Using Mobile Web 2.0 to Transform Pedagogy and Engage Learners

Author

Thomas Cochrane, Unitec New Zealand

In this publication, Thomas Cochrane describes how integrating Mobile Web 2.0 technology into learning environments can enhance learner engagement. Using a community of practice approach to explore the potential of technology to enhance tertiary education, mobile learning trials were established within design, music and landscape courses at Unitec. Both teachers and learners describe the benefits of integrating this technology into their courses.

Introduction

Blogs, wikis, podcasting, and a host of free, easy to use Web 2.0 social software provide opportunities for creating social constructivist learning environments focusing on student-centred learning and end-user content creation and sharing. Constructivism and social constructivism are usually seen in comparison to the more instructivist, content-driven pedagogies traditionally implemented in tertiary education. Herrington (A. Herrington & Herrington, 2007) argues that "the advances in philosophical and practical developments in education have created justifiable conditions for the pedagogical use of mobile technologies" based on newer learning theories that find their roots in social constructivism such as: authentic learning, communities of practice, distributed intelligence, distributed cognition, connectivism, and activity theory. Social constructivism focuses upon students being involved in learning environments as an explorative and social process. This is in contrast to the instructivist pedagogies that have dominated tertiary education in the past that focus upon the teacher/lecturer as the expert holder of knowledge from whom students learn directly. In general, education based on social constructivist pedagogies is interested in enabling students to develop creative, critical thinking, and collaborative skills, rather than focusing on course content.

Building on this foundation, mobile Web 2.0 has emerged as a viable teaching and learning environment, particularly with the advent of the iPhone (Nicknamed "the Jesus phone") and iPod Touch. Today's WiFi enabled smartphones provide a ubiquitous connection to mobile Web 2.0 social software and the ability to view, create, edit and upload user generated Web 2.0 content.

This video outlines the potential of Wireless Mobile Devices (WMDs) and Web 2.0 (social software) to create social constructivist learning environments that bridge multiple learning contexts. The video clips were captured using the various smartphones used in the projects by the participants, thus providing examples of authentic participant feedback and usage of the mobile Web 2.0 tools.

Background

Following on from the successful establishment of an intentional Communities of Practice (COP) model for teaching staff investigating the potential of educational technology to enhance tertiary education (during 2006), mobile learning trials were established within the Bachelor of Product Design (2006 to 2009), Diploma of Contemporary Music (2008 to 2009), and Diploma of Landscape Design (2006 to 2009) to explore the potential benefits of mLearning for their students and staff. The success of establishing a COP for professional development during 2006 became the foundation for a new approach to professional development used by the eLearning support team at Unitec (Cochrane & Kligyte, 2007a, 2007b), and also morphed into an intentional Community of Practice model that was used to underpin and provide pedagogical and technological support for the mLearning projects (Cochrane, 2007). This model is used for lecturer development prior to implementing mLearning projects with their students. The COP model is also used to form the core pedagogical and technological support mechanism for each mlearning project implementation, forming collaborative projects involving the researcher, the course lecturers, and the course students as COP participants. The weekly COP sessions are used to generate discussion and feedback on the progress of each project. This feedback then helps direct the focus of each COP session, enabling technical and pedagogic issues to be identified and mitigated, as well as providing a forum for participants to share their new discoveries.

The initial proof-of-concept trials have lead to the integration of the mlearning project model into the newly developed institutional elearning strategy. The trials played an important role in exploring the skills and confidence of academic staff in utilizing the technology before full implementation within their courses. The research follows a journey of discovery for the key participants (including the researcher and the lecturers involved), that has been recorded in over thirty research outputs during the past four years. Projects began in 2006 with groups of 8 to 20 students, whereas in 2009 we have purchased 250 smartphones and 200 netbooks, and will double this number in 2010. Integration into the eLearning strategy means that every lecturer and student at Unitec will have access to a personal WMD, integrated with some form of Web 2.0 social software by the end of 2012.

During 2008, participating students and lecturers were provided with a 3G smartphone and a 1GB/month mobile broadband account (Students were responsible for paying for voice calls and txt messages, while the 1GB data plan costs were reimbursed by the project) for the duration of the projects (2008). Internet connectivity was also available via the Unitec WiFi network while on campus. In 2009 project participants were supplied with a smartphone (Nokia Xpressmusic 5800, Nokia N95, Nokia N97, or iPhone 3G), and/or a Dell Mini9 3G capable netbook. However a user-pays model was used for 3G data costs in 2009, to establish a sustainable model for mlearning integration into Unitec's overall elearning strategy.

Defining mLearning

Mobile learning, as defined in this research, involves the use of wireless enabled mobile digital devices WMDs within and between pedagogically designed learning environments or contexts. mlearning can support and enhance both the face-to-face and off campus teaching and learning contexts by using the mobile wireless devices as a means to leverage the potential of Web 2.0 tools. The WMD wireless connectivity and data gathering abilities (e.g. photoblogging, video recording, voice recording, and text input) allow for bridging the on and off campus learning contexts – facilitating "real world learning". It is the potential for mobile learning to bridge pedagogically designed learning contexts, facilitate learner generated contexts, and content (both personal and collaborative), while providing personalisation and ubiquitous social connectedness, that sets it apart from more traditional learning environments. From an activity theory perspective, WMDs are the tools that mediate a wide range of learning activities and

Supported through the Good Practice Publication Grant scheme 2008. Published as part of the Good Practice Publication Grant e-Book: www.akoaotearoa.ac.nz/gppg-ebook

Page 2 of 11

facilitate collaborative learning environments (Uden, 2007). However, the use of WMDs as part of the teaching and learning environment requires changes in pedagogy and integration into the teaching and learning processes.

Pedagogical Design

The educational contexts included: the Diploma of Landscape Design, Bachelor of Product Design, Diploma of Contemporary Music, Bachelor of Architecture, and Bachelor of Performing Arts. An explicit social constructivist pedagogy underpins each project. This research project is interested in appropriating the benefits of Web 2.0 and pedagogy 2.0 anywhere anytime using mobile Web 2.0 and WMDs, in particular WiFi (wireless ethernet) and 3G (third generation mobile 'broadband') enabled smartphones, and 3G enabled netbooks. The core activity of the on-going project is the creation and maintenance of a reflective Blog/ePortfolio as part of a course group project. Additionally, a variety of mobile friendly Web 2.0 tools are used in conjunction with the smartphone (See Table 1 below).

The projects investigate how the smartphone can be used to enhance almost any aspect of the course. The project uses the smartphone within a wide range of activities. The following diagram illustrates the alignment of these activities with the projects underlying social constructivist pedagogy. There is an interactive online version available at http://ltxserver.unitec.ac.nz/~thom/mobileweb2concept2.htm :
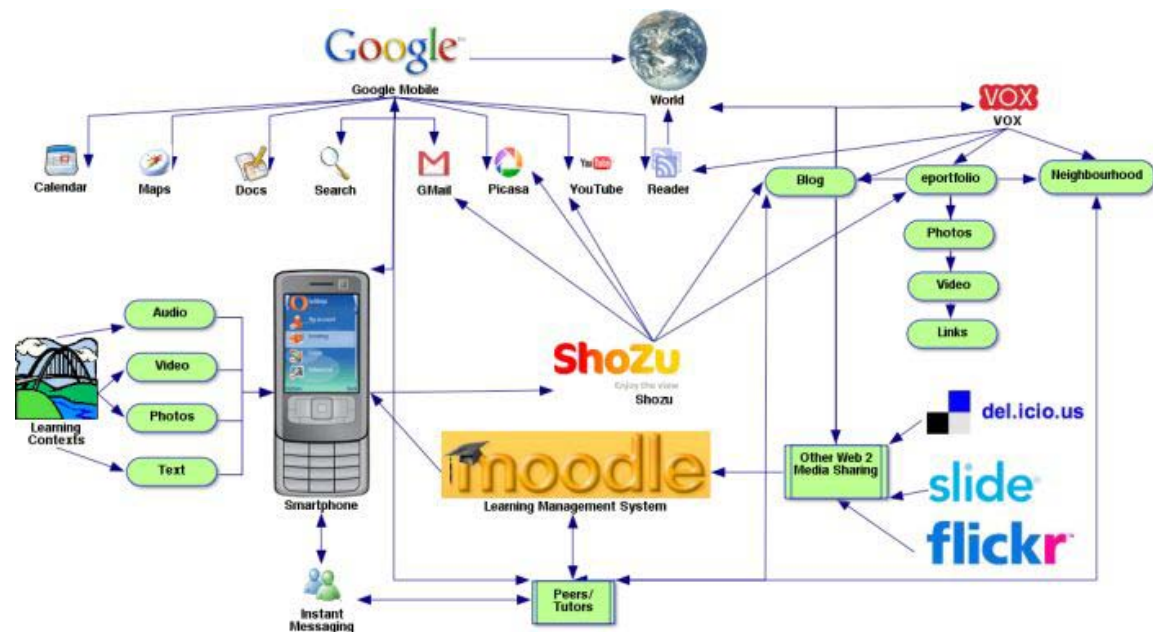

Figure 1. Mobile Web 2.0 Concept Map.

The concept map illustrates the smartphone's wireless connectivity and data gathering abilities (e.g. photoblogging, video recording, voice recording, and text input) bridging the on and off campus learning contexts – facilitating "real world learning". Shozu (http://www.shozu.com) is a mobile-friendly Web 2.0 service that provides forwarding of uploaded media to a wide range of Web 2.0 sites, forming a simple intermediary between a mobile device and Web 2.0.

Table 1: Affordances of smartphones mapped to social constructivist activities for 2009.

Activity	Overview	Examples	Pedagogy
Video Streaming	Record and share live events	Flixwagon, Qik http://www.qik.com	Real-time event, data and resource capturing and collaboration.
Geo tagging	Geo-tag original photos, geolocate events on Google Maps	Flickr, Twitter, Google Maps http://tinyurl.com/5a85yh	Enable rich data sharing.
Micro-blogging	Post short updates and collaborate using micro-blogging services	Twitter http://tinyurl.com/2j5sz3	Asynchronous communication, collaboration and support.
Txt notifications	Course notices and support	Txttools plugin for Moodle and Blackboard txt and twitter polls: http://www.polleverywhere.com http://twitter.polldaddy.com http://twtpoll.com	Scaffolding, learning and administrative support
Direct image and video blogging	Capture and upload images and video of ideas and events	Flickr, YouTube, Vox	Student journals, ePortfolios, presentations, peer and lecturer critique.
Mobile Codes	2D Codes scanned by cameraphone to reveal URL, text etc…	QR Codes, Datamatrix 2D Codes http://tinyurl.com/af2u6d	Situated Learning – providing context linking
Enhanced Student PODCasts	Remote recording of audio, tagged with GPS and images etc…	AudioBoo	Situated and collaborative Learning – providing context linking
Social Networking	Collaborate in groups using social networking tools	Vox groups, Ning, peer and lecturer comments on Blog and media posts http://tinyurl.com/4uz6rj	Formative peer and lecturer feedback

The learning outcomes for students are

- Developing critical reflective skills
- Facilitating group communication
- Developing an online eportfolio
- Developing a potentially world-wide peer support and critique network
- Learning how to maximise technology to enhance the learning environment across multiple contexts

mLearning Integration

The various mLearning projects undertaken have illustrated that pedagogical integration of mLearning into a course/curriculum requires a paradigm shift on behalf of the lecturers involved, and this takes significant time. Hameed (2009) describes this process as a "cultural re-alignment". Many of the identified mLearning scenarios were serendipitous rather than planned by the lecturers. Students also require significant time to gain the skills required to maximise the potential of new and emerging Web 2.0 tools – as our pre-trial surveys indicated, few students were already using these tools for their own content creation before the trial. Immersing students within a social constructivist pedagogical environment can be a new and challenging experience for the students, therefore implementation requires planned staging and scaffolding to support student learning (Cochrane, 2010). Based upon these experiences, in order to achieve an explicit move to a social constructivist learning environment using mobile Web 2.0 tools during 2009, a staged, and scaffolded approach has been adopted (Tables 2 and 3 below). This staged approach allows the bridging of the PAH (Pedagogy, Andragogy, Heutagogy) continuum (Luckin, et al., 2008), and the embedding of mobile Web 2.0 affordances that support each stage. Additionally, as the life-span of mobile computing is generally shorter than that of desktop computing, a staged roll-out of WMD computing for students involved in three year long courses could be achieved to minimise the redundancy of the student-owned WMDs. Academic staff development is critical in facilitating the pedagogical focus of this roll-out.

Table 2: Example mLearning roll-out timeframe

Deliverable	Timeframe	Outcome
Establish weekly COP with lecturers and technology steward. Establish support requirements (with IT Services and Telco)	Semester 1	Staff develop competency with mLearning. Staff develop pedagogical mlearning activities based on social constructivist pedagogies
mLearning projects with staff and students. Implementation of the mLearning activities within each course and assessment.	Semester 2	Increased student engagement. Flexible delivery. Facilitating social constructivist pedagogies and bridging learning contexts.
Staff publish and present case studies based on project implementation	End of Semester 2 and beginning of Semester 3	Conference, Journal publications and symposia presentations

A staged integration of mLearning (mobile Web 2.0) across the three years of a programme could be structured as follows in table 3:

Table 3: Scaffolding the roll-out of mobile Web 2.0 throughout various course levels.

Stage	Web 2.0 Tools	mLearning Tools	Student course related costs	Course Timeframe	PAH alignment
Level 1	Social Collaboration with peers and lecturer. Student generated content.	Use of student-owned netbook or mid-range smartphone, LMS and basic Web2.0 sites	Netbook $700 Internet paid access $250	1 year Certificate programmes, or first year of longer programmes	Pedagogy
Level 2	Social collaboration with peers and 'authentic environments'. Context Aware	Student-owned laptop and/or mid-range smartphone	Laptop cost $750 ($1500 spread over 2 years) And/or smartphone $750 Internet paid access $250	Second year of two year or longer programmes	From Pedagogy to Andragogy
Level 3	Context independent. Student generated contexts.	Student-owned laptop and/or high-end smartphone	Laptop cost $750 ($1500 spread over 2 years) And/or smartphone $750 Internet paid access $250	Third year of programme	From Andragogy to Heutagogy

Based on the experiences gathered from fifteen mobile learning trials over the last three years the researcher has short-listed several pedagogical critical success factors:

1. The level of pedagogical integration of the technology into the course criteria and assessment.
2. The level of lecturer modelling of the pedagogical use of the tools.
3. The use of regular formative feedback from both lecturers and student peers.
4. Appropriate choice of mobile devices and software.
5. Technological and pedagogical support.

Therefore the integration of the mobile Web 2.0 technologies into lecturers' daily workflow and integration into course activities and assessment are critical success factors, as is the establishment of a collaborative learning environment. An intentional Community of Practice model (Langelier, 2005) has been found to be effective for guiding and supporting the mLearning roll-out. This comprises weekly "technology sessions" (Community of Practice) with small groups of lecturers facilitated by an appropriate 'technology steward' (Wenger, White, Smith, & spa, 2005). Taking ideas from Herrington's

mlearning implementation plan (J. Herrington, Herrington, Mantei, Olney, & Ferry, 2009), lecturers participanting of the mlearning COP are required to committ to the following:

Lecturer requirements for an mLearning roll-out:

1. Participation in a weekly Community of Practice.
2. Personalised integration of mobile Web 2.0 technologies.
3. Development of mlearning activities based on social constructivist pedagogy for students.
4. Implement a semester-long mLearning project with students.
5. Publish a research output based on the project.

Example Project Outlines

The following tables provide examples of the mobile Web 2.0 trials conducted between 2007 and 2009. Each trial uses a Learning Management System (LMS) to provide scaffolding and support for both tutors and students (either Blackboard or Moodle). Each project also uses a different wireless mobile device, appropriate to the requirements of the course, and each project has a specific timeline that has been negotiated between the course tutors and the researcher.

Table 4: Outline of Diploma of Landscape Design 2007 mobile Web 2.0 trial.

Course: Diploma Landscape Design 2007, elective project	
Participants	8 students (three teams) –The average age of the students is 28 (19 to 49), and the gender mix was 5 female students and 3 male students. 1 Course Tutor Technology Steward (Thom Cochrane – CTLI)
Mobile Technology	Nokia N80 WiFi and 3G smartphone, prepay voice and data SIM provided, participants responsible for voice and data costs.
Pedagogical Focus	Design and build a group exhibition garden for the Ellerslie Flower Show
Community of Practice	Focused on beginning and middle of the project, with 4 sessions at the beginning of the trial and 4 sessions mid trial with the introduction of the N80.
Support LMS	Moodle
Deliverables	A reflective blog of the design and build process. (Initially Wordpress, then moved to Vox in July 2007) A portfolio (either electronic using VOX or print-based).
Timeframe	March 2007 to November 2007, with N80 mobile introduced in July 2007

Supported through the Good Practice Publication Grant scheme 2008. Published as part of the Good Practice Publication Grant e-Book: www.akoaotearoa.ac.nz/gppg-ebook

Page 7 of 11

Table 5: Outline of Bachelor of Product Design 2008, third year class, mobile Web 2.0 trial.

Course: Bachelor of Product Design, third year class, 2008	
Participants	9 students – The average age of the students is 24 (19 to 33), and all male students. 2 Course Tutors Technology Steward (Thom Cochrane – CTLI)
Mobile Technology	Nokia N80 WiFi smartphone (upgraded to N95 in Semester2), Bluetooth folding keyboard, participants supplied with a 1GB/month 3G data allowance.
Pedagogical Focus	Documenting the research and design of three products throughout the year, including working with a client company in small design teams
Community of Practice	Weekly throughout he entire course
Support LMS	Moodle
Deliverables	An online Blog/ePortfolio documenting and showcasing your design processes and forming the basis of a collaborative hub with worldwide peers and potential employers/clients.
Timeframe	February 2008 through to November 2008, expanding to the entire course 2009.

Table 6: Outline of Bachelor of Architecture Second Year mobile project.

Course: Bachelor of Architecture, Year Two, 2009	
Participants	115 students 6 Course Lecturers Technology Steward (Thom Cochrane – CTLI)
Mobile Technology	Dell Mini9 3G netbook, plus Nokia XpressMusic 5800 WiFi smartphone (or similar), participants responsible for 3G data, voice and txt costs.
Pedagogical Focus	Focus is on Design Studio course for 2009. Students create and share their architectural designs using photoshop and archicad creating real and virtual presentations for 'crits'. E.g. http://www.idsketching.com. Investigation of location services (geotagging) and mobile code use in Architecture.
Community of Practice	Weekly throughout he entire course
Support LMS	Moodle
Deliverables	An assessed online Blog/ePortfolio documenting and showcasing students' design processes and forming the basis of a collaborative hub with worldwide peers and potential employers/clients. And the weekly use of instant messaging, microblogging, QR Codes, and VODCasts for communication and collaboration.
Timeframe	March 2009 through to July 2009 with Lecturers. Student projects begin Semester 2 2009.

Supported through the Good Practice Publication Grant scheme 2008. Published as part of the Good Practice Publication Grant e-Book: www.akoaotearoa.ac.nz/gppg-ebook

Page 8 of 11

Example mLearning project feedback:

> It isn't 'easy' working in this way but it is immensely valuable and exciting. I think it would be very hard go back to traditional teaching only methods now that I have begun to use blogging and mobile blogging. (third year Bachelor Product Design lecturer).

> I really really enjoyed the process, it was great. The things I liked were being able to be completely mobile, and having access to the Internet – you know, if I was lost or if I needed to find someone, or I needed to ring a business. I could go on the Internet, Google their website, look up their opening hours, things like that... (Bachelor Product Design student)

Overview of Video

- Introduction to the mobile Web 2.0 tools
- Lecturer outcome goal examples prior to mLearning COP (Landscape Design and Product Design courses)
- Post COP: Examples of change in Lecturer confidence with technology and the beginnings of integration of the technology into their curriculums
- Examples of mLearning projects 2008 (Bachelor of Product Design)
- mLearning scenarios
    - Scenario1: An ESOL student found using the smartphone to record reflective VODCasts and upload these to their blog allowed them to communicate their project ideas to their lecturer and peers more effectively.
    - Scenario 2: Students used the mobile Web 2.0 technologies to blog their assignment posts from virtually any context. As an example, four of the students decided to go on a mid-term 'research' trip to the snowfields of Queenstown, officially to test their prototype snow-kite harness designs. However, two of these students were scheduled to present their NPC research to the class that week. These students therefore recorded their NPC class presentations on their N95 smartphones, and uploaded the virtual presentations to their Vox blogs for the rest of the class and the course tutor to view and comment on their presentations, in almost realtime. To 'prove' they were in Queenstown they also blogged mobile videos of their campervan and Queenstown scenery.
    - Scenario 3: A student decided to use mobile QRCodes to creatively annotate their design presentations. Instead of text annotations, 2D mobile codes are created and attached to the design drawings. Viewers then use the built-in camera of a smartphone and the QRCode software to decode and view the encrypted annotations, which can include: text, URLs, geolocation data, business cards etc… Thus an engaging interactive experience is created.
- Student feedback
- Lecturer feedback
- Example mLearning Project Feedback 2009
- Diploma of Contemporary Music
- Bachelor of Product Design
- Summary

Conclusions

Today's learners exist in a digital age. This implies access to, and use of, a range of Social Web tools and software that provide gateways to a multiplicity of interactive resources for information, entertainment and, not least, communication. (JISC, 2009)

Over the last three years, the researchers working on the integration of mobile Web 2.0 technologies into selected Unitec courses and programmes have found the projects to be very successful. As our video overview of the case studies show the student and lecturer experience within the programmes have been enhanced through the facilitation of a social constructivist environment that bridges multiple contexts and significant changes in pedagogical approach and levels of student engagement have been realised.

Our key findings show:

- Successful implementation of mobile Web 2.0 projects require careful, planned integration into the course curriculum and assessment.
- To support students in Web 2.0 teaching and learning, staff need to become proficient users of an appropriate range of Web 2.0 tools and technologies, the teaching of which must be incorporated into ongoing training and professional development programmes.

References

- Cochrane, T. (2007, 16-19 October). *Moving Mobile Mainstream: Using Communities of Practice to Develop Educational Technology Literacy in Tertiary Academics.* Paper presented at the mLearn 2007 - Making the Connections 6th International Conference on Mobile Learning, Melbourne.
- Cochrane, T. (2010). Mobilizing Learning: Intentional Disruption. Harnessing the potential of social software tools in higher education using wireless mobile devices. *International Journal of Mobile Learning and Organisation, 3*(4. Special edition: Developing Themes in Mobile Learning), 399 - 419.
- Cochrane, T., & Kligyte, G. (2007a, 23-25 June). *Dummies2Delight: Using Communities of Practice to develop educational technology literacy in tertiary academics.* Paper presented at the eFest, Wellington Convention Centre.
- Cochrane, T., & Kligyte, G. (2007b, 11-14 June). *Dummies2Delight: Using Communities of Practice to develop educational technology literacy in tertiary academics.* Paper presented at the JISC online conference: Innovating eLearning, JISC online conference.
- Hameed, K., & Shah, H. (2009). *Mobile Learning in Higher Education: Adoption and Discussion Criteria.* Paper presented at the IADIS International Conference on Mobile Learning 2009. from http://www.mlearning-conf.org
- Herrington, A., & Herrington, J. (2007). *Authentic mobile learning in higher education*. Paper presented at the AARE 2007 International Educational Research Conference, Fremantle, Australia.
- Herrington, J., Herrington, A., Mantei, J., Olney, I., & Ferry, B. (Eds.). (2009). *New Technologies, new pedagogies: Mobile learning in higher education*. Wollongong: Faculty of Education, University of Wollongong.
- JISC (2009). Higher Education in a Web 2.0 World (http://www.jisc.ac.uk/publications/documents/heweb2.aspx): JISC.
- Langelier, L. (2005). *Work, Learning and Networked: Guide to the implementation and leadership of intentional communities of practice*. Quebec City: CEFIRO
- Laurillard, D. (2007). Pedagogical forms of mobile learning: framing research questions. In N. Pachler (Ed.), *Mobile Learning: towards a research agenda* (Vol. 1, pp. 33-54). London: WLE Centre, Institute of Education.

- Luckin, R., Clark, W., Garnett, F., Whitworth, A., Akass, J., Cook, J., et al. (2008). Learner Generated Contexts: a framework to support the effective use of technology to support learning retrieved 5 November, 2008, from http://api.ning.com/files/Ij6j7ucsB9vgb11pKPHU6LKMGQQkR-YDVnxruI9tBGf1Q-eSYUDv-Mil6uWqX4F1jYA1PUkZRXvbxhnxuHusyL1lRXVrBKnO/LGCOpenContextModelning.doc
- Uden, L. (2007). Activity theory for designing mobile learning. *International Journal of Mobile Learning and Organisation, 1*(1), 81-102.
- Wenger, E., White, N., Smith, J., & spa, K. R.-. (2005). Technology for communities Retrieved 14 July, 2006, from http://technologyforcommunities.com