Mobile Learning Anytime, Anywhere: But Why and How?

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ABSTRACT
Expectations for learning anytime and anywhere are accelerating through the use of mobile technologies. While mobile devices are common for personal use, integration into learning systems poses multiple challenges. Organizations are expending great efforts to ensure connectivity and provide adequate security for users and information; however, these efforts may overshadow the pedagogical issues that are essential to realize the benefits of mobile technologies for learning. Innovative use of mobile technologies is more than parsing curriculum into smaller parts, migrating existing content for widespread access, or providing just-in-time information. Embracing mobile technologies offers an opportunity to rethink curriculum, examine assessment practices, and clarify distinctions between learning and performance support. This paper presents results of a yearlong examination of mobile technology use in military, academic, and government organizations. Multiple methods including interview, survey, literature review, and review of online sources and applications were used to determine how organizations are delivering mobile training in remote settings, the challenges they encounter, and the strategies they use to overcome these barriers. We also examined the pedagogical affordances offered by mobile applications. Examples include ways mobile learning is being used to tailor content to users' needs and locations, expand practice and collaboration activities, and provide authentic learning and assessment. The paper concludes with a discussion of strategies for integrating mobile learning into a hybrid or blended learning environment. Specifically the research was driven by the following questions:

- What is mLearning?
- How do distinctions between learning interventions and performance support affect design and use of learning applications (apps)?
- Can learning be delivered anywhere? How can learning be delivered in remote locations? What are the challenges?
- How can capabilities of mobile technologies facilitate learning?
- What are the implications of current research for integrating mobile learning into a blended or hybrid learning environment?

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INTRODUCTION: THE PROMISE OF MOBILE LEARNING

Expectations for learning anytime and anywhere are accelerating through the use of mobile technologies. In all fields, including education, business, national security protection, and healthcare, among others, people are demanding immediate access to learning materials and information. At the same time mobile technologies are becoming more prevalent as means of entertainment and socialization, particularly among those of the next generation. While mobile devices are common for personal use, clarifying the term mobile learning (mLearning) and integrating it into a cohesive learning system poses multiple challenges. With new technologies and applications (apps) appearing at a furious pace, there is a need to sort out what works best for delivering instruction, protecting information, and incorporating mobile technologies into a program of instruction. This paper presents results of a yearlong examination of innovative uses of mobile technologies in military, academic, and government organizations. While the focus was on language and cultural training, a variety of subject areas was also examined to identify the technical challenges for delivering mLearning and strategies for addressing them (i.e., the how) and pedagogical considerations that make mobile technologies attractive for promoting learning (i.e., the why). The intent is to call attention to factors and raise questions that potential decision makers should consider as they look to take advantage of mobile technologies.

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METHOD

A multimethod and multisource qualitative approach was used to address the research questions. Data collection methods included interviews (e.g., face-to-face, telephone, and focus group), surveys, document reviews (e.g., product documentation), research reviews (e.g., a review of the relevant scientific literature, online reports, conference proceedings), social media reviews (e.g., blogs, wikis, online interest groups, newsletters), and conference participation.

Sources

Face-to-face and telephone interviews were conducted with a total of 48 individuals, including language and technology specialists from each of the United States Armed Forces, 12 government agencies, and 10 universities. Focus group interviews were also conducted with 40 Active Duty Soldiers and civilians in language-learning programs to better understand the types of tools students use to facilitate language learning. Nine language classes were observed to gain a better understand of learning tasks and types of learning interventions used in face-to-face instruction. In addition, survey responses were collected from a total of 45 Soldiers and language specialists

returning from deployment to better understand the technical limitations associated with delivering mLearning content while in theater.

WORKING DEFINITIONS

To establish a common language for discussing mLearning, we provide brief discussions of what is meant by mLearning, performance support, and the factors that distinguish them.

MLearning

Although mobile devices are common, there is not a standard, consistently used definition of mLearning. Definitions of mLearning are open to various interpretations about the nature of learning, and the size and features of specific devices. The definition that circulated via the eLearning Guild in 2007 emphasized the productivity that mLearning offered when using small, portable, digital mobile devices (Wexler et al., 2007). More recently the Advanced Distributed Learning (ADL) described mLearning as "the use of ubiquitous mobile technology for the adoption or augmentation of knowledge, behaviors, or skills through education, training, or performance support while the mobility of the learner may be independent of time, location, and space" (ADL, 2012).

What tends to distinguish mLearning from other forms of distance learning (e.g., eLearning) is that mLearning involves more focused learning content consisting of small, bite-sized learning bits that are accessed for short durations or may be accessed as specific information is needed (ADL, 2012; Brown, 2010). Definitions of mLearning also clearly include performance support functions, raising questions about distinctions between acquisition of knowledge and accessing information.

Distinctions Between Learning and Performance Support

The relationship between knowledge and information is complex with learners needing an understanding of factual information to build a conceptual framework for organizing and retrieving knowledge (Bransford, Brown, & Cocking, 2000). Mobile technologies seem to further complicate the relationship. Learning, most simply, may be defined as "a process through which experience causes permanent change in knowledge or behavior (Woolfolk, 1998, p. 204). Learning activities are designed with the common goal of producing a change in the learner that may be applied in the future. Whether mLearning activities include short games to practice skills (a behaviorist approach) or group activities to encourage creating and sharing products that demonstrate language proficiency (a constructivist approach), the intended purpose is to produce change in the learner. That differs from the goals of performance support tools that provide users with access to information when they need it.

Performance support may be defined as "providing intuitive, tailored aid to a person at his or her moment of need to ensure the most effective performance" (Gottfredson & Mosher, 2011, p.3). Those five times of need occur when (a) learning for the first time, (b) wanting to learn more, (c) applying and remembering, (d) things go wrong, and (e) things change (Gottfredson & Mosher, 2011). Mobile performance support tools enable users to access information, transform data, capture data authentically (e.g., provide photos), or remember steps in a process. While some refer to performance support tools as outboard memory (Campbell & Finnegan, 2011) serving as an extension of one's capabilities at a given time, the limitations must also be recognized. A clear example is a language dictionary. A person with no knowledge of a language is unlikely to be able to string together a coherent sentence by looking up eight words. The dictionary, however, is an important tool that can help a student bridge a stumbling point to engage in more advanced communication. The point being, performance support tools and applications should be not be viewed as stand-alone learning materials, but rather as resources to extend what the learner knows or can do at a given time.

Distinctions between learning applications and performance support tools are made clear in the design of the product. A well-designed performance support tool enables the user to quickly access the exact information needed at a given time. There is no deliberate effort to connect the information to what the user may already know or situate

the content within a larger context as well-designed learning experiences would. A Global Positioning System (GPS) is a good example of a performance support tool. It provides explicit directions for reaching a desired location. It does not first acquaint the user with the neighborhoods of the city or provide an overview of main streets and highways. It does not remind the user of other destinations in the desired area that have been previously visited. In essence, it makes no effort to provide context, access prior knowledge, or attach meaning that might result in a being able to find the desired location sometime in the future. The user may well remember the route, but nothing in the design of the GPS directions is intended to make that occur. In fact, it is designed so that the user can pay minimal attention to contextual cues in the environment (being free to listen to the radio or carry on a conversation) and merely respond as direction commands are given. Performance support tools are designed to make searching for the specific information easy whereas the focus of learning applications is creating opportunities for learners to develop their knowledge and skills, providing practice and deep processing interventions to foster development. These distinctions are important in determining the roles mLearning will play in a learning program.

MOBILE LEARNING, BUT HOW?

As organizations consider the potential for mLearning, they often follow two complementary paths: (a) the technical of determining if and how they might accomplish mobile delivery and (b) the pedagogy of determining why mobile devices should be used to promote learning. This section addresses the technical challenges of realizing anytime-anywhere access to mLearning content and the mitigation strategies organizations are using to combat these issues.

Challenge 1: Limited Connectivity

While many individuals have grown to expect connectivity, that is not the case in all parts of the world, or even within the United States. A pressing question we repeatedly asked interviewees was, "Can you deliver mobile content in all operational environments?" The resounding answer was, "Yes, but…" At the extreme, there are locations in which connectivity is not possible due to geographical features or total lack of infrastructure. In other cases, the connectivity is so slow that downloading or streaming data from web-based sources or cloud-based access is not practical. Our research found organizations are using the following approaches to mitigate the challenges of gaining and maintaining connectivity for mLearning:

Using native or hybrid apps. To ensure access, many organizations are preloading native and hybrid applications onto mobile devices prior to deployment. A native app is a small software program that resides entirely on a device's hard drive and does not need to be connected to the Internet to function. All of the materials reside on the device, making them available for use in operational environments. Hybrid apps operate as native apps when connectivity is not available; when connectivity is available, however, they allow information such as test scores to be uploaded to a server or new content to be downloaded to a device.

Optimizing the design of mLearning content. Another way organizations are mitigating the challenges associated with limited connectivity is by designing specifically for mobile delivery rather than merely converting from traditional courses (Magnuson, 2012; Quinn, 2011). Efficient designs keep content in small chunks and avoid flashy features that increase download time and may, in fact, detract from learning.

Using local infrastructure for low technology solutions. Lessons may be learned from emerging nations where the traditional cell phones with simpler computing capabilities than smartphones are being used for brief bursts of training (Lugo & Schumann, 2012; Mukherjee, 2010; US Department of State, 2013). Using cellphones in this way is relatively inexpensive and allows expansion of a "whole new level of access to information" (Quinn, 2011, p. 59). For example, value-added service (VAS) is popular with language learning using short message service (SMS) and interactive voice response (IVR) to provide short learning segments (Ambient Insights, 2012). For example, a student in Bangladesh can call an IVR number and gain access to three-minute-long audio lessons and SMS quizzes (Mukherjee, 2010, p. 78).

Challenge 2: Security of Data, Devices, and Users

Balancing security with expanding access to content can pose another challenge for using mLearning, particularly in the Department of Defense (DOD) and various operational settings. The complexity of this challenge arises because it involves the security of data, users, and devices. Even though data itself (e.g., foreign language training material) may not pose a threat to security, the capabilities of devices to reveal information about the user may expose security vulnerabilities. For example, location-based services that use the mobile device's sensors to offer contextually relevant information can put the user and others at risk. As Steve Warren, Deputy for Army's G2 Maneuver Center of Excellence, remarked, "Every photo taken with a smartphone embeds a latitude and longitude setting that, with the right software and wrong motivation, could be used for malicious reasons" (Rodewig, 2012, np). Among the strategies being used to mitigate security risks are the following:

Acquiring mobile device management (MDM) services. MDM software is a key strategy being used to mitigate security risks for data, devices, and users. MDM software allows a system administrator to control the secure distribution of apps, data, and configuration settings across a fleet of mobile devices.

Partitioning or sandboxing devices. Partitioning separates a hard drive into multiple logical storage units. This approach may solve many of the security concerns associated with policies such as "bring your own device" because it allows individuals to have a partition for work applications and files and a separate partition for their personal content. If necessary, a system administrator can wipe clean the official/Government side of the device without disturbing the user's personal partition (St. Pierre, 2011).

Using mobile thin-client computing. With mobile thin-client computing, also referred to as dummy terminal or virtual desktop options, apps and data reside on a cloud-based server, not the device. From a security standpoint, this makes the device itself less of a threat if lost (Crowe, 2012); however, because an Internet connection is required to access the content, thin-client computing may not be a viable in operational environments.

Selecting web-enabled apps to protect the security of devices. Web apps serve as templates that optimize access to materials that typically reside on a server or in a cloud. Limited information is stored on devices reducing some security concerns and facilitating immediate updates to mobile users.

Disabling features and establishing usage policies. A simple approach many organizations are taking to protect the security of their data and users is disabling of device features, such as location services and geotagging. Many organizations are also establishing usage rules for mobile technologies and establishing secure networking sites to limit inadvertent security risks.

Encrypting data, requiring passwords, and user authentication. These strategies are not new or limited to the use of mobile devices; however, they are still among the security measures widely being taken by organizations to ensure data security. Increased use of biometrics for authentication is expected to strengthen security capabilities in the near future. In the meantime, agencies are continuing to look for authentication solutions that would allow users to access secure networks using their mobile device (Crowe, 2012).

Layering with products from different vendors. A layered strategy, creating a system of systems through the use of products from different vendors, may be an appropriate way for organizations to ensure security. By layering with products (e.g., encryption, device management) from different vendors, someone with malicious intent would have to break into each product to compromise the security of the data. This layered approach can leverage current technologies, reduce time to acquire capabilities and provide the safeguards by creating a system of systems rather than a single system to afford protection (Watkins, 2012).

WHY MLEARNING? PEDAGOGICAL OPPORTUNITIES

Military, business, and educational organizations are expending great efforts to ensure connectivity and provide adequate security for users and information; however, these efforts may overshadow the pedagogical issues that are essential to realize the benefits of mobile technologies for learning. Innovative use of mobile technologies is more than parsing curriculum into smaller parts, migrating existing content for widespread access, or providing just-in-time information.

Mobile technologies have the potential to change the experience of the learner in positive ways. Quinn, for example, contends that "digital technology complements what our brains are able to do, and mobile brings this capability with us whenever and wherever we are" (Quinn, 2012, p. 18). While educators frequently note that mobile delivery does not change the essential aspects of how people learn (Quinn, 2011), the types of interactivity that promote learning can change the learning experience through the use of mobile delivery (Kukulska-Hume, 2012). Integrating mobile technologies into a program to optimize these interactions and create a hybrid learning model offers exciting possibilities and many choices.

Good Pedagogy and Mobile Capabilities

To examine the potential for learning and teaching with mobile apps, we took a two-pronged approach. First, we identified best practices for facilitating learning as a foundation for pedagogical approaches. Second, we searched for innovative strategies in products and apps that could not only comply with the learning principles, but that might offer something that traditional methods could not. Although we use language learning as an example to highlight potential for mLearning, we think program managers, instructors, and designers will readily see implications for their fields.

Best practices for facilitating learning. In a recent analysis of best practices for distributed learning, Menaker and Tucker (2010) identified several key principles from the fields of language learning and cognitive psychology (based on the work of Frank et al.) that can serve as a foundation for language-learning pedagogy. The following remain relevant for mobile learning as well:

- Engage learners in interactive tasks.
- Provide feedback to learners so they notice and correct their own errors.
- Test frequently with minimal retrieval cues.
- Distribute practice across several small sessions rather than a single large session.
- Vary characteristics of learning activities.
- Introduce difficulty factors that make learning challenging and require students to deeply process content. (Menaker & Tucker, 2010, p. 10)

Mobile technologies offer a number of affordances that can facilitate these best practices. For example, the fact that people access mobile devices multiple times a day is a pattern that lends itself to the concept of spaced or distributed practice that has recently gained attention of mLearning community (Brown, 2012; Quinn, 2012). Our review of more than 125 mobile products included mLearning apps that leveraged these principles to promote learning. Innovative features that tailor content provide specific feedback, encourage problem solving and deep processing, enable users to bring current knowledge into a shared learning environment, and encourage collaboration and communication offer a window into some of the possibilities. The following section showcases apps that demonstrate some of these capabilities.

1. Provide authentic practice opportunities with tailored feedback. Applications that provide tailored practice opportunities based on performance and feedback offer the scaffolding learners need to move them forward in the learning process. The following examples illustrate some of the capabilities:

Anki, Babbel, and Rapid Rote are among the more popular flashcard applications that use spaced repetition algorithms to determine the optimal sequence and frequency with which a word should be presented to the user. They also allow the sharing of content among users. These apps have additional features that distinguish them from

traditional flashcards. For example, Rapid Rote contains native speaker pronunciation, allowing users to compare their pronunciation to that of an expert, and uses social media to show word usage in an authentic context. Babbel allows users to record and compare pronunciation. Wave forms and pitch curves provide visual displays of the user's speech and enable comparisons to experts so learners can improve their pronunciation. Such visual displays have parallels in other fields (e.g., those learning the trajectories of specific aircraft and weapons settings).

The Operational Language and Culture app is another example of a program that integrates assessments and feedback into an authentic language-learning application. This self-paced foreign language and cultural awareness program utilizes interactive lessons with animated characters to teach students basic foreign language vocabulary and phrases, grammar rules, and cultural norms. It allows students to record and compare their pronunciation with a native speaker. It also contains interim quizzes for assessment purposes and provides users with immediate feedback. The capture of voice allows users to record and compare pronunciation.

HeadStart2 Mobile App is an interactive phrasebook that provides native speaker pronunciation for common words and phrases. Unlike traditional audio phrasebooks, it provides pronunciation at various speeds and contains English, transliteration, and native script.

Kanji LS Touch is an application that uses the touchscreen interface of the mobile device to provide users with feedback on the correct way to write Chinese script. It allows users to trace letters and characters and receive feedback on each attempt. The ability to monitor student input and provide feedback enables a level of practice and feedback that would be difficult in a traditional classroom.

2. Engage learners in authentic tasks that encourage them to communicate, collaborate, and develop user-generated products. MLearning can spark learner interest and facilitate engagement by personalizing learning and making it relevant. While the applications we mentioned above engaged learners in interactive tasks, here we focus on productivity applications that are used to create user-generated content. Currently, productivity and Web 2.0 tools that promote social networking and social exchange of knowledge are playing important roles in all fields. For language learners, they expand the opportunities for learners to communicate, collaborate, and demonstrate their proficiency with authentic projects and tasks. For example:

Audacity, a productivity software program that allows users to record and edit audio recordings, is being used by classroom teachers to promote speaking and listening skills. For example, instructors at one university reported that students used Audacity to create of a radio DJ show in a foreign language. Students actively engaged in discussions about the music and artists, and conducted interviews with other students. The capability to record and play back these events encourages learners to monitor their performance and correct errors throughout the editing process. The same type of activity could be created by simply using a mobile device's audio- and video-recording capabilities. Instructors also reported that students used Audacity as a study aid, recording conversations and replaying them at different speeds so as to learn proper pronunciation.

Blogs, vlogs, microblogs, and wikis, are examples of web 2.0 technologies and tools (e.g., Twitter, Tumblr, YouTube) that are being used in innovative ways to promote learning. Blogs (online journals that individuals can continuously update) foster written communication by allowing learners to post thoughts and ideas, receive peer feedback or comments, and update their postings. Vlogging, or video blogging, provides opportunities for learners to demonstrate and share their oral skills, as well as identify and correct their own errors and those of peers. Instructors also use microblogging, the exchange of small elements of content such as short sentences, images, and video clips, to solicit spontaneous responses and assess students' levels of understanding. For example, using Twitter, a teacher may tweet a picture and ask his or her followers to describe the contents of the picture in a target language (e.g., Spanish, Arabic). Similarly, a teacher may solicit responses to a question and later review those responses with students in the classroom. Because the blog and vlog information is captured and maintained online, it can also be used as an electronic learning portfolio that allows students to track their learning and assess progress over the course of the semester. Finally, wikis (websites that allow users to add, modify, or delete content via a web browser) serve as spaces for co-creation of content and shared repositories of knowledge. These exemplars show how the

integration of Web 2.0 tools and apps onto mobile devices has made it easier for students to document their work, receive feedback on each other's work, detect and correct their own errors, and share information.

3. Use sensors and location data to augment learning and tailor training to specific environments. Context-aware apps detect and use a learner's location to provide relevant content about the people and objects in the environment. Whether historical facts, schematics of buildings or translations into common dialects, these apps expand the learning space, supporting learners as they explore new environments and communicate with others. We reviewed several applications that demonstrate how sensor data can be used to promote situated learning opportunities. Examples include:

Captura Talk combines optical character recognition (OCR) and text-to-speech (TTS) capability to offer reading support to users. This app can translate typed or photographed text into spoken form in over 20 different languages, enable users to enter voice notes, and store key words and phrases.

TANGO detects physical objects around the learner using radio frequency identification (RIFD) tags and assigns questions to the learner related to the detected object in order to improve vocabulary knowledge. The program also allows learners to share their knowledge with peers.

Mentira an augmented reality game set in a Spanish-speaking Albuquerque neighborhood connects language and place. Learners participate in meaningful interactions with local citizens and simulated characters to solve a mystery as clues are provided in the environment. Augmented reality features enable an overlay of information on actual locations.

THE STATE OF ASSESSMENT: A LACK OF EVIDENCE

An important factor in selecting products and apps is finding out how well they achieve their intended purposes. Our research revealed a paucity of empirical evidence on the effectiveness of mLearning products and apps. We also noted that researchers had made the same observation about the lack of attention to assessment and measurement issues (Haag, 2011; Quinn, 2011; Tucker, 2010). User reviews were the most frequently cited evidence, but few studies reported the impact on learning outcomes. This lack may reflect the changes evident in online culture and social media in which customer reviews play an increasingly important role. Digital capabilities that enable automatic capture of user performance and usage data from mobile devices may become more prevalent as learning management systems (LMSs) integrate mobile technologies. However, mLearning may emphasize the need to reexamine the role of assessments and, in particular, the potential for replacing summative assessments (one grade for a final product) with formative assessments that can identify specific strengths and weaknesses and changes over time (Tucker, 2010). Efforts to foster collaboration throughout the global community may raise additional questions about what a good measure is and how good measures should be designed (Johnson, Adams, & Cummins, 2012). In general, mobile technologies may encourage a rethinking, not only about the structure of learning, but also assessment strategies and metrics.

INTEGRATING MLEARNING INTO A HYBRID MODEL OF LEARNING

Many organizations are trying to determine how to integrate mLearning into their current training and education programs. Our research did not reveal a single "best" answer the question. Rather each organization is faced with challenges that reflect its resources, infrastructure, and policies. Like any training program, the effectiveness of the approach taken will depend on many factors, including the goals of the program itself, the readiness and motivation of learners, the ability of the of instructors to successfully use the technologies and resources, and the types of practice and transfer opportunities (Goldstein & Ford, 2001). Determining how mobile capabilities can further learning goals of a program requires an understanding of the strengths of each component within the learning system. Hybrid models offer a means of building on those strengths.

A hybrid, or blended, learning approach refers to an instructional methodology that combines different learning media (technologies, activities, and types of events) to create an optimal learning program for a specific audience (Bersin, 2004). Typically, hybrid learning assumes the continued use of face-to-face teaching as a basic building block of the learning experience, enhanced and enriched by the integration of learning technologies (e.g., computer-based learning, and mLearning) into activities that occur both inside and outside the classroom. Hybrid learning may mix face-to-face instructional activities, such as in-class discussions, active group work, and lectures, with web-based activities such as online activities, blogging, and discussion boards. Hybrid models are gaining in popularity, particularly in higher education, as cost-effective measures to extend access to varied audiences, expand the learning environment, and take advantage of the online skills many students have developed independent of academia (Johnson, Adams, & Cummins, 2012). Hybrid models also focus attention on the complex relationships between learners and content, learners and instructors or mentors, and learners and peers.

The Relationships Between Teachers, Learners, and Content in a Hybrid Classroom

Integrating mobile technologies into a classroom will likely alter the types of interactions between students, instructors, and content. Previous research examining the impact of interventions on achievement in online learning may provide insights and lessons learned for developing a hybrid learning model. For example, Bernard et al. (2009) found that three types of interactions all had positive impacts on learning and social satisfaction: student-teacher, student-student, and student-content. Of particular interest was the finding that student-content and student-student interactions were more powerful predictors of achievement than student-teacher interactions. This does not diminish the role of the instructor, but it speaks to the unique relationships in online instruction. The stronger the student-content interactions, the greater the achievement—a fact that may come as no surprise to those who advocate that it is the design of learning experiences that makes the difference. But, how much and what kind of design factors should be considered? To what extent will mLearning change the curriculum and establish different relationships between the learners, the content, the instructors, and the wider community at large? How can mLearning and online learning provide learners with experiences that will enable them to benefit most from time with the instructor? Chris Dede of Harvard University suggests that mLearning offers an opportunity to redesign the curriculum. He remarked:

> "…It's important to understand that the device itself isn't the innovation. People can't just digest worksheets and stick them on a cell phone and think that's going to be some kind of breakthrough. Good curriculum has to be rethought—not so much transferred, but more creatively redesigned. It's a question of our being willing to be creative and recognize the opportunities available, to look at this small computer as something that has new potential to redesign education…" (Puente, 2012, np)

Although redesigning education may be a long-term goal, a hybrid learning model can build on and modify an existing curriculum. Traditionally, instructors and curriculum specialists discuss content (what is to be learned), process (how it is taught), products (what the learner will produce as evidence of learning), and environment (where learning will take place). Within each of these components are many choices. Marsh (2012) discussed the challenges for creating blended learning opportunities. Her practical approach is based on fostering a student-centered environment in which students and teachers work as a team. The three suggestions listed below offer ways to exploit the strengths of each element within a hybrid model. Whether the integration results in a full-scale redesign of a learning program or a more modest modification within a course, Marsh's three suggestions provide usable guidelines,

1. *Components of a hybrid classroom should complement each other*. As many have noted, you cannot simply introduce technology into the classroom and expect learning to occur (Kukulska-Hulme, 2010, Marsh, 2012, Quinn, 2011). Designing a learning experience takes deliberate planning and an understanding of pedagogy. Marsh (2012) approaches this by examining the learning outcomes, student needs, and the options available. The features and affordances of mobile devices or apps need to align with the learning objectives to create an activity for the intended audience. For example, mLearning can provide opportunities for tailored practice and introduce rich and varied inputs to complement instructor-facilitated group activities. If a learning objective was to describe the local terrain in the target language, planned activities could use mobile capabilities to provide

tailored practice and expose students to new vocabulary with native speakers in authentic situations in preparation for face-to-face interactions with peers and instructors in the classroom. Novice learners might use a flashcard app that sequences and spaces words based on performance and allows users to adjust the speed of speech. This would allow students to learn vocabulary words while they are "on the go" and receive timely feedback optimizing the learning principle of distributed practice. More advanced learners might use their mobile devices to search news stories for examples of the vocabulary words in real-world contexts so they can use the vocabulary and discuss usage patterns (e.g., formal versus informal speech) with the instructor in class. This example demonstrates how the affordance of a device can expand learning spaces—not repeat what is done with the instructor, but complement it. Time with instructors can be used for higher-order interactive tasks rather than lectures or drill and practice.

2. *Learning materials must be pedagogically sound.* Although the marketplace is filled with many mLearning and eLearning products, serious evaluation efforts are needed to determine if they align with learning objectives and if the designs are based on good pedagogy. As discussed previously, many apps are performance support tools and as such may not promote learning goals. In addition, many products provide drill and practice approaches that may be appropriate for novices but less valuable for advanced learners. Others may be so complex that they cognitively overload students and impede rather than facilitate learning. It is also important to recognize that newer and older technology both have a place in a hybrid learning system. For example, mp3 audio files of native speaker conversations may be just as effective, less costly, and more accessible than interactive phrasebook apps. This is particularly important for language learners in the military who may find less technologically advanced components such as newspapers and radio programs to be an effective means for sustaining their language skills. At the same time, others may benefit from the tailored and immediate feedback many native apps offer.

3. *It is important to offer support in any hybrid system in which students use technology for self-study*. Marsh (2012) discusses three types of support that are imperative when developing a hybrid learning system. The first deals with academic support, such as establishing an online forum where students are invited to ask questions about concepts and constructs they find difficult. Such forums empower and encourage students to respond to their peers' questions and facilitate student-to-student interaction. The second form of support is concerned with teacher-student support. Instructors can use online blogs and other learning record systems to track student progress and use this as a means to provide support and tutoring to students who are falling behind or struggling with concepts (Marsh, 2012). The final form of support involves technical support for learning and dealing with any issues that may arise in using the new technologies. These forms of support should be encouraged by any organization that intends to integrate mobile learning into a hybrid learning system.

To Marsh's list we also add the importance of providing support for faculty**.** The integration of mLearning into a course or curriculum requires a paradigm shift for instructors, and this process requires time and support (Cochrane & Bateman, 2010). The magnitude of this change and support needed for transition should not be underestimated, especially for those more accustomed to teacher-centered learning. The organizational support and sharing of successes with colleagues can jump-start ideas and address challenges. Developing various repositories, including video capture of innovative practices, and working to follow-up with products introduced by faculty at showcase events can also facilitate integration of mobile technologies. As students develop class projects using mobile tools, they too may contribute to the body of available products or approaches.

CONCLUSION

Mobile technologies expand the place for learning in two distinct ways. First, through mobile technologies, a learner may access content or communicate with peers, instructors, mentors or experts from many different locations. Providing access enlarges the reach of the learning institution and provides learners with opportunities to engage with authentic learning material outside of the traditional brick-and-mortar classroom. Providing students with access to mobile training content can be a significant achievement for an organization. In fact, currently, many organizations list migration of content as their highest priority (Quinn, 2012). Migration often, however, translates into what Puentedura (2010) labels as substitution, meaning that no fundamental changes are made to the content, just changes that enable delivery to a new platform. If the sole purpose is to provide access, and pdf copies of documents or pod/vodcasts fulfill that purpose, then this may be deemed sufficient. For others, substitution may be reasonable first phase of a mobile integration plan serving as a placeholder until new mLearning apps or strategies to exploit mobile capabilities are implemented.

The second direction focuses on the potential for mobile capabilities to take learning to new places, to achieve learning outcomes in new, authentic ways that transform our notions of education by offering learning tasks not possible in the past. The capacity of mobile technologies to use the environment as an instructional tool is perhaps what offers the greatest potential. Capabilities such as recording voice memos and videos, taking photos, collaborating with peers, and taking advantage of augmented reality offer exciting and creative ways for learners to interact with varied environments and each other and demonstrate their achievements in authentic ways. The challenge of integrating mLearning is to develop a deliberate and coherent strategy, recognizing the role of the changing interactions between learners, content, instructors, and peers and the pedagogy that can guide those relationships.

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