Mobile Learning: Context and Prospects

A Report on the ELI Focus Session

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Abstract

On March 3 and 4, 2010, the ELI community gathered for an online focus session on mobile learning. This white paper is a synthesis of the key ideas, themes, and concepts that emerged from those sessions. The white paper also includes links to relevant focus session materials, recordings, and archives. It represents a harvesting of the key elements that we as a teaching and learning community need to keep in mind as we work to integrate mobile technology into teaching and learning in higher education. It is clear that while the application of mobile technology to learning is just now getting under way, the potential is enormous and we can expect that the rate of development will be very rapid indeed.

Introduction

On March 3–4, 2010, the EDUCAUSE Learning Initiative community gathered for a focus session on mobile learning. The focus session included keynote presentations, project reports, and discussions, all exploring the current state of mobile learning and its future prospects. In this document, which is a synthesis of all these focus session activities, we attempt to capture the key ideas, themes, and concepts that emerged from the sessions, while also linking these summaries to the focus session materials, recordings, and archives. It represents a harvesting of the key elements that we as a teaching and learning community need to keep in mind as we work to integrate mobile technology into teaching and learning in higher education.

Because the term *mobile technology* is broad in meaning, we found it useful during the focus session to distinguish between different types of mobile devices. We used the term *highly mobile device* to refer to cell-phone sized devices that can fit in a pocket: feature phones (supporting cell and SMS service only), smartphones, and other devices like Flip cameras. *Very mobile devices* include slates, pads, and netbooks. Finally, the category *mobile device* refers to larger devices such as laptops. While this might appear to be splitting hairs, the degree of a device's mobility determines the ways it is best used in learning: a smartphone is much more mobile than a laptop, and this high degree of mobility makes it indispensible in some contexts but a liability in others.

Replacement, or Part of the Blend?

One fundamental question was raised throughout the focus session: Is mobile technology a part of the blend of higher education learning or a replacement? Industry pundits have waxed eloquent about the revolutionary nature of the iPad. But the clear majority of focus session participants do not see mobile technology replacing the laptop and desktop computers we all use now. Mobile technology is clearly rapidly establishing itself as part of the learning blend. Because of that, there will be a significant and important redistribution of technology ownership patterns, which in turn will affect usage patterns. The annual ECAR study of undergraduate students and IT has, for several years, documented the shift away from desktop toward laptop ownership—yet desktop ownership has not gone away. As mobile devices become more powerful and more capable, this will no doubt have a ripple effect that will shrink the desktop market still further. Its effect on laptop ownership is uncertain at this time. In the past, it was a question of either/or: Due to the costs and logistical considerations, most students and faculty owned either a desktop or a laptop. Because mobile devices are less expensive, at least up front, it is clear we will be new combinations of ownership. These changes will reshape the way the faculty and student do their computing.

Growing Ascendancy of Mobile Technology

While laptop and even desktop computing will not cease, mobile technology has become the center of the computing industry's focus. Google's CEO Eric Schmidt has stated that their policy is "mobile first," meaning that their development efforts target mobile devices first. We also know that in developing countries it is likely that mobile devices will be the first line of Internet connectivity, as there the cell networks are established whereas IP networks are not. It is clear that for the "traditional" computers of the mobile lineup—netbooks and laptops—the innovations we will see here will be of the sustaining variety: incremental improvements. Some have predicted that we will see a gradual phasing out of the netbook, squeezed out by ever-lighter laptops and now a new category of mobile device, the "slate" or "pad" device. Over the next two years, we are certain to see a rich variety of sustaining and disruptive innovations that utilize mobile technology.

Contain, or Channel?

Is the widespread adoption of mobile technology a blessing or a curse? A blog post from late 2009, looking ahead to 2010, predicted that smartphones would "infiltrate" the classroom, clearly indicating an ambivalent attitude. Speaking to this point, one presenter at the focus session related a story about how two different villages in China approached the problem of water runoff when the snow melted in the spring. One village opted to try to fend off and contain the water by building dams; the other accepted the fact of the water movement and so built channels to guide the runoff right through the village, so that it did no damage. There's no way to say which village made the "right" decision. If the volume of water is modest, then constructing dams is likely feasible and prudent; if that volume is large, channeling the water might be the better option.

The focus session made very clear that momentum of mobile technology is equivalent to a very great volume of water. Most would agree that trying to keep mobile technology out of the classroom is impossible, so the best approach is that of constructing channels to direct mobile technology usage in constructive directions.

Taking initial steps to create these channels can be a low-threshold activity. One speaker introduced the idea of mobile-assisted learning, suggesting that adoption in this area can begin on a small, measured scale, often on the initiative of a single faculty member. Another speaker described an iPhone rental program, a creative approach to making mobile devices more accessible to students for learning engagements. Still other speakers suggested that content delivery is the "low-hanging fruit" that can be the first way an institution uses mobile technology to support the curriculum.

Focus Session Resources

- *A Revolution in Learning Is Taking Place in Our Hands*, Judy Brown, Mobile Learning Strategic Analyst, Academic Advanced Distributed Learning Co-Lab (slides and recording) http://www.educause.edu/Resources/ARevolutioninLearningIsTakingP/200399.

- *Mobile Devices in Higher Ed...for Learning? You Bet*, Nabeel Ahmad, Learning Developer, IBM Learning, Columbia University (slides and recording) http://www.educause.edu/Resources/MobileDevicesinHigherEdforLear/200504.

- *Anticipating the Future of Mobile Devices in the Classroom*, Malcolm Brown and Veronica Diaz (podcast) http://www.educause.edu/eli/futuremobile.

Ownership Patterns: Who Will Own Which Devices?

The 2009 ECAR Study of Undergraduate Students and Information Technology (available at http://www.educause.edu/Resources/TheECARStudyofUndergraduateStu/187215) reports several findings in the area of mobile technology usage and ownership. Just over half of respondents (51.2%) owned an Internet-capable handheld device, and another 11.8% planned to purchase one in the next year. Although nearly a third said they access the Internet from their device daily, more than three-quarters said that the cost of the data service plan as one of the reasons they limit their use. These data may be in sharp contrast with those of community colleges: One focus session presenter reported that as few as 2% of his community college students owned smartphones, while almost all had feature phones. This mixed data serves as an indicator of a key issue: The diversity of ownership of mobile devices, with their diverse capabilities, will be a challenge for a lot of instruction-based projects that rely on the uniformity of the tool and corresponding functionality.

Some focus session participants noted that they no longer have a smartphone but instead now have what is being called a "middle" product that is a bit bigger than a cell phone but does everything the phone did (typically utilizing Skype for voice service). More devices are being built that fit into this category as we see with the netbook or iPad. IP phone service (such as Skype) and wireless access, depending on where you use your device, may meet the phone-related needs and give way to other functions that are now more desirable. This means that an iPad could be a phone and much more. This "middle" product market is supported by another communication trend: moving away from synchronous voice and toward asynchronous text. Perhaps the market that we will see shrink, if any, is not that of the laptop but that of the cell phone.

Because mobile technology is evolving at a rapid rate, the danger is that innovations based on any single technology could become obsolete very quickly. Some industry analysts are already predicting the demise of the netbook, despite its great success. The point is that curricular initiatives will need to navigate these waters with care. It will be important to work with standards-based file formats and so forth to ensure maximum longevity for applications, files, and other resources developed for teaching and learning.

Ownership patterns are diverse. This is an obvious point, but it's important to connect this fact with our thinking about mobile technology and innovation in higher education. The blend of networked technology will vary depending on the type of student; there is no "one size fits all" here. To see this we only need compare the situation of the undergraduate living in a dorm at a residential campus with the adult student working full-time. The residential undergraduate has large segments of time to dedicate to his or her studies, whereas the full-time working student may engage in study in smaller segments, even snatches. Community college students, medical school students, business school students, students on internships—all have different learning rhythms, patterns, and habits. Their technology ownership and usage will directly reflect that. Adult learners and community college students who have commutes to and from the learning place might opt for a mobile/desktop combination, while an undergraduate at a residential institution might choose a phone/laptop pairing.

Other ownership issues, such as the reliability of wireless networking and the cost of data plans, will obviously be factors. Two things are clear. First, there will be greater variety in the combination of networked devices that faculty and students choose to own. Second is that fact that smartphones, unlike netbooks, laptops, and desktops, bring with them a continuing cost that will influence ownership decisions.

Generally we think of the digital divide in terms of device ownership: A student either has a smartphone or does not. But the data plan that underlies the handheld is also a key factor. Not all who own "smart" devices have unlimited data and text messaging plans. This means that we cannot build curricular activities that assume all owners of handhelds can send and receive very large numbers of text messages, as that might incur additional fees. Similarly, accessing video on a handheld may be outside the range of the data plan that many students have.

The important point here is to avoid making assumptions about such things as device ownership, data plans, and mobile learning preferences. Institutions are well served by taking the time to survey their unique student populations on these topics and understand their own digital divide.

Focus Session Resources

- *Mobile Devices in Higher Ed...for Learning? You Bet*, Nabeel Ahmad, Learning Developer, IBM Learning, Columbia University (slides and recording)
http://www.educause.edu/Resources/MobileDevicesinHigherEdforLear/200504.

Faculty and Student Roles in Developing M-Learning

Student Roles in Campus Infrastructure

These are still early days for mobile application development, and the focus session highlighted two major application development efforts (at Stanford University and the University of Florida) in which students played a major role. These are apps that become institutional resources, part of the institutional infrastructure. Their success quickly led other campus groups to build on the foundation these apps established. There is opportunity for student involvement with and contribution to the campus infrastructure by participating in development efforts.

The focus session discussions made clear that this opportunity for student involvement is a window that will likely close quickly. In the past, when new kinds of computing technology became available, students often were the pioneers. An illustration is the pioneering of timesharing at Dartmouth College: Although led by Prof. John Kemeny, it was largely done by students. But once the technology becomes part of the infrastructure, it is generally taken over by the central IT organization (such was the case at Dartmouth). The same pattern is likely to play out with the development of campus mobile apps: They may start with student pioneers, but once they become part of the campus infrastructure, like the institutional website, development will be outsourced or moved to professional staff.

The 9:30 a.m. Saturday Call

One of the faculty presenters related how he enjoyed having a Skype call with one of his students at 9:30 a.m. on a Saturday. Yet one wonders how many of his peers would share his enjoyment. This introduces a major consideration: Mobile devices, with their anywhere/anytime capability, increase the opportunities for faculty/student interaction. Once a student has a faculty member's mobile phone number, the student can text the faculty member any time. In the same way that students often do not want "adults" invading their social spaces, it is natural to expect that faculty will not want their students invading their spaces at will and at any time. The expectations for mobile-based interactions is an aspect to a course that faculty and students will have to negotiate, in a way similar to the negotiations that happen now about laptop and phone usage during face-to-face class meetings. As one person in the chat space put it, "Student empowerment is a faculty member's threat."

Increased Work for the Faculty

Another issue that emerged in the focus session is the potential for mobile technology to increase the workload of the faculty. Already faculty need to become more and more like master jugglers, addressing not only course content, design, and execution but also various technologies, such as the course website and classroom technology. Mobile technology adds an additional layer of complexity and preparation and might also entail repackaging course content to fit the handheld device. This will make it all the more imperative to choose carefully where to utilize mobile technology in a course because each application will involve preparation and support. Staff support of faculty pioneering with mobile technology will be essential for the next two years.

Changing the Student Mind-Set

There was frequent mention of faculty resistance to new technology, but it was clear over the two days of the focus session that the students are not necessarily ready to fully move into the mobile space for their coursework. "Don't assume student expertise other than listening to music" was one

way this challenge was worded. Mobile technology might be in student hands, but the expertise needed to use it effectively for course work and assignments might not be—indeed, focus session comments clearly implied that most students do not have strong expertise. This is a factor that any program using mobile technology needs to take into account.

Focus Session Resources

- *Your Campus on a Smartphone, and the Future of Mobile Education*, Aaron Wasserman, Student, Class of 2010, Stanford University (slides and recording) http://www.educause.edu/Resources/YourCampusonaSmartphoneandtheF/200400.

- *MOCA: It's Not Just Chocolate Anymore*, Shan Evans, Assistant Dean for Information Technology, University of Texas at Austin (slides and recording) http://www.educause.edu/Resources/MOCAItsNotJustChocolateAnymore/200423.

- *Student iPhone App. Development and Institutional IT: The Story So Far*, Douglas Johnson, Assistant Director for Learning Services, University of Florida (slides and recording) http://www.educause.edu/Resources/StudentiPhoneAppDevelopmentand/200425.

- *It's Flipping Easy! How Easy-to-Use Portable Digital Camcorders Bring the Larger World and New Pedagogies into the Classroom*, Samantha Earp, Director, Academic Services, Duke University (slides and recording) http://www.educause.edu/Resources/ItsFlippingEasyHowEasytoUsePor/200422.

- *Low-Effort, High-Impact Mobile Development: Designing a Mobile Website with iUI*, Chad Haefele, Reference Librarian for Emerging Technologies, University of North Carolina at Chapel Hill (slides and recording) http://www.educause.edu/Resources/LowEffortHighImpactMobileDevel/200424.

- *Lowering the Barriers to Mobile Device Adoption*, Daniel J. Bracken, Associate Director–FaCIT, and Michael Reuter, Director of Technology Operations, CEHS, Central Michigan University (slides and recording) http://www.educause.edu/Resources/LoweringtheBarrierstoMobileDev/200402.

- *Strategic Analysis: A Typical Community College Wondering How to Take Advantage of mLearning*, Gary Marrer, Faculty, Glendale Community College (slides and recording) http://www.educause.edu/Resources/StrategicAnalysisATypicalCommu/200503.

- *Mobile Collaboration: Redefining the Classroom*, Kyle Dickson, Director, Digital Media Center, and William Rankin, Associate Professor and Director of Educational Innovation, Abilene Christian University (slides and recording) http://www.educause.edu/Resources/MobileCollaborationRedefiningt/200517.

- *Assessment of Mobile Learning*, Gary Marrer, Faculty, Glendale Community College (slides and recording) http://www.educause.edu/Resources/AssessmentofMobileLearning/200508.

- *Student Engagement in the Age of Mobile Devices*, Peyton Jobe, Instructor of Spanish and Member, Technology Advisory Committee (slides and recording) http://www.educause.edu/Resources/StudentEngagementintheAgeofMob/200506.

Support Issues: How to Facilitate the Migration Toward M-Learning

It is easy to fall into thinking of the faculty as being resistant to learning innovations, while missing similar adoption challenges with students. The mystique of technical savviness is sometimes part of the stereotype that Net Generation students are technically savvy and enthusiastic about any project involving technology. In fact, students are people, too, and the bell-shaped curve of adoption applies to them as much as it does to any other group. It is more realistic to expect that some students might initially resist innovations and changes that mobile technology ushers in, especially if they have difficulty using it or it is not immediately apparent how the technology might support their learning. Those implementing innovative curricular initiatives should keep in mind the importance of reminding students, perhaps constantly, of the pedagogical justification for the new way of doing things. Everett Rogers's five conditions of innovation adoption—relative advantage, compatibility, complexity, trialability, and observability—will apply here as anywhere (see http://en.wikipedia.org/wiki/Diffusion_of_innovations).

Many of the smartphone applications that exist today were not designed for teaching and learning, but there is great value in the exposure our students are receiving to mobile applications and technologies in their everyday lives, like viewing a live display of the campus bus route for instance. This kind of exposure builds tolerance, openness to experimentation, and more importantly, an interest in exploring ways in which mobile technologies can support, facilitate, and enhance their learning experience.

Adoption takes work and cross-campus participation. We all know that it is not the case that if you build it they will come. To get them to come also takes support and advocacy. Impressive was Central Michigan's efforts to get its mobile initiative moving, to the point that they had support staff outside the classroom to work with students as they entered to ensure they were ready to participate with the technology in the face-to-face meeting. Indeed, one is tempted to add support and advocacy to Everett Rogers's list of factors that contribute to the adoption of innovation.

Innovation, in mobile learning and other emerging areas, is risky and riddled with obstacles, but this is not a reason to avoid moving forward. Success is highly dependent on the extent and quality of collaboration between the various units at our institutions. Especially important is to recognize that other units—transportation services, marketing, outreach, admissions, and recruitment, for instance—might be more interested in moving forward with mobile technologies, and so students might have some early exposure that will build a comfort level with and interest in using mobile technologies in a more learning-oriented setting. There is real value in the collective of the mobile learning applications that exist at the moment, both within and outside the classroom.

Focus Session Resources

- *Enabling Personalized Learning*, John Shannon, Associate Professor of Legal Studies, Dean of the Stillman School, and Vice President for University Affairs at Seton Hall University (slides and recording) http://www.educause.edu/Resources/EnablingPersonalizedLearning/200401.

- *Lowering the Barriers to Mobile Device Adoption*, Daniel J. Bracken, Associate Director–FaCIT, and Michael Reuter, Director of Technology Operations, CEHS, Central Michigan University (slides and recording) http://www.educause.edu/Resources/LoweringtheBarrierstoMobileDev/200402.

- *Mobile Collaboration: Redefining the Classroom*, Kyle Dickson, Director, Digital Media Center, and William Rankin, Associate Professor and Director of Educational Innovation, Abilene Christian University (slides and recording) http://www.educause.edu/Resources/MobileCollaborationRedefiningt/200517.

- *Transforming Digital Toys into Study Buddies: Using Mobile Devices to Engage Students*, Berlin Fang, Associate Director, North Institute, Oklahoma Christian University (slides and recording) http://www.educause.edu/Resources/TransformingDigitalToysintoStu/200505.

Usage Patterns: Who Does What with What

Sometimes the highly mobile device is characterized as a stand-in for the laptop or netbook. The focus session revealed that the usage pattern for highly mobile devices is very distinct from that of the laptop or even the netbook. In some respects, the access to content might be like using a laptop (one can view a feature-length movie on an iPod touch), but the generation of content is very different. A key for us is correctly identifying the usage patterns that work best for the highly mobile device and building apps and other learning engagements that take advantage of those characteristics. The focus session made it clear that the highly mobile device is not a small laptop.

Smart Phones vs. Feature Phones

One useful distinction that was made in terms of handheld devices was between a smartphone and a feature phone. The smartphone runs a mobile device operating system (such as Android, Windows 7 Mobile, or iPhone OS), has a browser, makes voice calls, supports text messaging, and has the capability of running apps. It is then a kind of mini-netbook with the added capability of making phone calls. By contrast, the feature phone has a subset of the smartphone capability: It can make voice calls and do SMS text messaging—but little else. Obviously there are devices that fall between these two (such as the iPod touch), but for the purpose of understanding learning opportunities this distinction is useful, as it determines what faculty and student can and can't do.

Don't Dismiss the Feature Phone

It is easy to focus attention exclusively on the smartphone. One of the keynote presenters, however, made a strong case for the feature phone, with its relatively simple set of capabilities: voice and SMS text messaging. Many schools are basing their emergency notification systems on the SMS capability; for that reason alone the feature phone figures in the planning at many institutions. Are there lessons being learned from the development of emergency notification system that could be applied to the curriculum as well? Lessons not just about technology but also about the kinds of communications that work best using SMS? We know that almost all students have a cell phone with SMS capability; by contrast, according to the last ECAR study of undergraduates and IT, only 50% have a smartphone with a data plan (and a percentage of these students don't use it to access the Internet). There is an opportunity to exploit this capability for curricular purposes.

The Duration Factor

The most recent ECAR study of undergraduates and IT documented that the majority of smartphone use by undergraduates to access the Internet is of short duration: relatively short, quick checks for news, updates, messages, and so forth. This is in contrast to more sustained sessions with laptops and desktops. This makes sense: If a student or faculty member is on the move, the quick check is

what one would expect. It is also hard to imagine many people typing a lengthy document, such as a term paper, using the cramped keyboard of the highly mobile device. This theme of the "short duration" is a factor that needs to be taken into account when devising curriculum and course activities that utilize highly mobile devices. The fact of the short duration challenges us to consider the types of pedagogies and learning opportunities that are unique to this type of technology rather than attempting to translate what is currently done with laptops onto the mobile device.

Limited Screen Space Is Not Always a Disadvantage

We often think of the small screen of the highly mobile device as being a limitation. In many ways it is; however, we heard one of our keynote presenters relate a case in which it became an advantage. This involved the design of a mobile application to allow students to perform course registration tasks. The standard web interface for this function, as used on laptops and desktops, was apparently complicated and confusing, a victim of "more is less" by presenting too many options. Moving these functions to the mobile device forced a thorough rethinking of the interface to the registration system and separating what was essential from that which was not. The result was a simpler, easier to use interface via the mobile device. This theme, which we could call "less is more," came up in several different contexts.

Access to All My Files

Because it is impossible to control the mix of mobile devices that faculty and students own and use, it will be important instead to focus on making it possible for these devices to access the student's personal learning environment. This is an environment that exists across all of one's devices, applications, and content; it is the "stuff" and applications the student needs to participate in a course. Apple's MobileMe service is an example of this kind of environment: When a contact is added on one device, that addition migrates out to all the other devices. Contacts aren't on a single device but are "on" or "in" my personal environment. In this way, users can access and update contacts from any place with any supported device. The key is to be able to access resources across the variety of devices and applications. For learning, the capacity to access the student's personal learning environment is a key to establishing mobile technology's usefulness in the learning enterprise.

At the focus session, speakers from Abilene Christian University (ACU) underscored the importance of enabling students to access the key aspects of their personal learning environment. ACU has a network-based file service that provides a place for students to store their files. As ACU increasingly offered services for the iPhone, the institution made sure that students could access their files using their mobile devices. This makes the mobile device an integrated part of the personal environment. The success of the mobile device in the curriculum will depend a great deal on how thoroughly it is blended into the personal learning environment.

The key to providing access to the personal learning environment from the highly mobile device lies in the APIs, the programming interface to networked and cloud-based services. ACU has been able to bring services to the smartphone largely by tying phone-based interfaces to centralized services by means of APIs.

Pushing Content Is Not Enough

Users can get the latest news and announcements on handhelds. They can listen to podcasts or replay lectures, anywhere and at any time. However, while this pushing of content out to the highly mobile device is important, it is not by itself enough. As one participant stated, "Students seek

engagement." Pushing content without facilitating engagement is not sufficient. Without engagement, the pushing of content is—to paraphrase Clausewitz's famous saying about politics and war—simply the continuation of the transmission model of education, only by other means.

Complementary Student Teams

The issue of the "mobile divide" came up repeatedly: How do you design curricular projects if only a percentage of your students have handhelds that allow them to participate? One solution that emerged out of the scenario work is that of the complementary student team. To accomplish a project, there are a variety of tasks and functions that need to be done. Not all of them require technology, certainly not the latest highly mobile technology.

This idea arose in connection with the discussion of a learning scenario. In the scenario, an instructor in sociology wants student teams to go into nearby neighborhoods to study and document the impact of the foreclosure crisis. For a student team to complete this assignment, it would not be necessary for all students to have capable handhelds. Whether the task is to record the audio of an interview, to take photos of a neighborhood, or to capture the visual aspect of the neighborhood in video, a single highly mobile device per team is sufficient. There are many tasks and roles in a student project, and not all of them require a dedicated device.

Creating Apps Like Mashups

Over the past several years, it has become possible to make mashups and mini-apps on the web using generator sites. These sites make it possible to generate a lightweight mashup application on the fly using a visual interface. No coding is necessary, which makes this accessible to almost anyone with a computer. At the focus session, there was some discussion of these kinds of application generators being available soon for handheld devices. Such an application generator would be of great use in the curriculum, as it would enable students to augment their work with procedures and applications. This is something that, should it actually become available, is worth keeping an eye on.

Focus Session Resources

- *Your Campus on a Smartphone, and the Future of Mobile Education*, Aaron Wasserman, Student, Class of 2010, Stanford University (slides and recording) http://www.educause.edu/Resources/YourCampusonaSmartphoneandtheF/200400.

- *Beyond Emergency Notification*, Alan K. Livingston, Director of Research, Development, and Planning, Weber State University (slides and recording) http://www.educause.edu/Resources/BeyondEmergencyNotification/200426.

- *MOCA: It's Not Just Chocolate Anymore*, Shan Evans, Assistant Dean for Information Technology, University of Texas at Austin (slides and recording) http://www.educause.edu/Resources/MOCAItsNotJustChocolateAnymore/200423.

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- *Enabling Personalized Learning*, John Shannon, Associate Professor of Legal Studies, Dean of the Stillman School, and Vice President for University Affairs at Seton Hall University. (slides and recording) http://www.educause.edu/Resources/EnablingPersonalizedLearning/200401.

- *Mobile Devices in Higher Ed...for Learning? You Bet*, Nabeel Ahmad, Learning Developer, IBM Learning, Columbia University (slides and recording) http://www.educause.edu/Resources/MobileDevicesinHigherEdforLear/200504.

Additional Focus Session Content

ELI Focus Sessions (http://www.educause.edu/eli/events) generate a significant amount of content around their themes. Such content often includes discussion questions, thematic scenarios, podcasts, speaker recordings, and readings. These items for the 2010 Fall Focus Session on mobile learning can be found at http://net.educause.edu/Proceedings/1024403. Below you will find a comprehensive list of all speaker recordings including keynote sessions, plenary sessions, and project parlor presentations. For your convenience, this content has been organized into two categories: that related to teaching and learning supported by mobile technology, and that related to the implementation of mobility initiatives.

Teaching and Learning Content

- *MOCA: It's Not Just Chocolate Anymore*, Shan Evans, Assistant Dean for Information Technology, University of Texas at Austin (slides and recording) http://www.educause.edu/Resources/MOCAItsNotJustChocolateAnymore/200423.

- *Enabling Personalized Learning*, John Shannon, Associate Professor of Legal Studies, Dean of the Stillman School and Vice President for University Affairs at Seton Hall University (slides and recording) http://www.educause.edu/Resources/EnablingPersonalizedLearning/200401.

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- *Assessment of Mobile Learning*, Gary Marrer, Faculty, Glendale Community College (slides and recordings) http://www.educause.edu/Resources/AssessmentofMobileLearning/200508.

- *Student Engagement in the Age of Mobile Devices*, Peyton Jobe, Instructor of Spanish and Member, Technology Advisory Committee (slides and recording) http://www.educause.edu/Resources/StudentEngagementintheAgeofMob/200506.

- *Transforming Digital Toys into Study Buddies: Using Mobile Devices to Engage Students*, Berlin Fang, Associate Director, North Institute, Oklahoma Christian University (slides and recording) http://www.educause.edu/Resources/TransformingDigitalToysintoStu/200505.

Implementation Content

- *Your Campus on a Smartphone, and the Future of Mobile Education*, Aaron Wasserman, Student, Class of 2010, Stanford University (slides and recording)
http://www.educause.edu/Resources/YourCampusonaSmartphoneandtheF/200400.

- *Beyond Emergency Notification*, Alan K. Livingston, Director of Research, Development, and Planning, Weber State University (slides and recording)
http://www.educause.edu/Resources/BeyondEmergencyNotification/200426.

- *Student iPhone App. Development and Institutional IT: The Story So Far*, Douglas Johnson, Assistant Director for Learning Services, University of Florida (slides and recording)
http://www.educause.edu/Resources/StudentiPhoneAppDevelopmentand/200425.

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http://www.educause.edu/Resources/LowEffortHighImpactMobileDevel/200424.

- *Lowering the Barriers to Mobile Device Adoption*, Daniel J. Bracken, Associate Director–FaCIT, and Michael Reuter, Director of Technology Operations, CEHS, Central Michigan University (slides and recording)
http://www.educause.edu/Resources/LoweringtheBarrierstoMobileDev/200402.

- *Mobile Collaboration: Redefining the Classroom*, Kyle Dickson, Director, Digital Media Center, and William Rankin, Associate Professor and Director of Educational Innovation, Abilene Christian University (slides and recording)
http://www.educause.edu/Resources/MobileCollaborationRedefiningt/200517.

- *Mobile Devices in Higher Ed...for Learning? You Bet*, Nabeel Ahmad, Learning Developer, IBM Learning, Columbia University (slides and recording)
http://www.educause.edu/Resources/MobileDevicesinHigherEdforLear/200504.

Appendix: M-Learning Scavenger Hunt

The two lists below—of current and future/potential m-learning apps—was compiled by the participants of the focus session. The inclusion of an app or an idea on these lists does not represent an endorsement of any kind by ELI of its suitability or feasibility for use in the curriculum. Any deployment of these apps or ideas would need the usual careful testing, planning, and evaluation. The descriptions of current apps and ideas are those of the person who submitted the item.

Current M-Learning Applications

- ChalkTalk—productivity, iPhone, whiteboard, shared discussion tool. "Anyone using ChalkTalk (the paid version) on your WiFi network can connect with you to draw. Then get a shared screen so you can see whatever each other draws. Build on each other's strokes while drawing, or play games like Tic-Tac-Toe and Hangman using background images we provide." http://www.rlslog.net/chalktalk-v10-iphone-ipod-touch-cracked-corepda/

- Business Essentials—provides basic courses on business management. http://itunes.apple.com/app/business-essentials/id313976522?mt=8>

- GoodReader—Enables you to read large txt and PDF on the iPhone. A utility PDF reader, iPhone/iPod touch, for viewing PDF files and can reflow many PDF documents for easier reading. http://itunes.apple.com/us/app/goodreader-large-pdf-viewer/id306277111?mt=8

- Art Envi—art history, iPhone, allows you to browse art collections on your smartphone, very useful in teaching art and art history. http://we-envision.com/Page.asp?NavID=28

- Google Mobile—productivity; iPod touch/iPhone, Android, Nokia S60, and BlackBerry; connects to the suite of Google products (Gmail, Calendar, Docs, Talk, Tasks, Reader, News, Book Reader, Notebook, Photos, Earth, Blogger, etc.). Collaboration through docs, blogs, shared feeds on Reader/Buzz, GIS with Earth. Reference utility. iPod touch/iPhone. Access all the Google productivity tools - Google Docs, etc. Google Docs used for collaboration. http://www.google.com/mobile/ http://www.apple.com/webapps/productivity/googledocsmobile.html

- iFlipr—flashcard app: make your own flashcards, swap flashcard decks with others in your study group. http://itunes.apple.com/hr/app/iflipr-flashcards/id287056408?mt=8

- Dropbox—iPhone, distributed file share, useful for file sharing and access, team work, passing "unofficial knowledge" http://itunes.apple.com/us/app/dropbox/id327630330?mt=8

- SCVNGR—game, iPhone/Droid/mweb: students can build scavenger hunt that is a learning activity for others: specimens in a garden, resources in a library, public art in a city, historical tour of a neighborhood. http://itunes.apple.com/us/app/scvngr/id323248984?mt=8

- Mobl21—Course Content Creation Mobile Web. Commercial authoring tool - development and publishing tool for learning assets - to iPhone and iPod touch. http://itunes.apple.com/us/app/mobl21/id350326010?mt=8

- Essay Organizer—Collects data for essay, provides guidelines, share essays. http://itunes.apple.com/us/app/imobile-writing-platform-by/id332491766?mt=8

- AudioBoo—Utility/Social Networking; Runs on iPod touch/iPhone (requires mike; Application for recording your voice and sharing your "boos." Free version lets you record up to 5 minutes of audio and post on a website; Post geo-tagged images with audio. http://itunes.apple.com/us/app/audioboo/id305204540?mt=8

- Summary of iPhone apps and resources (Apple Learning Interchange). http://classtools.net/twitter/tweet.htm?message=iPod+touch+in+Education+Lots+of+inspiring+ideas+here%2521+&url=http://edcommunity.apple.com/ali/story.php%3fitemID=16472

- FourSquare—Runs on iPhone/iTouch, Droid, BlackBerry, Palm Pre also can be used via SMS or mobile web. Allows people to "check in" at various sites and receive tips from those sites. Would be a great way to do a "scavenger hunt" as a part of campus/museum tours, introductory classes (i.e. freshman seminars), etc. http://itunes.apple.com/us/app/foursquare/id306934924?mt=8

- Timer—time test taking, group discussions, etc. Productivity - Voice recorder - record foreign language lessons/homework. Utility - Calendar - track assignments, set reminders. http://www.apple.com/webapps/productivity/timer_pietjonas.html

- SugarSync—file sharing, streaming audio syncing, dropbox, Google Docs. http://www.apple.com/webapps/productivity/sugarsync.html

- Designnear—Locative Media - iPhone - Provides listing of architectural and public art projects within a given range. Has strong applications within the design and architecture academic communities. http://itunes.apple.com/us/app/designnear/id319429408?mt=8

- Congress+—iPhone, allows you to see pretty much see any info on current members of Congress: votes, sponsorships, donors, earmarks, etc. Useful for any number of legislative analysis activities. http://itunes.apple.com/us/app/congress/id291329881?mt=8

- Voice Memo—productivity - iPhone - use for narration, note-taking, English language learner (this comes standard with the iPhone)

- Skeptical Science—runs on the iPhone, gives skeptics arguments coupled with rebuttals from scientists on the subject of global warming. Applications for Geography and Environmental Sciences. http://itunes.apple.com/us/app/skeptical-science/id353938484?mt=8

- Adobe Acrobat Connect Pro—Adobe Connect for iPhone - Connectivity App - Allows users to connect to Adobe Connect sessions and allows for audio, screen, and file sharing (from presenter only) and text response. Has great potential as a distance learning/extended classroom tool. http://itunes.apple.com/us/app/adobe-acrobat-connect-pro/id338279127?mt=8

- Blackboard app for the iphone. http://itunes.apple.com/us/app/blackboard-mobile-learn/id364252826?mt=8

- Kindle app for iPhone. http://itunes.apple.com/us/app/kindle/id302584613?mt=8

- Read It Later—Productivity. iPod touch/iPhone. This app lets you save websites to read later, even without an Internet connection. Useful when doing research, if you have limited connect

time. Save the relevant articles and read them later. http://itunes.apple.com/us/app/read-it-later-pro/id309601447?mt=8

- Bird Flip—Drill basic info, learning anytime, saves progress offline. http://itunes.apple.com/us/app/bird-flip-flashcards-common/id358296301?mt=8

- SleepCycle—for iPhone, personal learning, measures your sleep cycle, can be used to be a more awake learner. http://itunes.apple.com/us/app/sleep-cycle-alarm-clock/id320606217?mt=8

- Periodic Table Shoot 'em Up!—review/learn elements in the periodic table. iPhone/iPod. Simple but engaging interactive quiz app that presents 10 random elements, one at a time and times student response to click on the element on the periodic table. Simple sound effects, hints when the answer is wrong, and basic scoring are surprisingly effective in engaging learners. http://itunes.apple.com/app/periodic-table-shoot-em-up/id348793576

- WorldCat—app, productivity, iPhone/iPod touch, BlackBerry(?). Search library catalogs. http://itunes.apple.com/us/app/worldcat-mobile/id309643302?mt=8

- Star Walk—planetarium on your phone, iPhone, useful in teaching astronomy. http://itunes.apple.com/us/app/star-walk-5-stars-astronomy/id295430577?mt=8

- Sylvius MR—Atlas of the Human Brain, medical reference product designed to provide students and professionals with an intuitive, interactive and fully annotated MRI atlas of the human brain on your iPhone or iPod touch. http://itunes.apple.com/us/app/sylvius-mr-atlas-human-brain/id297877245?mt=8

- Twitter—real-time and on-demand communication, group communication, broadcasting, social trending (there are numerous iPhone apps that work with Twitter).

- Camera—Documentary, digital storytelling, reporting, historical searches, science projects; sharing, locating, elucidating an idea, capturing images for media rich course responses (comes standard with the iPhone)

- WordPress—Social Networking. iPod touch/iPhone. Manage your WordPress blogs. Encourage students to journal experiences around a common theme. Share & comment. http://itunes.apple.com/us/app/wordpress/id335703880?mt=8

- Whiteboard—Runs on iPhone/iTouch. Allows devices to share a virtual whiteboard on their screens when they are in the same area, allows students to collaboratively create images or visual displays of data. http://itunes.apple.com/us/app/whiteboard-lite-collaborative/id301962306?mt=8

- Whiteboard Capture—capture contents of whiteboards. http://itunes.apple.com/us/app/whiteboard-capture-pro/id302625335?mt=8

- NASA App—Education/reference. iPod touch/iPhone. Access to a wide variety of resources supplied by NASA: Mission information, countdown clock, etc. http://www.apple.com/webapps/news/nasatoday.html

- YouTube—upload and use videos; homework, research topics, practice drama/theater or music performance, using software (comes standard on the iPhone).

- ASL—reference. iPhone. Library of American Sign Language signs serves a similar purpose any reference material would. http://itunes.apple.com/us/app/asl-dictionary/id353574642?mt=8

- Evernote—productivity - iPhone - use to store and create notes, share with classmates. http://itunes.apple.com/us/app/evernote/id281796108?mt=8

- Cram—Flashcard and test creation. Individuals sharing to small groups sharing to large groups based on merit and usability. http://itunes.apple.com/us/app/cram-flashcards-multiple-choice/id290024708?mt=8

- Stanza—eBook Reader. iPod touch/iPhone. This is a great eBook reader. Books can be downloaded for free from the Internet Archive/Gutenberg Project for all kinds of uses, as well as purchased content from a number of different providers. http://itunes.apple.com/us/app/stanza/id284956128?mt=8

- Facebook—for iPhone, social networking, supports ad hoc study groups. http://itunes.apple.com/us/app/facebook/id284882215?mt=8

Future/Potential M-Learning Applications

- General data collection application that would allow faculty to create their own data collection screens, students collect data, everything submitted to backend database for analysis.

- Discussion board with threaded discussions.

- An e-book reader similar to the Kindle (iPad is supposed to be coming out with one)

- Easy-to-use flash card creator, image or text based.

- Quick app creator: something that allows mobile applications to be quickly created and deployed over a range of devices.

- Collaborative learning. Helps students collaborate in groups by a set of criteria either they set or their teacher sets for mashing up class into ad hoc groups or teams for discussion and/or group project work.

- Transparent screen idea: an overlay of information about anything my device camera is pointing at in a geo-specific context.

- Audio/Video Editing: Take pictures, videos, sound files and edit them/integrate them into other apps/reports/presentation.

- "LibNav." Typically initiated from the library catalogue, this app would provide a GPS/SatNav/GoogleMaps-like experience in giving you turn-by-turn guidance to finding the physical book or resource you have selected on the right shelf in the right aisle on the right floor of the right library.

- Apps that have location-aware capabilities that would deliver information about laboratory equipment, studio capabilities, etc., when you entered them; e.g., you go in a chem lab and based on the room number or GPS coordinates, it brings up info about what equipment is in what cabinets for that room, short videos of how to use each piece of equipment, etc.

- LMS collaborative tool app: whiteboard, word processing, blog, or wiki app that allows students to use "stolen productivity moments" from their pocket to access course assignments or upload images

- Virtual desktop app where student can be given access to instructor podium computer to draw on a whiteboard or add to presentations.

- A texting integration tool that works with the LMS. When I make a new announcement, it will be sent to the LMS announcement within the course, students' e-mails, and their phone. Discussion forum on-the-go, with notifications of new posts, subscription by class, integrated to LMS.

- We could use an app that would enable a student listen to a podcast, stop the podcast, tag it, make an audio note, and record it.

- Augmented Reality Tour Maker: The app would take advantage of the GPS unit in the device to know where the phone is. The app would facilitate the easy creation of augmented reality tours by allowing students or faculty to go to a place, press a "mark" button and enter data about the place, links to other resources, pictures and/or video of the place. Ideally the "mark" feature would allow you to trace a shape (polygon, square, circle) around the place you are marking, so you have the ability to "enter" and "exit" areas. This would be very useful in places like outdoor museums, nature centers, etc. where people are walking from place to place. When they walk up to a building or area, the app would pull up the information automatically for them. The user experience for this app isn't really new technology, the power of the app is more the easy ability to create the tours.

- An app for a student-created media stream, automatically pushed image/audio/video into flickr/podcast/youtube/wiki.

- More multimedia compendiums of specialized information, e.g., more things like the iBird app.

- Mentoring application similar to Text4Baby.org. Mentoring4Students? Take in enough information to allow for individualized text messaging to facilitate course/project goals, lifelong learning. Could work to connect: industry-to-student or teacher-to-student or...

- Website evaluator: reads the content of a site for proper nouns such as personal or organizational names, then searches the Internet for info on that name; searches the site's domain name to find out if it was an edu, gov, mil; searches the site for a date to see how current the info is.

- Time Line app. It would build a time line based upon data input students would collect data around a topic and use it to build a visual representation of the development of the particular topic

- I would like to see an Augmented Reality app that would allow for students and faculty to add content on the fly and generate custom AR layers. Essentially a turn-key, wordpress-like AR app.

- We would look for full integration of course syllabus, class presentations, a calendar of relevant dates, all events, all homework assignments, class texts, study guides and quizzes available through one mobile application. Also, this mobile application would provide this information for each class.

- Peer Review Finder: find out if a journal that doesn't appear in your database is peer reviewed.

- Field research tool to identify bird calls.

- Audio recognition software (a la Dragon/Google Voice) to assist field researchers in identification.

- An "app tracker" that builds profile of applications you are using and what new applications you may be interested in.

- Way-back machine that functions through a smartphone camera. Bring up news stories, building histories, media relating to areas. Akin to digital graffiti?

- Checkin. An application that uses bar code scanning for submissions.

- Assignment Planner. Guides student through steps to complete an assignment. Gives a recommended time line.

- App that mimics the functionality of http://www.dipity.com/ incorporating GPS data. Create a map of your tour overseas. Create a map of a field-trip for a class. Get access to the experiences of students who've traveled that path before you.

- Image search of photo taken from camera, e.g., what is this bird? what is this bug, what is this plant?

- Math equation convertor, it would take a math equation and convert it to math symbols, it could be used for discussing math concepts.

- Online testing as we already do on the web.

- I want an app-building app, so we can easily build our own apps.

- App for taking notes on PDFs, drawing, writing, etc.

- Bibliography creator that groups or the entire class can use to collectively build a bibliography of important readings. Should also have the ability to add comments.

- Real-time monitoring of seismic data, surgical procedure, etc. Have students respond when an earthquake looks like it will appear, etc.

- Ability to web search based on images—take a photo, get back information about that place, more images, 3D mapping/modeling, linking to other people who have been here or care about this place.

- App 3: audio social networking/conferencing with strangers around common interests. Audible real time, Facebook for my ears

- Standardized electronic library interface that allows easy access and readable multimedia formats for students/faculty.

- Better backchannel applications integrated with the instructor's podium computer. Classroom-specific "Twitter" app.

- With all this presentation on mobile learning, what about the student who is visually impaired or is hearing impaired?

- Should be able to sync with Outlook (Exchange) and Gmail accounts.

- Better apps for data entry on the fly so that people doing field research could quickly make forms for entering information on mobile phones that would then go into databases and be searchable from mobile devices.

- Anonymous peer evaluation apps that would allow for peer review/commenting and that would be available to/trackable by instructors.

- Class tracker syllabus4students—would send the student his/her syllabus, lecture, assignment, daily activities, suggested daily activities from each subscribed course on a schedule; send citations of readings.

- Making a decision app. Enter a choice about a topic (e.g., health care) and the different aspects that would be affected both positively and negatively would come up this could be used to help teach the impact of a choice—that all choices have consequences both intended and unintended.

- I would like to see a port of Google Goggles for the iPhone. Google Goggles, which is currently only available for Android, allows users to search a database of images based on photos taken with their mobile phone's built-in camera. This software would allow for students to gain info on books, architecture, and landmarks.

- Photo-recognition app. Snap a photo and pull back information relating to the object photographed. Something akin to http://www.tineye.com/ capable of bringing back previous photos but also descriptive information about the object.

- Wireless positioning improvements to allow smartphones to operate in three-dimensional space to assist with mapping and AR inside campus buildings.

- Maps: geographic tagging, geology projects, scavenger hunts

- GPS map app of campus—could also have one of the library for finding resources

- Flashcard Touch, practice, rote exercise. Have students create own flashcards for vocabulary, term development, have students share flashcards with other classmates

- Current apps that work as a substitute and/or enhanced clicker style tool. Something akin to MOCA that was demo-ed earlier.