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Personalized Profiling and Self-Organization as strategies for the formation and support of open m-learning communities.

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Abstract

Mobile and wireless technologies are globally aware therefore so to do institutions have to think globally. By this is meant not simply making learning objects available to international students, but inventing ways to engage students from any geographical location with these objects in such a way that the outcome is knowledge.

This paper explores the applicability of personalized profiling as a means to link students studying similar disciplines to each other, and proposes a self-organizing 'living systems' model that aims to overcome present impediments to the creation of sustainable, 'open', m-learning communities.

'Open' m-learning communities are characterized by their ability to self organize and adapt to changing circumstances. Their conceptual framework is systems theoretical, which draws on understandings about the natural world from the biological and physical sciences. Concepts such as "open structure", "self organization" and "living systems", have currency in the discourses of information and computing sciences (i.e., the research fields of artificial life and artificial intelligence). In the biological scientific view, the sole purpose of a living organism is to renew itself by opening itself up to its environment, or to another structure. In natural scientific terms, an organism that is in equilibrium is a dead organism. Living organisms continually maintain themselves in a state far from equilibrium, which is the state of life.

The transfer of understandings about the operations of living systems is evident in the approaches of computer game designers and programmers, where "swarming" and other empathetic behaviours of organisms such as bees, fireflies and even stem cells, provide the basis for the design of software to support massively multi-user on-line gaming. This new knowledge may have applicability in new approaches to m-learning, for example, through learner self-profiling and the automated matching of learner profiles to other learners and learning opportunities. The first step in this process is that of understanding how the specificities of emerging mobile and wireless technologies might facilitate open m_learning and the formation of m-learning communities.

Key Words: m-learning, personalized profiling, self-organizing systems, mobile learning communities

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Introduction:

The mission of 'open' universities - to be open to everyone whatever their background, and to provide flexible learning choices to meet life and study needs – means that that the conditions within which they operate are neither fixed nor stable. In this sense, Open Universities are like living organisms. According to the theory of living systems (Capra, 1997) the sole purpose of an organism is to renew itself by opening itself up to its environment or another structure. [1] In an environment dominated by the forces of technological and structural change, organisms that survive are those capable of co-evolution. Thus universities must not only adapt to the new conditions wrought by wireless and mobile technologies, and their application to production, dissemination and consumption, but also co-evolve.

Specificities of the Mobile Mode

By focusing on the specificities of the mobile mode - technological, structural and systemic - universities can 'open' themselves to the m-learning environment, and evolve as part of its ecology. Such features as lower unit cost, miniaturization, wearability, 'always on' status, increased data storage capacity, programmability, and multi-media-capability in cell phones have grown a critical mass of student-users who no longer need to physically access CPUs. This signals a transition in the dominant communication mode from 'e-' (electronic) to 'm-'(mobile).

Whilst the growth in cell phone uptake, and the phenomenon of 'always on' are attributable to economic structural and systemic change (from mono to multifaceted marketing. [2], and from time-based to data-download rating system) the 'invisible engines' driving innovation and industry transformation are software platforms (Evans et al, 2006). Application Programming

Interfaces (APIs) in combination with evolving markup language forms, e.g., WML (wireless) and XML (extensible) which deliver information to wireless devices (Gralla, 2005), and DIAL (Device Independent Authoring Language) for authoring mobile content software that will work on different hand-held devices (of which there are more than 2,500) (Boulton, 2006) have brought web-browsing capabilities to miniature hand-held displays. Arguably, software platforms have effectively made cell phones the interface between individuals and their 'worlds'.

An economy of multi-literacies:

New demands for speaking, reading, and writing new media texts which use multiple information modes 'on the fly' in meaningful ways, requires us to be multi-literate. The evolution of low-end, mobile multimedia production, reproduction, and dissemination technologies and systems has made Internet TV a reality (c.f. Current TV[3.] and YouTube). Emergent mobile cultural and social behaviors, codes, and conventions with origins in gaming and diary genres, coupled with multifaceted marketing, have evolved around VC2 (viewer created content). Current TV's VC2 encompasses consumer-provided news, movies and advertisements – now derived from 'on the fly' recording and sharing of experiences and symbolic expressions in the form of cell-flicks (mobile phone video productions).

The education system is founded upon this innate (human) need to make sense of and record our responses to the world through symbolic expression (as culture), and have our creations affirmed in society. Structural adaptation to the mobile mode is evident in lecture theatres and classrooms, where interactions between teacher and learner, and among learners is increasingly mediated by a spectrum of miniaturizing, wirelessly operated hardware, from cell phones and PDAs to laptops and Smartboards™.

Our participation in technologically-mediated, multi-modal learning and communication requires the development of multi-literacies (The New London Group, 1996). A compulsory course in Griffith's undergraduate teacher-education program (Multiliteracies in Education) that we have co-developed, with the contributions of peers and students, addresses this need by engaging students in deconstructing, reconstructing, and transforming meaning in multimodal, multimedia infotainment and edutainment texts. The emphasis is on recognizing what and how learning takes place as children and adolescents engage with these media, and on the students' own learning. Students use e-portfolios to provide evidence of learning in this practical and creative course.

Building Mobile Open Learning Communities

Early Internet community authority, Howard Rheingold (Whole Earth 'Lectronic Link) and others have argued that assumptions that 'community' will automatically form on the basis of embedded broadband services and advantageous telecom partnerships are misguided (Rheingold, 1996; Riva, Davide, & Ijsselsteijn, 2003). Ubiquitous computing and the quick up-take of technological advances such as the 802.11b standard (also known as WiFi) made obsolete the notion of the 'wired community'. The freely available radio spectrum can now be used to network neighborhoods, small businesses, organizations and institutions, even whole towns, through co-operation and a willingness to share resources (Flickenger, 2003). In the era of wireless mobile computing and connectivity, it is possible for learning-communities to transcend not only cultural and geographical boundaries, but also institutional boundaries. For example, m-learning communities could comprise 'roaming' students capable of self-organizing into 'swarms' around learning opportunities. Students would engage with each other in self-directed discussion, exchange information or points of view, or work together on formal assessments.

Mobile technology and instant messaging provide conduits for students engaging with their worlds and the worlds of others around them (Sharples, 2005). Thus we need to consider how best to support learning (as it evolves through social networking) that may be not only trans-institutional, but also transient. We can anticipate a future where students may 'bank' units or modules with a variety of learning service providers, possibly worldwide, toward an accredited qualification or program.

These aspirations, however, must be tempered by the fact that the extent of user agency is a significant factor in enlisting acceptance of a new tool, system, or environment. A commitment to 'designing with' (rather than 'designing for') could be supported with the introduction of strategies derived from community development and its close relative, community cultural development - fields characterized by a focus on social good, commitment to human rights, and community cohesion. A multi-disciplinary pedagogy that is values and problem-based, would be required to address inhibitions to community formation arising from power differentials.

The significance of digital convergence and computer networking for education was quickly recognized, with The National Institute of Multimedia Research (NIME) established in Japan in 1978 to support educational reform in higher education institutions, and the sharing educational resources worldwide. A collaborative e-learning network is in place, with federated searching enabling information retrieval via NIME and ARIADNE, the European learning gateway (Oblinger, 2006). Japan and Europe are partnered with Australia (education.au), Canada (LORNET) and the United States (MERLOT) to form the GLOBE (Global Learning Objects Brokered Exchange) portal that provides searching across all five repositories (GLOBE, 2006). Software platforms facilitating interoperability and digital rights management (DRM) have encouraged data-banking of intellectual output in the form of learning object repositories. Work is

currently underway on the development of national standards in primary, secondary and further education in Australia, and in the tertiary sector the contribution of a unit of learning to an accrediting institution's graduate profile is now identified and published. However how education providers might productively and profitably connect m-learners to shared or open source databases for accredited programs remains a challenge.

A move toward meeting this challenge could be taken through an approach that is systemically aware of, and capable of 'structural coupling' in order for open learning to evolve as part of the mobile ecology. Entrepreneurs adopting this approach have created and grown new industries based on their recognition and co-option of how the mobile mode as effectively turned always-on cell-phone users into listening and tracking devices (Pesce & Fraser, 2005) that already self-generate consumption and activity profiles, and identify 'friends' (Nokia, 2005). Such 'coupling' has yet to be exploited by 'knowledge' industry entrepreneurs.

Personalised Profiling:

In the past 5 years support has grown for student-managed learning profiling through the introduction of electronic portfiolios (ePortfolios). In Griffith University's Education and Arts Faculties, students are required to collect, store and share their learning materials and resources for evaluation and report back, and for later reference as they progress through their studies or in their early careers. These institutional portfolios are organized in terms of graduate attributes desired by the profession, and are subsequently used to secure employment. Similar demands have now been placed on academics to provide web-based 'evidence' portfolios covering teaching, research and service activities to serve the dual purposes of promotion and government operational funding.

M-learning Profile > Object

Affordances and barriers currently exist to m-learning design. The capacity for personalization or customization of content presentation and delivery that has long been associated with website design can support learner-managed profiling. Users choose their style or interest area using individual design attributes through the use of tags, and website content is timely, delivered via email or SMS when created or updated. [In limited learning environments so far - largely just-in-time learning in large corporations - this concept, also known as the IBM-coined term of profiled notification (von Koschembahr & Sagrott, 2005), alerts employees of new downloadable learning materials via cross-referenced data in their human resource (HR) profile.] Furthermore, it is possible now for content to be matched to pre-determined learning profiles, as learning objects are already tagged with metadata for categorization and searching within university digital repositories.

To facilitate the sharing of student-provided content, consideration would need to be given to the provision of spaces within existing, or alternative, digital repositories for tagged learning materials. As well, barriers such as the gatekeeper against shared access to learning objects by a particular institution's learning management system (LMS) would need to be removed, and associated security issues resolved. Blackboard™ (an increasingly preferred LMS in the global market, including K-12 and further education) currently has a limitation whereby students are unable to upload to its content management system. Open source LMS, Sakai, however, has an enabling feature for publishing and searching through user profiles that are made for public access.

A model for m-learning designed with profile matching and learner created content as its basis would anticipate that as learners begin to access multiple repositories, form learning

communities, become more independent, more globally-aware and more savvy network navigators, their profiles take on more importance and functionality. Thus it would be necessary to think beyond personal preferences and rules for customized content or RSS subscriptions. Using a principle behind context-aware ('listening') systems, which underpinned an innovative just-in-time information provision via cell phone for museum visitors (Kusunoki et al, 2002) the interface would follow the user not the other way around. The m-learner's evolving profile would follow the user, morphing dynamically.

In the model we are proposing (see Figure 1 below), the profile becomes an entity in itself, a dynamic network package that continually grows, expands, catalogues and tracks a student's journey or learning trail (Walker, 2006) as they acquire, construct, deconstruct and reconstruct knowledge and experience. Metadata on a student's interaction, participation, task and activity completion, and information sources visited or referenced, is written to their profile. The source, text, image or sound files developed as a result of the learning interaction are stored on the member's preferred server, as server space is now as inexpensive as $US7.95 per month (Dreamhost, 2006). A student's learning object itself can then be viewed via a web browser or similar viewer applications for smaller mobile devices. A student's chosen pathway through knowledge is tracked and cross-referenced and intertwines with the pathways of other learners. At these junctures, opportunities for learning interactions alert the learning community of new activity, which in turn mobilizes those interested members to swarm.

Soon the profile swells to become a learning passport, able to be checked against the requirements for completion of courses at any institution; as prerequisites to enrolment at further institutions or other learning communities. For the community, the morphed profile takes on its most precious of roles yet as an open learning object.

Conclusion: A 'Living Systems' Model

Rather than treat technology in fixed and abstract terms, as a tool or thing to be 'embedded' in the human life-world, it may be more productive to view technology from a systems perspective, as set of ideas circulating via feedback loops, according to a *Living Systems* model of social organization (Nalder, 2002). A living system is a complex, multiply-interconnected network whose components are constantly changing, being transformed and replaced by other components. "*Complexity theory* provides insights into the behavior and emergent properties of social systems" supporting "the familiar patterns of interaction and collective organization that characterize the voluntary and community sectors" (Gilchrist, 2000:264-75).

Education institutions open to structural and environmental change which is re-organizing human-technology-world relations in mobile mode share several attributes for survival with living organisms. A 'living systems' operational model, such as that evident in the games industry - where 'swarming' and other empathetic behaviors of organisms such as bees, fireflies and even stem cells, provide the basis for the design of software to support massively multi-user on-line gaming, and an economy based on freely distributed software supporting consumer created content – would seem an appropriate one to adopt for our purposes.

A globalizing knowledge economy calls for pedagogical and learning support innovations that draw from and contribute to the mobile ecology. Innovation that ensures renewal relies on distributed creativity and networking to maintain feedback loops. Customized APIs are key 'engines' of the mobile ecology within which both teachers and learners are now embedded. These 'invisible engines' can bring both together 'on-the-fly' to form self-organising m-learning

communities, by matching learner self-profiles and learning opportunities, irrespective of geographical location. A framework exists to support a global accreditation ‘passport’ approach to open university qualifications for m-learners, using the theoretical framework and learning>object model described here.

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Footnotes

[1] . Physicist, Fritjof Capra (1997:177) (who has attempted to synthesise recent scientific breakthroughs such as the theory of complexity, Gaia, chaos and other explanations of the properties of organisms, social systems and ecosystems) explains: "… an organism in equilibrium is a dead organism. Living organisms continually maintain themselves in a state far from equilibrium, which is the state of life ... as we move away from equilibrium we move from the universal to the unique, towards richness, and variety. This, of course, is a well-known characteristic of life."

[2] Internet economics expert, David Evans, explains how multifaceted marketing evolves, beginning with the familiar one-sided marketing strategy "give away the razor and sell the blades" evident in the pricing approaches of businesses such as TiVo, who embedded an "invisible engine" in their digital video recorder. The recorder was priced low to grow an initial market of revenue paying subscribers who wished to record television shows but skip the commercials. These customers were then used to attract two other sides, one using the strategy of providing tools and offering prizes for the best applications in several categories, including games, music, and photos", and the other providing an opportunity for advertisers to "provide creative services to users. Viewers can select advertisements they are interested in and can download infomercials and other more detailed product information that they can't get in a 30-second spot." (Evans et al, 2006, p339)

[3]Current TV is a VC2 (Viewer Created Content) channel that has evolved through an understanding of the specificities of both APIs (Application Programming Interfaces) and multifaceted marketing. Current TV's attraction is that their content is flowing in both directions, as users are able to upload newsworthy and entertaining video-clips as well as create prize-winning advertisements for the channel's advertisers.

Figure Captions

Figure 1. Learning profile<->object.