx.doi.org/10.3991/ijim.v10i1.5288

This article looks at a selection of studies done from 2005 – 2015 that examine the use of mobile technologies in special education applications in pre-school and Kindergarten children. The aim of the article is to look for data around early literacy, early numeracy, and cognitive and social emotional development. The premise of the authors is that young children are exposed to mobile technologies through their parents devices at a very early age and learn to use touch-screen technology easily. They present summaries of studies on the use of mobile devices in five areas: early literacy; early numeracy; Attention Deficit Hyperactivity Disorder; Autistic Spectrum Disorder; and mental health problems. I chose this particular resource as it presents information very useful for special education

teachers and support workers. These mobile tools could have a significant impact on fragile learners and would be an asset to assistive technologies. I would highly recommend this article to co-workers for the information and also for the wealth of cited references they include.

12.) Lombardi, M. (2012). *Learning on the Move.* Retrieved 2 April, 2016 from http://www.netdimensions.com/uk/resources/collateral-request.php?FileId=74#loaded

Aberdeen Group is a data analysis group that looks at business trends and makes recommendations for improved Human Capital Management. This particular document compiles a variety of different data sources such as, research, interviews, surveys, etc., and compiles them into comparative reports. They identify learning as a critical element of any organization carrying out its business plan. Their analysis of data collected in 2011, identified learning as second only to talent acquisition as the top Human Capital Management activity. For this to happen, the data indicated that learning needs to meet the needs of rapidly changing company dynamics. Having employees able to access learning through their mobile devices was quickly identified as a top development priority. The use of mobile tools to access learning increased two-fold in an 18 month period. The report goes on to look at the What and How of mobile learning, the different types of learning activities taking place on mobile devices, and barriers to implementing a mobile learning plan. The report identifies three main take-away points from their research: learning drives organizational adaptability; mobile is about formal and informal learning; and

mobile learning is still evolving. I found the corollaries in this article between business and education very compatible. In particular, two things were mentioned that I have seen quite clearly within the educational system: that technology innovations happen much faster than organizations can absorb; and that mobile tools will only be shiny objects until proper planning and integration makes them an integral part of the way learning is handled. This is a very good resource to share with administration and senior leadership as it shows that business models are looking to mobile learning platforms as well. This information can go a long way in making a case for developing a mobile learning plan in your school or district.

13.) Lynch, M. (2015, 31 March). Do mobile devices in the classroom really improve learning outcomes?. [Weblog]. Retrieved 10 April 2016, from

http://theconversation.com/do-mobile-devices-in-the-classroom-really-improve-learning-outcomes-38740

Lynch claims that mobile devices are becoming a common element of education at all levels. He indicates that more than half of all teachers in the US have smart phones and most teachers are pushing for a BYOD national policy. Citing the Pew Research Center, Lynch found that a significant number of teachers report using mobile technology in their classrooms and find that using mobile apps and devices has resulted in a marked increase in student performance. He does note that there are a number of challenges to integrating mobile technology into schools, noting such things as theft, lower sense of teacher authority, cost, socio-economic divide, enforcement of policies on student-owned devices, and privacy. Lynch summarizes

what does work: E-readers which are always up-to-date, ability to individualize

mobile modules, text/response programs for teacher/student communication, and

use of cloud technology to make learning seamless from the classroom to the home.

I have included this article as it merits attention through the surveys and studies

mentioned and that Lynch provides a look at both the positives and negatives you

might encounter when planning for mobile technologies. Perhaps the most

significant comment made, is that excellent teachers are more necessary than ever,

and balancing technology use with good teacher interaction is the way to maximize

the learning environment.

14.) Mobl21.com. (2016). *Mobile Learning In The 21st Century*. Retrieved 30 March,

2016, from http://www.mobl21.com/resources/

This web resource provides ready-made platforms for helping to initiate M-

Learning in the K – 12 setting. There are two pdf. documents to download titled:

“Mobile Learning Basics”, and *“Implementation Steps in Mobile Learning”.* These are

brief articles that give information and possible steps in considering implementing

mobile technologies in classroom instruction. The company itself is able to provide

ready-made applications for use with multiple mobile devices that can be

customized quickly for a teacher's specific use. These are not free services, so

potential users need to consider if this product fits into budget and regulatory

requirements. I included it in this bibliography for its information and because of

the quickness with which a school could implement mobile apps into existing and varied technologies.

15.) New generation technologies for learning. (2013). *Android and iOS App Development Explained: A guide for Teachers and Trainers*. (1st ed.). Retrieved 5 April, 2016, from http://e-standards.flexiblelearning.net.au/implementation/mobile_technology.php

This document was developed as a training manual for educators working in the field of Vocational Education Technologies. The manual is produced as part of a series of information and training manuals and guides for modernizing education in Australia as a national initiative. This guide identifies native apps, mobile web apps, and hybrid apps as well as steps to developing each different type of app. This process is further explained as app development applies to the operating systems for Android and iOS devices as well as web-based ones. Resources are stated with active links for each type of app. This is a huge resource for anyone looking to understand and incorporate app development into their educational plans. The links to other pertinent resources are well organized and pros and cons are explained. The document is licensed under a Creative Commons Attribution 3.0 license, which makes using the manual very user friendly. Anyone considering using apps for mobile learning should have this document on hand.

16.) Notquitesoancient. (2012, no-date). TeenInk.com. [Weblog]. Retrieved 1 April 2016, from http://www.teenink.com/nonfiction/academic/article/458083/Why-Cell-Phones-Should-Not-be-Allowed-in-a-School-Setting/

The author gives a list of reasons that indicate cell phones, (mobile devices), should

not be used by students in schools. A variety of studies are included with results

ranging from loss of attention, to addiction, and aberrant behaviour. The author

cited health studies that indicate students suffer from lack of sleep and restlessness

when constantly using their phones. In school behaviours that negatively impact

student lives were bullying, cheating, and lower literacy rates due to texting

language shortcuts. Widespread disruptions were also considered as reasons to ban

cell phones from schools. While quite counter-cultural in today's school

environments, I wanted to include this article as a counterpoint to the rush to

include mobile devices in educational settings. I also particularly like the fact that it

is written by a teenage student, which gives a totally unexpected viewpoint.

17.) Peters, K. (2007). m-Learning: Positioning educators for a mobile, connected

future. *The International Review Of Research In Open And Distributed Learning, 8*(2).

Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/350/894

This 2007 article uses data from a previous study by the Australian Flexible

Learning Framework and at looks at research about the use of mobile technologies

for commerce and learning. The paper provides a look at how M-Learning has

evolved out of E-Leaning and both are found within the framework of Flexible

Learning. Her model clearly shows the 'just in time, just enough, just for me'

elements critical to M-Learning. Peters states that mobile devices allow for

portability, social interactivity, contextual sensitivity, connectivity, and

individuality. She goes on to state that M-Learning is significantly different than E-

Learning and that there are different considerations to be looked at when designing

M-Learning strategies. These included urgency of need, knowledge acquisition,

mobility of the learner, interactivity of learning process, where the learning occurs,

and the integration of content. The paper provides an interesting discussion about

how the business world is ready for M-Learning but the educational world is

lagging. This is due to a number of considerations, but primary are whether

teachers are prepared to implement mobile technologies, and if students and

parents are prepared to engage in using personal devices for learning academics.

This is an excellent resource that looks at many interconnected factors regarding

mobile learning. It is a valuable resource to use as part of a literature review for

studying the feasibility of implementing mobile learning in a school or district

where the idea is new.

18.) Swan et al.. (2005). Uses and Effects of Mobile Computing Devices in K–8

Classrooms. *Journal of Research on Technology in Education*, 38(1), 99-112.

Retrieved 11 April, 2016, from http://files.eric.ed.gov/fulltext/EJ719939.pdf

This article examines the results of a study of grade 3 to 7 school students in two

different learning situations. The study focused on a group of students in a very well

equipped computer lab/classroom with very high levels of access to technologies by

the students and another group in a different school with much more limited access

to mobile devices. While the teachers in both situations encouraged ongoing use of

the technologies, it was apparent that the students in the well equipped setting

fared better on similar assessments. The study clearly showed that different

students reacted to the applications available in very different and individual ways. What was common was that the majority of the students used their devices outside of the assigned classes, such as at home, in other classes, on the bus, etc. Teachers noted that homework assigned using the mobile devices resulted in everyone getting it done, which was quite different from paper and pencil forms of homework. The study clearly shows that the use of mobile devices can be beneficial in and outside of classes. Literacy applications for average and struggling students were noted as being quite popular and successful in increasing performance. Limitations were also noted. Primarily, these included that there has not been a long enough period of time to say that these devices will continue to provide positive results, results may decrease when the novelty of a new thing wears off for students, and that some data may be suspect as it was self-reported. All-in-all, this is a good piece of research on the efficacy of mobile devices as a learning tool in K-12 education. I appreciated the notion that it is not the technology that makes a difference, it is what the students use it for that does. This article is a good fit into any working bibliography for promoting mobile learning.

19.) West, D. .M. (2015). *Connected learning: How mobile technology can improve education*. Retrieved 10 April, 2016, from

http://www.brookings.edu/~/media/research/files/papers/2015/12/01-connected-learning-mobile-technology-education-west/west_connected-learning_v11.pdf

This paper examines the benefits of adopting mobile devices as a way to improve global educational standards. West points out how many countries around the world still organize their curricula and schools around agrarian or industrial age models, even in the face of pervasive and ubiquitous connectivity with mobile devices. His paper examines some of the ways that mobile devices can improve learning and student and teacher engagement. One way that is identified is that mobile devices allow educators to customize content for an individual student. This is a huge help when teachers have to deal with very diverse student needs. A second benefit identified is how digital technologies make it possible to embed assessment within the learning tools being used. When content is provided in digital form, assessment can be automatic and provide immediate feedback to both the student and the teacher. Digital technologies can also provide the means for many innovative practices. Students will take on more responsibility for their learning and teachers can focus on higher-level thinking and problem-solving skills. A fourth benefit identified is that mobile technology can offer educational opportunities and assistance to the disadvantaged, where, in many developing countries education and skill training is often too expensive for much of the population. West also recognizes the growing importance of machine-to-machine communications in recent years, thus giving mobile devices even greater value. He indicates that one of the greatest benefits of mobile technology is how it has contributed to economic growth in all nations around the globe. He concludes by saying that mobile technologies transform all areas of learning. This is an excellent resource to include in any presentation looking to support the implementation of M-Learning practices

in schools and districts. The author and cited studies are credible and the information is clear and concise. This is worth including in a literature review examining the efficacy of mobile learning.

20.) Wikieducator.org. (2008). *Implications of Mobile Learning in Distance Education for Operational Activities* . Retrieved 1 April, 2016, from

https://wikieducator.org/images/c/c6/PID_624.pdf

This article examines mobile learning as a component of a Flexible Learning Model. The model is characterized by four elements: accessibility, choice/control, responsibility, and support. The article predisposes mobile learning as a "must do" in today's society as learners do not have a choice on whether they can learn without using mobile technology at some point. Advantages and disadvantages of using or implementing mobile learning technologies are examined. Key issues emerged from the study identifying privacy concerns, distraction, informality of learning, and the feeling of ownership of the device. I liked this article as it provides a global comparison of factors we can see in our own learning contexts around using mobile technologies and the recommendations listed are applicable in Canada as well. The article is obviously a translation, which makes it a bit hard to read, but the study and its outcomes are very applicable to our points of reference.

21.) Wong, W. (2014). *How Schools Are Making Mobile Learning Work*. Retrieved 9 April, 2016, from http://www.edtechmagazine.com/k12/article/2014/01/how-schools-are-making-mobile-learning-work

This article gives a credible look at the work being done by schools today to make mobile learning not only possible, but a priority. The article looks at how various schools and districts across the United States have implemented various strategies to incorporate mobile learning into their educational planning frameworks In most cases, this has resulted in embracing the value and engagement of mobile technologies for student use. This has lead to IT units looking at ways to ensure that students and teachers have sustainable access to the web and are safe and privacy protected at the same time. In most of the scenarios presented, this has resulted in a concerted effort to provide sufficient bandwidth to the school as top of the list for priorities. Most schools mentioned, needed to ensure that the networks being set up not only had sufficient bandwidth to serve the entire school population, but that there was a system in place that would accommodate either devices provided by the school, students bringing their own, or both. This necessitated the development of compartmentalizing access with various levels. For the most part, any security concerns were alleviated by using web or cloud-based content for students leaving encrypted networks for staff. This requires the development of sound policies for acceptable use and digital citizenship. The article also points out that for mobile learning to be successful, there has to be sustained professional development for teachers in how to integrate mobile learning into their courses/classrooms. This article gives some sound advice and describes how schools and districts can develop

plans for implementing a mobile learning strategy for their students and teachers. It was interesting to note that in one economically depressed area, the digital divide was minimized by the district providing the mobile devices for the students for use at school and home. This article is linked to more articles on related content such as BYOD, cloud computing, and mobility. Overall, a good article to include for information on planning for implementing mobile technologies.