

Standards informing design of library service delivery to mobile devices and nomadic learners

Sarah-Jane Saravani
Learning Hub Manager
Waikato Institute of Technology
sarah-jane.saravani@wintec.ac.nz

Abstract:

What educational institutions are facing today are the requirements of increasing numbers of learners who are described as nomadic. The nomadic learner has specific requirements, not all of which include specific mobile devices or technologies, but rather a support system or infrastructure which allows easy access to information in a convenient form as the nomad moves from place to place. Across the education environment a shift of focus is occurring - 'learner demands, the technology supplies seamlessly'. This shift challenges libraries to examine their service delivery and to focus on the implementation of relevant standards.

Introduction

What educational institutions are facing today are the requirements of increasing numbers of learners who are described as nomadic. Nomadicity is defined as “individuals or groups of people who travel from one place to the next for work, trade or to seek food and shelter” (Ally, 2008, p. 37). The nomadic learner has specific requirements, not all of which include specific mobile devices or technologies, but rather a support system or infrastructure which allows easy access to information in a convenient form as the nomad moves from place to place (ibid.).

M-learning, or mobile learning, has challenged the library world to rethink the way it delivers services to, and address the issues of, learners who use portable devices to access learning from a place and time and manner of their choice. Mobile learning has a variety of definitions but is usually regarded as including “learning using mobile and wireless computing technologies in a way to promote learners’ mobility and nomadicity nature” (Lee, 2007).

Mobile standards, such as ANSI-41 compliance standards from the American National Standards Institute, and Global System for Mobile communications (GSM), International Organization for Standards (ISO), Institute of Electrical and Electronics Engineers (IEEE), support the development of mobile computing. If we accept the conclusion, however, that mobile learning focuses on devices and their ability to deliver information in the manner intended, the problem arises for libraries of the rapid changes that exemplify this field: the ability of Learning Management Systems to deliver asynchronous learning, synchronous learning, chats sessions, forums, podcasts, video casts, iTunes podcasting, mobile ebooks, Kindles, etc. Technologies emerge, have their day and are left behind in the ongoing determination to find the most user-friendly, cost-effective and fitter-than-fit-for-purpose device or software. In the meantime, learners are becoming less stationary in their lifestyles, more expectant that learning preferences will be accommodated within their other commitments.

Across the education environment a shift of focus is occurring which places the learner within context, whose needs define technical specifications, content management, a rich set of capabilities and services, accessibility and authorisation protocols. The new model offered is – ‘learner demands, the technology supplies seamlessly’ – differing from the traditional ‘technology defines and pushes, learner accepts as mobile device permits’.

What challenges does this scenario offer for libraries, especially those which have travelled down the path of network-based delivery towards preparing their services for mobile consumption? A growing number of libraries are taking on board the challenges of delivery to end device and a number of questions must be posed:

- Are these same libraries also looking at whether such services are actually meeting the needs of learners who require technologies to support their learning as they move from place to place?

- Have they addressed within their planning operations the characteristics and capabilities that a “nomadic learning system” must have to meet learners’ needs?
- Are these libraries aware of what infrastructure at a local, regional or national level supports nomadic learning?
- What frameworks or standards for nomadic learning have been developed at national or international level?

This paper will explore some of the issues surrounding approaches to mobile learning and nomadic learning with specific emphasis on library planning.

Background

Mobile communication has been in existence since the mid-twentieth century. Early devices appeared in the form of two-way radio transmitters - the first official mobile phone was used in Sweden by the Swedish police in 1946. The devices were inefficient and cumbersome with very limited coverage. In 1983, Motorola unveiled the first truly portable cellular phone and by the early 1990's cellular phones were considered as being second generation (2G) and they were able to work on mobile phone systems. Digital mobile phone networks were in use in the United States in 1990 and in Europe the following year. These days, the 3G era, most laptops and personal digital assistants have wireless cards or Bluetooth interfaces built into them for convenient mobile internet access. This has led to increase in the adoption of mobile internet and expansion of the use of portable devices involving computer, media player and cell phone.

Mobile engagement with information is becoming increasingly routine. The concept of learning has broadened to include features other than the body of information being transmitted. Place, time context, technology, compatibilities, synchronicity, learner-centeredness and individual requirements have entered the educational realms and offered their challenges to providers. At a glance it would appear that the marketplace is driving expectations of educational provision as increasingly powerful devices of reduced size become commonplace and open up opportunities for learning to take place in novel and meaningful ways. Although learning using mobile devices has been in existence for more than half a decade now, still many education providers are struggling to articulate comprehensive policies and plans to ensure standardisation and consistency of practice.

The field is piecemeal; individual academics, specific departments, cross-team collaborative projects are moving ahead in innovative ways to deliver the means of taking educational provision into the future. Very often, they are working in degrees of uncertainty that lessen the long-term sustainability of their endeavours. There is also no doubt that particular difficulties continue to beset the use of mobile devices – coverage problems, network access difficulties, battery life, complexity issues and, for many, cost, and competence in using the wide and powerful range of functionalities that now form part of the latest mobile devices. An increase in uncertainty in how best to benefit from the increase in power and functional and technical potential that mobile devices offer is causing many to query what the future of mobile information access and learning holds. The purpose of this paper is to

examine what standards are in existence to assist those engaged in delivering learning through mobile technologies and how these have informed the design of service, with a particular focus on the library and information sector.

Mobile learning

The concept of mobile learning has generated debate as to what aspect is actually the distinguishing feature from other forms of learning such as e-learning or traditional learning that allows the learner a variety of functionality options. There is general agreement that a precise, universally-agreed definition is unlikely to be accepted, but certain key features do receive recognition by many working in the field.

O'Malley (2003) offered the following definition, which incorporates a generally-accepted model:

Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies.

Al-Moqbali and Al-Abri (2009), have suggested four key characteristics, the first two of which could be said to exemplify sound learning principles in general, the latter two specific to mobile learning:

- Enables knowledge building by learners in different contexts.
- Enables learners to construct understandings.
- Mobile technology often changes the pattern of learning/work activity.
- The context of mobile learning is about more than time and space.

The Australian Flexible Learning Framework's Guide to working with m-learning standards, for use in Australia's vocational education and training sector, narrowed the focus of the technology aspect to include handheld devices commonly in use and excluded the larger, more educationally-employed devices (O'Connell & Smith, 2007, p. 3):

while 'mobile learning' could encompass all kinds of activities where learning happens out of a formal classroom situation, the terms 'mobile learning' or 'm-learning' are used here to refer specifically to learning that is facilitated and enhanced by the use of digital mobile devices that can be carried and used anywhere and anytime. Such devices include: mobile phones, PDAs (personal digital assistants) iPods, MP3 players, smart phones.

Excluded are laptop computers, tablet personal computers, Ultra-Mobile PCs, with the focus on a suite of devices that are typically identified by their small screen, lack of standard keyboard and pocket-sized nature.

Sharples, Taylor and Vavoula (2005) took the approach that mobile learning was more than simply a focus on technology and its characteristics. They offered a more pedagogically-focused approach in that the learner and their experiences, background and context informed the characteristics of mobile learning:

Good m-learning uses good teaching and learning practices and makes the most of *being mobile*. It is the learner who is mobile rather than the device, and this key principle should inform all other m-learning principles.

By placing mobility of learning as the object of analysis we may understand better how knowledge and skills can be transferred across contexts such as home and school, how learning can be managed across life transitions, and how new technologies can be designed to support a society in which people on the move increasingly try to cram learning into the interstices of daily life.

Good m-learning makes the most of being on location, providing immediate access, being connected, and acknowledges learning that occurs beyond (and in conjunction with) formal learning settings, in places such as the workplace, home, and outdoors.

Geddes (2004) defined mobile learning as “the acquisition of any knowledge and skill through using mobile technology, anywhere, anytime, that results in an alteration in behaviour.” Geddes includes laptops and tablet computers in his definition and places emphasis on technology providing access while on the move. He regards self-directed learning as truly coming into its own in this context, with the teacher or facilitator playing a lesser role. Geddes proposes four major advantages that can be gained from m-learning to a greater degree than any other learning methods: access, context, collaboration, and appeal. He also mentions cost as having bearing on the ability to employ mobile learning devices.

The eLearning Guild (2008, p. 7) focuses on the learner and interactivity in their definition:

Any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse.

What emerges from this discussion on what constitutes mobile learning is the challenge to place this new wave of learning possibilities within context. Should the focus be upon the technological facilitation of learning, should it be upon how the learner uses such facilitation, should the ability to engage in learning in a transitory mode be the focus, what about the opportunity to integrate the immediate environment with the learning resources? Do the traditional models of learning fit the style of accessing information when and where the learner chooses, is a disconnect emerging that will render the ability and desire to learn increasingly incompatible with the ability and desire to deliver learning content?

Having briefly examined the context of mobile learning, we shall address the implementation of mobile learning later in this paper. Three aspects of planning for the transition to successful and sustainable delivery will be discussed more fully:

- how organisations and institutions should plan to allow their employees or students to learn on the move
- how designers and teachers should implement successful support strategies for their students engaged in such learning practices

- what learners wanting to take advantage of mobile technologies to enhance their learning experiences should expect from the convergence of learning and technology.

Nomadic learners

Nomadism is defined as “individuals or groups of people who travel from one place to the next for work, trade or to seek food and shelter” (Ally, p. 37).

The nomadic condition was assessed by Leonard Kleinrock (1996, p. 351) as universal in that all people are mobile and communicate, but that the systems for dealing with connectivity and change were failing to meet the challenges of such a mobile computing and communication environment. He proposed the essence of a nomadic environment as being the ability to adjust automatically all aspects of the user's computing, communications, and storage functionality in a transparent and integrated fashion. The five areas he identified were: location of the user, communication device being used, communication bandwidth available, the computing platform and whether or not the user was in motion. Kleinrock acknowledged the context or surroundings impacting upon the nomadic user as being part of the logical parts of a nomadic system.

Five years later, Kleinrock was describing nomadism as “transparent virtual networking” with the need for the learner to be able to access a range of campus information services from virtually anywhere on just about any type of internet-enabled gadget. This implied that the provider of such networked services needed to be able to provide an architecture that allowed the same advantages to mobile learners as to stationary devices. This model was based around user demand rather than technology push and has challenged many information technology departments to develop policies and infrastructures that include ease of access from a variety of locations on a variety of devices.

Frank Farance (1996) came to a similar definition with the emphasis being on stability of connection to services from a distance. He defined nomadism as the capability of people to move from place to place while retaining access to services that may or may not be available within their local environment. He went on to identify the standards needed to address the provision of services which are flexible and responsive to the minimum and essential requirements of the nomad.

The concept of nomadic learner continued to develop as the focus upon technology and infrastructure architectures increased rapidly. Devices capable of supporting mobility and a variety of environments are being marketed to consumers at an increasing rate and render the developments of earlier models redundant even as they are being applied and integrated into the mainstream environment. The hallmark of the nomadic learner is the ability to retain continual access to services regardless of location or time while utilising an essential communication device, such as a cell phone, that enables connection to some remote site.

Hitch and McCord (2004) formed a definition that demonstrated the manner in which nomadism was evolving as a concept. Nomadism, a term coined in several articles,

means the consumer (really our community of users) is basically now in charge of how, when, and to what they want to be connected. This phenomenon stems not only from a multiplicity of devices, but also from the immediacy that the internet itself has facilitated.

In the same year, Bryan Alexander (2004) in his article *Going Nomadic: Mobile Learning in Higher Education* brought the convergence of technology and expectation into a focus on who was using the device and accessing the services – “creative, communicative participants rather than as passive, reception-only consumers. We lack a term for describing the world as a writable and readable service, encompassing mobile phones forming communities, P2P handheld gaming, moblogging, and uploading to RFID chips. For now, and to retain the educational focus, I will use *m-learning*. The physical vs. the digital, the sedentary vs. the nomadic - the wireless, mobile, student-owned learning impulse cuts across our institutional sectors, silos, and expertise-propagation structures.” He posed the question of whether the traditional education environment was ready to accommodate the “digitally nomadic swarms of arriving students” thereby implying that providing such students with the flexibility they were expecting remained a work in progress.

The more recent view, now that many of the technology challenges have been accommodated through standards and protocols, is commentary on the unique features that distinguish the nomadic learner and their approach to information acquisition. They may, for example, be identified as having different interests and more immediate and goal-directed intentions than desktop Web users. Their enquiries may be context-driven, location-relevant and extremely time-constrained. They may also lack interest in accessing material that requires complex search input that carries large file sizes or involves excessive scrolling to accommodate document length, such design features remain the preserve of the desktop computer although rapid changes are taking place in this area of instructional design.

The mobile learner is also influenced by what appears in the marketplace as much as what appears in their course information. As new products reach the retail shelves they shortly afterwards appear on campus and the expectation from the purchasers of such devices is that they will be supported by the institution in which they are enrolled. If this happens, the mobile user’s dissatisfaction may not be directed at their newly-acquired device but rather at the institution that has failed to meet their changing needs. This places considerable pressure on providers of higher education, in that the standards, guidelines, protocols which have allowed them to meet operational and quality-assurance requirements may be increasingly unsuited to the immediate environment. While standards will always follow practice, if the disconnect between the two becomes too great then there is a tendency to adopt ad hoc, reactive practices that are expensive and unsustainable.

Standards on mobility and nomadicity

Not surprisingly, the earliest and most comprehensive approach to addressing issues raised by nomadic learners has been in the area of information technology. Connectivity has received focus, operating systems suited to the mobile web, interoperability, device detection, location awareness systems, device specifications,

functionality enhancements, reliability, and platform compatibility. These issues have been addressed by international bodies responsible for providing guidance.

The Internet Engineering Task Force (IETF) is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the internet architecture and the smooth operation of the internet. Its mission is to produce high quality, relevant technical and engineering documents that influence the way people design, use, and manage the internet in such a way as to make the internet work better. These documents include protocol standards, best current practices, and informational documents of various kinds.

An example of the work undertaken by the IETF is the following protocol:

Mobile IPv6 (MIPv6) is a protocol developed as a subset of Internet Protocol version 6 (IPv6) to support mobile connections. MIPv6 is an update of the IETF (Internet Engineering Task Force) Mobile IP standard (RFC 2002) designed to authenticate mobile devices (known as mobile nodes) using IPv6 addresses.

The Cross Industry Working Team (XIWT) is a multi-industry coalition refining the architecture and key technical requirements for a powerful, sustainable information infrastructure. The XIWT addressed the concepts of nomadicity in the National Information Infrastructure (NII) and related standards in the white paper "Nomadicity in the NII." The Working Team defined the basic characteristics as including location independence, device independence, motion independence, widespread access, and ease of use, all issues exacerbated in a nomadic environment.

The American National Standards Institute (ANSI) has a number of working groups, including the Information Infrastructure Standards Panel (IISP). The Panel disseminated a list of needs identified as being necessary to ensure continuous communication access between the nomadic user and the data source – IISP Nomadicity Standards Needs. These included IISP Need #86 through to Need #97 and covered hands-off mechanism, person/device location, device coordination, communications management, re-routing, unique and anonymous IDs, context management, security, dynamic service allocation, persona management, exception handling and logical network/infrastructure management.

The Australian Flexible Learning Framework, the national training system's e-learning strategy established by the Department of Education, Science and Training, published two documents in 2007 designed to assist the lack of standards and guidelines for implementation of mobile learning. The focus was on the Vocational Education and Training (VET) sector and the reports, *M-learning standards* (the Report) (Low, 2007) and *A guide to working with m-learning standards* (the Guide) (O'Connell & Smith, 2007), investigated and documented existing standards and best practices. They referred to the W3C recommendations, particularly W3C Mobile Best Practices 1.0 (November 2006) as a necessary adjunct to working the recommendations contained within the reports.

The Report recommended two basic principles of resource development for mobile devices that should facilitate creation of m-learning resources:

- Ensure resources are compatible with baseline ('default') delivery contexts, and minimise demands on memory, processor and presentation.
- Exploit the capabilities of more advanced delivery contexts to maximise quality and usability through adaptive delivery or by providing alternative versions of resources optimised for a number of delivery contexts. (Low, 2007, p. 4)

The issues of creation, delivery, interoperability and discovery of mobile learning resources was identified by the report's author, Leonard Low, as being central to the development of m-learning standards and best practices. He referred to his work of the previous year (Low & O'Connell, 2006), in which the need was stated for m-learning to follow the same principles of learning in general: "to be educationally designed on the basis of sound teaching and learning theory, developed into appropriate teaching and learning activities supporting and supported by sound theoretical basis and implemented in accordance with standards and best practices" (Low, 2007, p. 8).

The dichotomy that emerges here is that those involved in the development of resources and services intended for delivery to mobile devices are faced with (a) reconciling already well-established and recognised best practice, which, rightly, indicates that developments in the field of learning, such as e-learning or m-learning, are not radical departures from established principles, and (b) the use of tools designed for purposes other than only learning and which undergo technological changes at a consistently rapid rate.

The m-standards Report was organised into four general topics covering client platforms, mobile content development, support and delivery. An appendix listed fifty-three activities suitable for m-learning, suggested their applicability to educational scenarios and identified the platforms that would suit.

The Guide acknowledged Harry Lichstein's article (2002) in which he explained how standards follow practice not lead it:

What eventually becomes a standard typically begins as limited practice that is nurtured and then promoted. Once a practice gains traction, it is subjected to the give and take of a marketplace, and is eventually accepted by a community of users. A community grows up around a practice, and the community influences and then controls its evolution. Some form of committee process is created, within certain boundaries. ... A standard will survive and evolve over time only if it attracts adherents and offers them value.

The Guide listed a number of points by which learners, teachers and developers could judge whether the m-learning developed was good practice. These included whether it enhanced the context or authenticity of learning, whether it enabled flexible and convenient use, leveraged the power of mobile devices, supported equal access to learning, responded to the diversity of the learner group, and increased the availability of m-learning resources to the community likely to use them (O'Connell & Smith, 2007, p. 8).

The Guide proceeded to potential m-learning activities and how best to cater for each, depending on context, device, learning outcomes and user needs. These

included audio and video resources, web content and communication, portable documents, cross-platform activities and content, and networked, wireless and proximal devices. This last included the use of GPS, RFID and Quick Response (QR) codes.

The World Wide Web Consortium, W3C, has undertaken commitment to developing guidelines and best practice sets for the past several years. The Mobile Web Initiative was tasked with developing best practices for creating mobile-friendly content and applications, enabling easy access to device descriptions, setting up test suites for increased interoperability of mobile browsers, and exploring ways to use the Web on mobile devices to bridge the digital divide (W3C. Mobile Web Initiative, n.d., *The Web on the move*).

As a consequence, in 2005 the Mobile Web Best Practice (MWBP) Working Group was established, whose main objective is to enable the reach of the Web to be easily extended onto mobile devices by providing guidelines, checklists and best practice statements which are easy to comprehend and implement. These, when implemented by a Web site provider, will enable the content to be perceived by users on mobile devices, particularly small-screen devices such as PDAs, smart phones and touch-screen devices. A recent standard to emerge from the W3C is the OWL 2 Web Ontology Language – the latest version covering ontologies (formalized vocabularies of terms, often covering a specific domain and shared by a community of users), syntaxes, semantics and profiles and takes advantage of new datatypes defined in the XML Schema Definition Language (W3C, 2009). Standards are continually being updated to meet the technological, technical, functional and physical requirements of communication architectures.

The W3C Mobile Best Practices 1.0 (November 2006), mentioned above in relation to the Australian Flexible Learning Framework Report, is a W3C Web Standard that helps people design and deliver content that works well on mobile devices. It has been summarised into ten help tips:

- Design for One Web

- Rely on Web standards

- Stay away from known hazards (e.g. tables, frames)

- Be cautious of device limitations

- Optimize navigation

- Check graphics and colors

- Keep it small

- Use the network sparingly

- Help & guide user input

- Think of users on the go (W3C, Mobile Web Initiative, n.d., *Mobile Web Best Practices (MWBP) Flipcards*)

A final look at an international body involved in the development of standards relating to mobile learning leads to the ISO. The ISO/IEC JTC 1/SC 36 is the technical committee on Information Technology; working group 36 has responsibility for advising on Information Technology for learning, education and training. In addition

to concentrating on metadata, Shareable Content Object Reference Model (SCORM) and reference models, the working group currently has before it two draft standards relating to mobile learners: ISO/IEC NP TR 29140-1 ITLET - Nomadicity and mobile technologies -- Part 1: Learner reference model for nomadicity; and ISO/IEC CD TR 29140-2 ITLET - Nomadicity and mobile technologies -- Part 2: Learner information for mobile learning.

The draft standards acknowledge other bodies working in the field of mobile learning and which may have an interest in the standards under development. They acknowledge the need for learners to be able to access information as they move about and refer to this as nomadic learning. Draft Standard 29140 Part 2 addresses the need for infrastructure to be in place to ensure learners are able both to access learning materials as and when they need, and also supported in such access. The completion and publication of these two standards will, no doubt, be greeted with interest by practitioners in the field wishing for guidance.

The two standards are the first to include the term “nomadic” within their headings, despite it not being a new term by any means. Nomadicity is likely to increase in frequency of mention, as designers and developers come to understand the concept and its implications. Mobile learning still contains elements of an extension of e-learning, which has established its legitimacy within the echelons of learning during the past decade. Technical competencies and assessments are well established in this field. Nomadicity carries the implication that the user, not the technology, is central to the concept and this is less easy to quantify or qualify. It suggests multiplicity of needs, contexts, devices, technical requirements and applications, a minefield of diverse components that need structuring into a model that can be proven robust and applicable. Where institutions have committed time, money, staffing, reputation and other substantial resources to the development of a learning delivery infrastructure any concept that emerges that renders such investment to be of limited value is unlikely to receive speedy acceptance.

Barriers to adopting m-learning

The Mobile Learning 360° report (The eLearning Guild, 2008, p. 51), in which eLearning Guild members were surveyed regarding their usage of m-learning, indicated that lack of standards was considered by members to be one of the main barriers to adopting m-learning. This rated higher than limited bandwidth, cumbersome text input, unreliable connectivity or short battery life.

Amongst those organisations which had implemented m-learning and among those which had no plans to do so, obvious differences in perception of barriers emerged in several critical areas. These were “Don’t know how to integrate with LMS”, “Management will resist”, “Cost” and “Learners will resist”. (ibid.) What this shows is that m-learning implementation amongst a range of organisations that have yet to travel down the m-learning implementation path is perceived as being costly, with a lack of management buy-in (death knell for most projects) and a lack of learner interest.

Some of the member organisations which had implemented m-learning initiatives and had experienced disappointing results believed this stemmed from a

technology/learner mismatch. In other words, the learners did not perceive the mobile learning opportunities that had been created for them as meeting their needs or providing any additional benefits. Avoidance and lack of take up was the response.

Lack of support from senior management caused problems. This was illustrated in a case where management were keen to gain competitive advantage through uptake of new communication opportunities. However, the support was not forthcoming, either through funding or through informing other areas of the organisation that such a programme was of priority. Consequently, IT support was difficult to gain and the programme foundered. (ibid., p. 63)

Lack of preparedness inevitably becomes a problem in larger organisations unable, for whatever reasons, to react quickly to changing environments. A quick scan of predictions for the big impacts of 2010 (Schonfeld, 2010) reveal at least half of these to be related to mobile technologies. They offer exciting challenges, how many organisations will look back at the end of the year and congratulate themselves on having integrated at least four of these big opportunities?

Libraries and m-learning

John Traxler (2008, p. 44) defines the m-library concept as “occupies a similar and possibly overlapping territory with mobile learning; a territory where technology expertise meets academic expertise, where “know” meets “know-how””.

Libraries are well under way with investigating, developing or implementing mobile services. Examples such as the Open University (UK), University of Bath and Athabasca University demonstrate how libraries are, in fact, influencing the direction their parent institutions are taking with mobile learning. There is, perhaps, no surprise in this move; libraries have traditionally been promoters of ease of access, creators of information resource availability, engagers with communities, social networkers, developers of systems and services, connectors of tools, people, technologies and information. Libraries have long delivered services to distance learners and so the concept of learners who want access to information at any time, from anywhere and to any device does not constitute a major shift in focus or planning. It is, however, critical for libraries to understand what is happening across their campuses and to be seen to be at the forefront of mobile delivery. This means working collaboratively with other units, faculty and students using mobile devices for teaching, learning and research and engaging in projects exploring the delivery of content to such devices.

It is increasingly likely that the library will be partly, if not fully, wireless-enabled. This means that users will be approaching their learning differently and expecting a unified approach to support across the entire institution. For example, if the tutor is utilising systems that set assignments involving video capture, file transfer and assessment by handheld devices and storage on local servers, then the expectation is that other areas of the institution will be engaging in similar utilisation of data access.

It is important that libraries understand what their users want from them as regards delivery to mobile devices. This means surveying users, analysing data, developing a clear understanding of the local culture, expectations and requirements and planning how best to meet these needs. What seems to be emerging from research on the subject is that students differentiate between using their mobile devices for social needs and learning. Attempts by well-intentioned educators to blur the two have not met with the success originally anticipated and the now-common phrase “creepy tree-house” was an unexpected result.

As yet, there is no common ground being demonstrated across the library community. Some libraries are committing strongly to deploying resources to innovation in the field of mobile learning; others still display entrance signs forbidding patrons to use mobile telephones within the precincts of the library.

One of the factors that will influence the manner in which libraries approach planning for delivery of library services to mobile devices is the overall institutional mobile strategy. A knowledge of this planning is essential, involvement in is better; the library’s expertise needs to inform any decision-making across campus in regard to mobile delivery. Libraries are in a unique position with their direct, daily involvement with learners, to understand why the future of delivery will, or should, be learner, rather than IT-management, focused. This focus is what McCord (2004, p. 7) describes as the “switch from an assessment of “how well the campus supports what it has provided” to “how well the campus supports my personal technology needs.”

Traxler (2007, pp. 20-21) warns of the difficulties of implementing sustained, wide-scale mobile education at institutional level because of strategic factors at work. He advises that these social, cultural, and organisational factors must be addressed first if mobile education, however innovative, technically feasible, and pedagogically sound, is to have any chance of sustained, wide-scale institutional deployment in higher education in the foreseeable future.

Conclusion

The development of standards relating to mobile learning is still in its infancy and heavily dependent upon a comparison with e-learning. The multiplicity of devices has focused standards and best practice upon the technology aspects of mobility. The needs of the user are still very much under discussion. Libraries have engaged in delivery of services to mobile devices as keenly as other areas of their institutions, however, much of the work undertaken is in pilot or trial phase and the long-term future is uncertain. It is to be hoped that libraries will contribute actively to the development of best practice and, thereby, influence design of future standards in mobile delivery. That the focus is firmly on the future of mobile delivery and mobile learning is evidenced by the number of mobile conferences taking place around the world in 2010. From these conferences will emerge greater understanding of how best to implement mobile service delivery, where the focus should lie, how to avoid pitfalls and how best to harness the many opportunities that currently await our involvement.

References

- Al-Moqbali, A, & Al-Abri, A, 2009, *Mobile learning*. Retrieved August 14, 2009, from <http://www.slideshare.net/u067535/mobile-learning-1362962>
- Alexander, B, 2004, Sep./Oct., 'Going nomadic: Mobile learning in higher education', *EDUCAUSE Review*, vol. 39, no. 5, pp. 28–35. Retrieved, August 15, 2009, from <http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume39/GoingNomadicMobileLearninginHi/157921>
- Ally, M 2008, Nomadicity and information access: The mobile digital library for people on the move. In G. Needham & M. Ally (Eds.), *M-libraries: Libraries on the move to provide virtual access*, pp. 37-46, Facet, London.
- ANSI IISP, 1996, '*Nomadcity needs, Executive summary: IISP/96-0174*'. Retrieved August 15, 2009, from <http://publicaa.ansi.org/sites/apdl/Documents/Standards%20Activities/Information%20Infrastructure%20Standards%20Panel/Nomadcity.doc>
- Cross-Industry Working Team, n.d., '*News*'. Retrieved August, 15, 2009, from <http://www.xiwt.org/>
- Farance, F, 1996, Nomadicity standards needs -- Executive Summary. Retrieved August, 15, 2009, from <http://publicaa.ansi.org/sites/apdl/Documents/Standards%20Activities/Information%20Infrastructure%20Standards%20Panel/Nomadcity.doc>
- Geddes, SJ, 2004, *Mobile learning in the 21st century: Benefit for learners*. Retrieved August 15, 2009, from <http://knowledgetree.flexiblelearning.net.au/edition06/download/Geddes.pdf>
- Hitch, L, & McCord, A, 2004, 'Of nomadicity, expectations, campus IT infrastructure and, oh yes, budget', *EDUCAUSE Evolving Technologies Committee*.
- Internet Engineering Task Force, 2004, '*A mission statement for the IETF*'. Retrieved August, 15, 2009 from <http://www.ietf.org/rfc/rfc3935.txt>
- Kleinrock, L, 1996, 'Nomadicity: Anytime, anywhere in a disconnected world', *Mobile Networks and Applications*, vol. 1, no. 4, p. 351. Retrieved August 16, 2009, from <http://www.lk.cs.ucla.edu/LK/Bib/PS/paper203.pdf>
- Kleinrock, L, 2001, Sep., 'Breaking loose', *Communications of the ACM*, vol. 44, no. 9, p. 41. Retrieved August, 15, 2009, from <http://net.educause.edu/ir/library/pdf/DEC0404.pdf>
- Lee, I 2007, *Mobile learning: Its challenges and opportunities for culturally heterogeneous society*. Retrieved May 12, 2009, from <http://www.initiatives.refer.org/Initiatives-2005/document.php?id=232#tocto10>

Lichstein, H, 2002, February, Standards follow practice, they don't lead, *ViewPointz*. Retrieved August 21, 2009 from http://www.taskz.com/ucd_standards_indepth.php

Low, L, 2007, *M-learning standards report: Background, discussion and recommendations for usable and accessible m-learning*, p. 4, Commonwealth of Australia, Canberra.

McCord, A, 2004, Sep., 'Of Nomadicity, Expectations, Campus IT Infrastructure and, Oh Yes, Budget' *EDUCAUSE*, p. 7. Retrieved August 16, 2009, from <http://net.educause.edu/ir/library/pdf/DEC0404.pdf>

O'Connell, M, & Smith, J, 2007, *A guide to working with m-learning standards: A manual for teachers, trainers and developers*, p. 8, Commonwealth of Australia, Canberra.

O'Malley, C, Vavoula, G, Glew, JP, Taylor, J, Sharples, M, Lefrere, P, 2003, *MOBlearn. WP 4 – guidelines for learning/teaching/tutoring in a mobile environment*, p. 6. Retrieved August 14, 2009, from <http://www.mobilearn.org/download/results/guidelines.pdf>

Schonfeld, E, 2010, *Ten technologies that will rock 2010*. Retrieved January 16, 2010, from <http://www.techcrunch.com/2010/01/01/ten-technologies-2010/>

SearchMobileComputing.com, n.d., 'Mobile IPv6'. Retrieved August, 15, 2009, from http://searchmobilecomputing.techtarget.com/sDefinition/0,,sid40_gci847445,00.html

Sharples, M, Taylor, J, & Vavoula, G, 2005, *Towards a theory of mobile learning*, p. 2. Retrieved August 14, 2009, from <http://www.mlearn.org.za/CD/papers/Sharples-%20Theory%20of%20Mobile.pdf>

Smith, J, & O'Connell, M, 2007, *A guide to working with m-learning standards: A manual for teachers, trainers and developers*, p. 3, Commonwealth of Australia, Canberra.

The eLearning Guild, 2008, *Mobile learning: What it is, why it matters, and how to incorporate it into your learning strategy*, p. 51, The Guild, Santa Rosa, CA.

Traxler, J, 2007, *Current state of mobile learning*. pp. 20-21. Retrieved August 19, 2009, from http://www.aupress.ca/books/120155/ebook/01_Mohamed_Ally_2009-Article1.pdf

Traxler, J, 2008, Use of mobile technology for mobile learning and mobile libraries in a mobile society, p. 44, In G. Needham and M. Ally (Eds.). *M-libraries: Libraries on the move to provide virtual access*, Facet, London.

W3C, 2009, *OWL 2 Web Ontology Language Document Overview*. Retrieved January 15, 2010, from <http://www.w3.org/TR/owl2-overview/>

W3C. Mobile Web Best Practice (MWBP) Working Group, n.d., *Charter*. Retrieved August 22, 2009, from <http://www.w3.org/2005/01/BPWGCharter/Overview.html>

W3C, Mobile Web Initiative, n.d., *Mobile Web Best Practices (MWBP) Flipcards*. Retrieved August 22, 2009, from http://www.w3.org/2007/02/mwbp_flip_cards.html#stay_away_from_known_hazards

W3C. Mobile Web Initiative, n.d., *The Web on the move*. Retrieved August 22, 2009, from <http://www.w3.org/Mobile/>