

Using Smartphones and Mobile Web2.0 to create a Mobile Computing platform for Tertiary Education.

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Abstract: Today's smartphones are mobile multimedia computers, in Nokia's words: "It's what computers have become". Smartphone manufacturers have seen the potential to partner with online social software (Web2.0) sites (e.g. Flickr, YouTube, Vox, Ovi etc...) to produce a mobile computing platform to capture and share our daily lives with friends and family, anywhere, anytime. These tools can be utilized within tertiary education to create context independent collaborative learning environments. Pedagogical design of learning experiences using mobile web2.0 allows a tutor to create rich learning environments for students beyond the classroom or lecture theatre. This paper illustrates this by analysing students responses to a third year Product Design project that transformed a traditionally paper-based learning journal into an interactive, collaborative, online eportfolio using mobile web2.0 technologies facilitating an explicit social constructivist pedagogy. Students were provided with a Nokia N95 smartphone, a bluetooth folding keyboard, and a 1GB 3G data account. They created an online eportfolio, and used the smartphones to capture and record learning events and ideas from a variety of contexts. The learning outcomes included the development of a far more media rich and critically reflective collaborative experience than was previously possible using traditional approaches.

Background

This research project is concerned in appropriating the benefits of web 2.0 anywhere anytime using mobile web 2.0 (web 2.0 services that are formatted for use with mobile devices) and wireless mobile devices (or WMDs). The emergence of these technologies challenged many educators to attempt to understand the extent of these technologies have on the student learning environments.

What is unique about WMDs for mlearning is their ability to BRIDGE contexts – i.e. to provide ubiquitous connectivity independent of the context of use, thus linking multiple contexts into the learning environment, continuing learning 'conversations' via social presence and communication technologies. The WMD's 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". In particular, the context bridging and media recording capabilities of today's smartphones make them ideal tools for mobile blogging. Smartphones allow a user to send text, photos, video and audio directly from the site of recording to the users online Blog.

The research summarised in this paper is part of a wider research project investigating the potential of mobile web 2.0 for enhancing teaching and learning through a series of participatory action research projects (Creswell, 1994; Wadsworth, 1998) in a variety of disciplines since 2006.

This paper is presented from a product design perspective, which mean that the focus is on understanding how the Product Design students and staff at UNITEC New Zealand used this technology within the Product Design context. The approach is to look upon it as value learning and teaching approaches adopted by both students and staff willing to create learning environments where students are motivated to learn in relevant contexts. i.e which mean creating both learning and teaching value, students being involve in the learning process and staff as creatively developing teaching skills around the learning.

Examples and scenarios are highlighted illustrating how the implementation of mobile web 2.0 technologies has impacted and transformed some of the Bachelor of Product Design courses.

Scenarios:

Final Year Design Project paper

The overall aim of the Final Year Design project papers is to consolidate the application of design criteria to design process, through facilitating an individual, final design project. The mobile Web2.0 technologies were used to facilitate some of the assessment deliverables of the course. Students used blogs and eportfolios to record pictures, videos, articles related to their project etc. and reflect on their design process. These were made available to the lecturers to provide direction, support, guidance and advice for design project management and address any relevant design issues. They were assessed on this evidence to direct, organise, manage and document an entire final design project. Three major New Zealand companies participated in the Final Year Design Project. Scion a Research Institute developing biomaterials, Design Mobel, are designers, manufacturers and makers of bed designs, Queensberry are designers and manufactures of luxury wedding albums. The final year design project evolved around the development of Product Design teams formed between the students and the external clients listed above. The project design brief was to develop a commercially viable product for their assigned client. Student blogs and eportfolios were used to record and reflect on their design processes, and are made available to the client for comment and interaction.

NPC Project paper

NPC course assignment focused upon a group project and require multiple participations from students. On a weekly basis, the student must find an article that raises issues related to “New Product Commercialisation” (e.g. NZ magazines Design and Business, such as IDEALOGY, BRIGHT, UNLIMITED), the article maybe directly relevant e.g. the description of an NPC project, or it may simply raise issues that can be discussed in terms of NPC e.g. the impact of imports, a clever marketing initiative, tax changes for R&D etc... Using a blog as a mean of communication, the student write a synopsis of the article followed by their own interpretation of the points raised in it (i.e. 500 words per post). The synopsis and comments are to be published in a blog along with a link to the original article either as a weblink or magazine’s reference for the submission.

The major deliverables in this course was a the creation and maintenance of a blog that provides a concise overview of successful product development and commercialisation processes. The blog must reflect the importance that design plays in this process. Collaboration and interaction are important aspects of the project.

Therefore each student will work with their group to refine their chosen article and any additional comments on it using the ‘comments’ feature of each other’s Blogs. The article will then be presented every week at the tutorial group sessions. It is expected that each member of the work-group will be familiar with the article and be able to assist the author in reporting back.

Tools and Approaches

Students and staff were supplied with a Nokia N95 WiFi/3G smartphone and folding Bluetooth keyboard. Students used the smart- phone for recording and uploading evidence of their design development process and models to their VOX blog (<http://www.vox.com>) and other online media sites such as YouTube for video. The smart- phones are also used as a communication tool between students and with teaching staff for immediate feedback via instant messaging, email and RSS subscriptions. Students are responsible for paying for a voice call and text message account but are reimbursed the cost of a 1GB/month 3G data account. The project is supported by a weekly “Community of Practice” (Lave & Wenger, 1991), comprising the course Lecturers, the student volunteers, and the researcher who is also the ‘technology steward’ (Wenger et al., 2005) for the community of practice. An interactive concept map illustrating the integration of the mobile web 2.0 technologies with the smartphone is available at <http://ltxserver.unitec.ac.nz/~thom/mobileweb2concept2.htm>.

Student learning experiences

A student decided to use the smartphone’s camera to record still images and video podcasts outlining significant and iterative steps in the design process when designing a snow kite harness. This allowed the student to reflect and critique their design work and design methodology using visual media rather than simply creating a text-based book or online journal. This took place over the six month product design project. Video clips were recorded from the design studio on campus, from testing in the local park, and from test flights during two ski-field trips in the South Island of New Zealand. The course lecturers followed the student’s blog posts, offering tips and design guidance while on campus, at home, and while attending overseas conferences. The video clips were later edited and compiled into a ten-minute video overview of the most significant design steps taken over course of the design project. The compilation video was then uploaded to YouTube and the student’s blog for showcasing and sharing.

This illustrates the affordances of mobile web 2.0 tools to facilitate user content creation and sharing, and context independent (ubiquitous and seamless) input from lecturers (Laurillard, 2007).

The following is an example of a student blog post for their NPC paper and the resulting comments from their classmates. The post (Figure1.) and comments (Figure2.) show significant engagement and critical reflection occurring by multiple parties and within multiple contexts. The use of the blog facilitated the posting of student reflections on examples of new product commercialisation and the extra dimension of peer critique of these ideas, with the ability to respond and enter into a collaborative ‘conversation’. The use of WMDs (smartphone) facilitated searching for examples anywhere, anytime, and the ability to upload supporting media directly to the student’s blog. Lecturers viewed and commented on student blog posts using their

smartphones and bluetooth keyboards, and subscribed to student blogs via RSS. However, students tended to read each other's blogs on their laptops. This is an example of a socially constructed use of the technology rather than an affordance of the technology itself (Bijker *et al.*, 1987). Students were encouraged to subscribe to each other's blog RSS feeds to enable automatic notification of new posts for discussion. Additionally, VOX features a weekly 'neighbourhood update' email, that students could receive and read on their smartphones. This facilitated a social constructivist learning environment.

Selling Against the Tide

McKee, S. (August 2008). BusinessWeek

http://www.businessweek.com/smallbiz/content/aug2008/sb2008088_947929.htm

INTRO:

This article discusses the market strategy of Counterprogramming. Which I think in relation to the New Product Commercialisation process, it can be applied to the product opportunity gap identification stages, as well as the associated marketing aspects which occur later in the process.

SYNOPSIS:

A few examples explain the concept, WarnerBrothers' Batman: the Dark Knight has gone on to break all sorts box office records. The Counterprogramming occurred here when competitor Universal Pictures made the decision to release its offering Mamma Mia! a film based on the ABBA stage musical on the very same day.

Now conventional wisdom would suggest that it's a terrible idea to try and compete with such a blockbuster, money-making juggernaut. Truth is they knew they could never compete, yet Mamma Mia! still managed to pull in US\$27 Million in its first weekend, well above many pundits expectations and forecasts, this is Counterprogramming. While Batman had a typically young male audience, Mamma Mia! was appealing to the very opposite, the older, female viewer.



Batmanna. Mia!!

After the effects of the documentary Supersize Me, and the raised awareness of the "Obesity Epidemic" and the current crusades against fast foods and trans-fats. This is an American example, but we also see the same happening here, where many fast food chains like McDonalds have rethought and rebranded themselves, offering healthier menu alternatives. Rival fast food chain Carl Jr's. has taken the exact opposite route, going completely against the trend, offering the biggest, sloppiest, most unhealthy burgers available, which has gone on to gain some sort of success.

MY THOUGHTS:

So relating this back to New Product Commercialisation and Product Design, the idea of Counterprogramming is effectively running on the idea that a 'trend' will never be able to cover the entire market. While a trend moves toward one direction to appeal to a certain type of customer, gaps appear where the opposite are being left out. Developing products and marketing them to completely different customers than logic might suggest. Although, just as importantly you need to be able to market and position at the same time as everyone else as well to capitalise on your point of difference.

Especially with product sectors that are often subject to trends, and change a lot, taking the route where you completely avoid the direction the rest of your industry is taking, leaves you completely open and competition free at the other end. Sure, there might not be potentially as much money in it, like in the Dark Knight vs. Mamma Mia example, but there could be a simpler, easier, less competitive way of obtaining it. I think this strategy could be incredibly helpful for smaller companies that could never realistically compete, and it gives an opportunity for their products to carve out their own niche at the other end of the market.

One example I have sitting in front of me is the N95, all of the ads and marketing drives that companies are pushing involve cellphones that do it all. Not just limited to calls and text, but internet, emails, photos, videos, games, the whole package. Web 2.0 ideals. Yet at the same time I'm sure there's still a market for people that want a cellphone but to do the basics, nothing more, nothing less. I myself

More Desktop Manufacturing

Springwise (August 5, 2008).

http://www.springwise.com/style_design/more_desktop_manufacturing_for/

INTRO:

For my Week TWO I have written about the evolving way that customers are becoming more involved in the design (and manufacturing) process. As an NPC topic, the important aspect discussed is the role of the designer within that process, much to do with the current generation of young people. And as far as product designs are concerned, it touches on designers embedding and implementing levels of customisation available to the user.

SYNOPSIS:

This article talks about the ability for consumers to design and manufacture their own one-off products. It mentions New Zealand company Ponoko, which lets people upload their designs to be put through the laser cutting process using 2D vector images, and then constructed into 3D. If they're good enough these user designs can even be sold to others through Ponoko.



As the use and technology of 3D printing becomes more prevalent, the more people are beginning to find out about it, not just limited to designers and other product related industries. More often now, 3D print makers are beginning to target a wider audience, making themselves more and more accessible to a wider audience of the everyday consumer than ever before.

MY THOUGHTS:

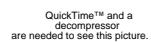
By making these quick manufacturing processes more accessible to the general public, is really tapping into the 'make-it-yourself' trend. A trend not limited to physical objects, but widely seen in the entire concept around the Web 2.0, looking to greater interaction and participation resulting in user based content.

Its all about letting people doing what they want and having options which they can control. Especially the growing buying power of current Generations Y and Z, where through the products they own they're always looking to be different, to distinguish themselves from others, and essentially 'fight the power'. This has help spark the global rise in creative expression, a movement which Idealog Magazine refers to as a "Renaissance revisited."

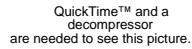
Customization of products has been somewhat limited in the past with what's in the shop is all that you get. Now more and more companies are allowing people to specify different colours, materials, patterns, etc, in their products. Letting people 'design' the entire products themselves looks to be just the next evolutionary stage in the cycle, and in the future it wouldn't be surprising to see people create designs with more complexity as technology and the world changes over time.

For companies that produce their own products, it seems they'd need to consider allowing their consumers the creative freedoms and ability to take that product, and do with it what they want. Whether that be altering the specifications before they receive the product or as more of an aftermarket exercise, the flexibility need to be there.

With global factors such as money getting tighter as well, with growing prices across the board the slow down in mass consumerism is also likely to see people more careful with their purchases, and if you can give them options and 'exactly' what they want, then that's the only edge you need over the competition.



QuickTime™ and a decompressor are needed to see this picture.



QuickTime™ and a decompressor are needed to see this picture.

Fig 1. Screenshot of example student NPC blog post.

Comments



[Andy Chang NPC wrote:](#)

Aug 17, 2008 | [Reply](#)

Time is money, especially for the fast food stores. It is possible to see that, the food from the fast food stores are not that delicious, but the reason of going there and buying foods is because of the speed – the customers don't need to spend too much time on waiting for their dishes. Therefore, I believe in the general restaurants, increase the speed of serving the dishes to customers will increase the profits.

The conservative working process or environment will decrease the working efficiency; this reminds me the time when I was working in Taiwan, due to the pressures from the target demanding achievements, the life everyday became horrible, and therefore quit the job at the end.

To employ the talent people is the most important issue for a company, how to assist the company to preserve these people will be an interesting topic.



[Isaac wrote:](#)

Aug 17, 2008 | [Reply](#)

your points are valid, productivity can be improved in many ways, in which most efficient is the employee well being. most of the systems in place in those places are based mostly on productivity instead of people. Maybe we the, customers, driving these practices to existence.



[Steve wrote:](#)

Aug 18, 2008 | [Reply](#)

Best service (buying a burger) I ever got at was in Japan... from a vending machine.

It is possible that our machine friends could one day put the fast food workers out of work; as systems get more automated and streamlined it is possible we could see human staff decreasing.



[Gareth NPC wrote:](#)

Aug 19, 2008 | [Reply](#)

The thing with McDonald's and Wendy's is that they have that "we make your burger when you order" thing which is just a marketing ploy. For one, this doesn't necessarily make for better burgers, and I can only imagine makes everything harder for the staff trying to keep up. So it seems to me that sooner or later, the fast food chains will have to realise that they can't have it both ways in terms of faster service, but producing freshly made food.

Fig 2. Screenshot of example student NPC blog and comments.

Stretching Boundaries

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 to test their prototype; snow-kite harness designs. However, this coincided with their scheduled presentation of the NPC research to the class that week. In order to keep the presentations on schedule the 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!.

During the course of the year academic teaching staff have visited three overseas countries: Japan, UK, Spain, France as well as numerous New Zealand towns outside of Auckland: Rotarua, Tauranga, Napier, Hastings. Staff used mobile web 2.0 technologies to pass relevant information to their student(s) from these countries and locations.

During April 2008, a staff member visited Kyoto, Japan to participate in a conference that took place during the teaching semester. This scenario provided the opportunity for the staff member to test the use of Web2 as a distance communication tool: could regular contact was maintained between the staff member and students and information be easily shared using a smartphone? The use of mobile web 2.0 technologies allowed real time text, video and still images of the conference, sites, design, architecture to be easily and immediately uploaded to the staff members blog for students to see and share in. By return, the use of instant messaging and blog comments allowed students to remark on the posts, pose questions and request further information on the conference before the end of the visit.

In a second case, staff member required to make a trip to the UK and France taking valuable time away from teaching. At this stage, students were well advanced into their projects and having a staff member overseas posed a potentially difficult situation for them and the programme. The use of mobile web 2.0 technologies allowed the staff member, his fellow staff members and students to stay in regular contact sharing comments and project concerns: in effect a ‘virtual studio situation’ was created. Upon the staff members return, there was no need for time consuming catching up to take place and students were not significantly disadvantaged due to his taking time away from studio teaching.

Key Issues

Unfortunately, the benefits of mobile web 2.0 technologies are not gained without challenges. Using the technologies placed new and increased time, organisational, and pedagogical demands on the lecturers. Perhaps the most difficult of these challenges is the question of maintenance. Once a project is created and mobile web 2.0 technology is embedded in the context of a course, the lecturer often finds himself/herself responsible for supporting the resulting posting. While this may not pose a significant problem the first or even the second time it occurs, it can be difficult to manage over the year. Leaving it to the individual Lecturer to instigate such projects adds another complexity and challenge that may discourage many other lecturers from using the technology. This requires a change in time management and a refocus on regular formative feedback rather than the traditional summative end-of-project feedback and assessment procedures. When this is implemented the benefits for students and tutors in being continuously emersed in the projects is realized, creating much lower reliance upon end-of-project presentations and summative assessment.

A second challenge associated with the introduction of mobile web 2.0 is the number of courses adopting the technology within the same year. The major project is focused

on individual student work. In contrast NPC course assignment focused upon a group project and required multiple participations from students. Because of the nature of these projects, it is often difficult to manage without creating a separate blog. Thus creating more work for the Lecturer, possibly reducing the quality of the final product and potentially reducing the quality of the experience for the students. Using features of VOX such as tagging, RSS and groups can help to minimize this extra management load.

A final challenge associated with using such technology is that of consistency within the programme. Many of the projects are initiated from lecturers keen to use the technology to expand the existing knowledge base of the students. Leaving it to the individual Lecturer to instigate such projects adds another complexity and challenge that may discourage many other lecturers from using the technology. It is important, however, that Lecturers continue to provide the support on the type, scope, size, and pedagogical input of the mobile web 2.0 aspects of the projects that are introduced into courses. Creating a course-wide strategy for the integration of mobile web 2.0 within the programme that would enable all of the teaching team to support one another in supporting these innovations is a goal for 2009.

The mobile web 2.0 integration project within the Bachelor of Product Design has highlighted several key issues.

Conclusions

- The use of web2 technologies in the programme have demonstrated the potential to create increased student engagement with the learning environment.
- Higher levels of student reflection and critique were achieved compared to that previously seen with more traditional assessment procedures.
- Anywhere, anytime learning (context independent and context bridging) has been facilitated and made use of in unforeseen scenarios.
- Tutor engagement with the technology is essential for students to value its use and to gain an understanding of its pedagogical usefulness beyond social activities.
- The integration of the mobile web 2.0 technologies into the assessment (Both formative and summative) is critical for student motivation.
- Access issues must be considered carefully when planning to integrate the use of mobile web 2.0 technologies. The sustainable provision of hardware, software and connectivity (3G data plans and wifi availability) must be thought through. Various models for achieving this sustainability are being brainstormed for the future of this project.

References:

- Bijker, W., Hughes, T., & Pinch, T. (Eds.). (1987). *Social construction of technological systems: New directions in the sociology and history of technology*. Cambridge: MIT Press.
- Cook, J., Bradley, C., Lance, J., Smith, C., & Haynes, R. (2007). Generating learner contexts with mobile devices. In N. Pachler (Ed.), *Mobile learning: Towards a research agenda* (Vol. 1, pp. 33-54). London: WLE Centre, Institute of Education.
- Creswell, J. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks: Sage Publications.
- 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.

- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Wadsworth, Y. (1998). What is participatory action research? Retrieved May 3, 2002, from <http://www.scu.edu.au/schools/gcm/ar/ari/p-ywadsworth98.html>
- Wali, E., Winters, N., & Oliver, M. (2008). Maintaining, changing and crossing contexts: An activity theoretic reinterpretation of mobile learning. *ALT-J, Research in Learning Technologies*, 16(1), 41-57.
- Wenger, E., White, N., Smith, J., & spa, K. R.-. (2005). Technology for communities. Retrieved 14 July, 2006, from <http://technologyforcommunities.com/>