

Using techno-centric networks to develop flexible learning spaces outside studio-based classrooms: Teaching and augmenting learning through network technologies.

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Collaboration is an essential aspect of the design process. Design educators go to great lengths to create dynamic and flexible studio-based environments that allow collaboration to occur throughout the design process, so as students can articulate, visualise and test ideas. Through class interaction and practical application, students hone their conceptual and theoretical skills as well as visual design sensibilities. However, learning can take place anywhere and anytime. While Design students learn through interaction and socialisation with their lecturers and peers in classrooms, they also learn over coffee and via network technologies, more specifically the World Wide Web (web). With a growing emphasis on inter-disciplinary design, information and communication technologies (ICT) now play an integral role in the communication, implementation and dissemination of design.

In the university sector the rush to introduce networked technologies, specifically e-learning, was poorly conceived and economically motivated (Bennett, Chan & Polaine, 2004; Brabazon, 2002; Leaver, 2003; Mallinen, 2001). Within Design, there were insecurities surrounding the transferral of a practical, hands-on, one-to-one learning method to a digital and dehumanised environment. The collapse of many online courses confirmed that the transfer of face-to-face curriculum to an online environment was not enough to sustain students (Brabazon, 2002). The experience demonstrated that working with ICT was an unknown entity and quite different from anything previously experienced. A generation on, we have familiarised ourselves with ICT and educators, less technically fearful, are embracing e-learning as an opportunity to extend the studio paradigm and explore the possibilities for building new dynamic learning communities (Baskin, 2001; Bennett & Dziekan, 2005; Salmon, 2003; Whitehouse & Wragg, 2006). Through practice we have begun to understand particular characteristics of working in online environments and the methods required to engage a student body whose lives are increasingly being mediated through digital on-screen environments, the Internet, communication technologies and convergent media. One of the most significant developments to emerge from the first decade of online learning, specifically from design education, is

the pedagogical rethinking of the importance of socialisation and communication in fostering safe, interactive and engaged learning communities.

This paper reflects on our ongoing research and experiences of educating Faculty of Design (FoD) students in and for the online/screen environment. It questions the manner in which ICT is shaping and supporting new learning environments, and driving a re-evaluation of the 'classroom' dynamic and support pedagogies. Focusing on the students' and educators' experiences, we seek to identify some of the key challenges in creating flexible action driven and socially interactive online learning environments. This paper presents case studies from two units of study, Design Online, a foundation history unit for entry-level Design undergraduates, and Technology for the Web, an Honours unit in the Multimedia Design program. Our experiences of e-learning as case studied here comprise two types, that of Learning Management Systems (LMS) and that of a student-led design of an online design portal developed outside LMS with current web technology. We aim to demonstrate how new pedagogical practises within Design education, inclusive of ICT, can create a richer and deeper learning experience.

Building Learning Communities

Experience in industry demonstrates that the design process is highly interactive (Lawson, 1980). Designers interact with their peers, clients, users and production teams to create products that communicate effectively to their target market. Within Design teaching the challenge to develop similar networks or learning communities for students, where they can develop ideas and their own visual expression, is vital as learning does not occur in isolation, but through a combination of dialogue, observation, display, imitation, and competition (Kennedy & McNaught, 1997). As Mallinen argues the social and cultural infrastructure of a classroom impacts on knowledge building (Mallinen, 2001). Additionally social interaction plays an important role in developing identity, a sense of belonging, purpose and construction of knowledge (Brook & Oliver, 2003; McLoughlin & Luca, 1999). When functioning well the classroom is a dynamic environment in which individuals construct their knowledge networks again and again.

With the growing use of ICT, students arrive at university with well-established ICT shaped social practices. As they move around SMSing, playing with their camera phones and working on their laptops, it is obvious that their ICT behaviour is, like that of youth in Europe and Asia, being shaped through socialisation, communication and entertainment (Dong-Hoo, 2005; Hjorth, 2005; Lin, 2005). There is an aura of play and identity making

as they show-off new mobiles and screen savers, play games and discuss the stylist features of the latest iPod. Our challenge as teachers, is to shift and rethink entrenched pedagogical practices of the classroom and Studio to shape modes of online delivery that capitalise on students' ICT practises.

Born out of universities distance education programs, such as the Open University (Salmon, 2003), e-learning has been successful in offering students, especially those in remote regions, the flexibility to study in their own time and place. The experiences of distance education also have demonstrated that the traditional classroom could not be simply replicated online. Rather there was a need for teachers participating in online teaching to develop new skills for effective delivery, handling technology and managing relationships in an online environment (Salmon, 2003). Additionally students dislocated by time and space required greater socialisation and interaction with their peers and lecturers to establish an environment that is conducive to learning.

Controversy has emerged as mainstream undergraduate and postgraduate programs both nationally and internationally adopted the use of content management systems (here termed learning management systems, LMS) such as WebCT and Blackboard amidst a climate of funding cuts, staff reduction and rising student numbers (Bennett, Chan & Polaine, 2004; Brabazon, 2002). Triggering widespread debate, concerns were raised about the underlying motivations of adopting LMS. Their generic features, recyclable components and modular approach to creating e-learning bundles provided no allowances for variations in pedagogical structures. Critics attacked the pedagogical standardisation of LMS arguing that these portals, with their cumbersome technology would shape online education into a generic 'McDonalds' or 'neo-fordist' model (Leaver 2000; Frieson, 2003; Owen 2007).

New learning modes and socialisation

After experiencing the integration of ICT and LMS into our curriculum for some 5+ years we, like others, have been forced to rethink our pedagogical approach to become more techno-centric while pushing beyond the generic limitations of LMS and the Web to develop educationally sound online content and practices and rethink where and how learning can occur (Whitehouse & Wragg). In this context, we are utilising the technology to create dynamic on-line learning communities that rethink the social dynamics of face-to-face and studio-based learning.

Case study 1: Design Online Project

Embarking on the Design Online Project, a core unit for entry level students, we encountered the restrictive techno-logic of the Blackboard LMS, and quickly recognised that if we were to engage first year students (the bulk of whose subjects would be conducted face-to face) we would have to push past Blackboard's text intensive, distance education conventions to somehow create a vital and dynamic site and an engaging passage into it. We needed to give students a reason to go online and be willing to stay engaged. And we needed to embed the concept and practice of e-learning into the entry-level student's experience and, more specifically, their engagement with the history and culture of Design. To do this we sought to subvert the generic nature of Blackboard by personalising it by building a lively, interactive sense of community and place.

Entry into the Blackboard LMS is not easy. Its screen interface and architecture lack the friendly and intuitive logic that informs the everyday world of telecommunications. The Design Online's Blackboard screen interface, that sets the course narrative and activities, is also configured to stimulate community conversation, with visually rich announcements, community discussion forums and studios changing throughout the week, so that when the student enters there is always something new to see and learn. Students become players in this dynamic as they design the site's changing banners, and engage in posting new content and new visuals to build an evolving discourse, the aim of which is to prepare them to become members of the larger design community.

Finding the chat facility inadequate we stumbled into using the Discussion Board, unconventionally, for synchronous, as opposed to asynchronous, discourse. In the process, we were able to create a Studio-type learning environment in which small groups engage with a tutor over two hours in 'real' time discussion, and a variety of online learning tasks, designed to develop online communication and research skills, historical knowledge, creativity, analytical and writing skills. This approach, we discovered, brings a new pace to learning as the synchronous discussions offer students time to converse using a process of 'listening', reading, reflecting and responding, and the activities enable students to lead the building of course content, openly share their individual discoveries, and learn from each others' different approaches and points of view. It also offers different students diverse opportunities for achievement. With the Studio, Community Forums and learning tasks recorded for review, each student's journey of learning can, in contrast to the physical

classroom experience, be included in assessment. But, most importantly, it has enabled us to create an engaging and productive learning environment.

The New Student/Teacher Experience

Students need gradual induction and schooling to working with Blackboard with its operational demands, and it is the more experienced and fearless students who, quickly mastering the navigation skills and protocols, set the pace. They bring an infectious openness to new technological experiences and an easy sociability to online learning, which is undoubtedly a carry over of their daily social use of the Internet and convergent technologies.

Our experiences support Bennett's (2000) findings that students value the physical anonymity of online learning and the removal of the competitive dynamic of the traditional classroom with its physical and intellectual, peer pressure games. This is a big behavioural change for students who have spent 12 years or more within the face-to-face classroom. It involves a shift from being listeners and receivers of the teacher's knowledge to being active creators of the course dynamic and content as they work, quite naturally, together driving discussion and building knowledge while helping one another, in the process, to solve technological problems and set standards of legibility and behaviour. The vast majority report feeling liberated and, as more students feel confident in participating than in the face-to-face environment, the quality of the learning dialogue improves considerably. In a manner which is typical of any major technological change they express concerns about the increasing depersonalisation of their lives, while relishing the flexibility offered by the online experience and the manner in which it is facilitating a new social dynamic in the learning environment (Design Online Survey, 2005). The following posts demonstrate the multifaceted learning that's occurring amongst design students:

Forum: Metropolis: Dystopias and Utopias

Date: Wed Mar 22 2006 09:00

Author: Student 2

Subject: Re: Housework

I'm enjoying the online thing. It's great to develop new skills such as relying completely on computer ability- especially when submitting tasks. It's all new for me as I've always been involved in 'face-to-face' learning, but I think it's important to embrace new technologies- exactly what we are learning in class really...

Author: Student 3

Subject: Re: Homework

I am really enjoying working online and find it really beneficial-it allows you to view everyone's thoughts on the topic in a much more effective and efficient way then if we were in a classroom.

Author: Student 4

Subject: Re: Homework

I agree ... I was hesitant at first but once we finished our first class online I could see the benefits. I think it almost encourages everyone to contribute to our discussions more so than in a classroom. I'm learning a lot!

Author: Student 5

Subject: Re: Homework

Yeah actually, that's true...in class quite often people are too shy or timid to speak up. But online it's easy to have a go and making a point isn't so confronting.

Author: Student 6

Subject: Re: Homework

... it's very useful getting instant replies from others. I also like the fact that I can access information about projects from home.

For the educators involved in the Design Online Project the shift into new roles as guides and facilitators has led them to review entrenched pedagogical attitudes. Pooling their resources and experience they are developing new teaching resources and strategies that address the distinctive features of the Internet, the most important of which is engaging communication in the form of open questions that use the student's experience to trigger discussion and discovery. They have identified the development of new cognitive skills, such as the process of interactive comprehension that comes from using synchronous Discussion Boards to read, reflect and respond to each other's posts. There is also the development of discerning online and offline research skills, and the creation of layered learning patterns that include time for reflection and review and, most importantly, prompt feedback and guidance. Significantly, these changes have produced a depth of response from students not often encountered in the conventional classroom, and a marked improvement in students' comprehension of course content.

Perhaps, given popular perceptions about the superiority of face-to-face learning, the biggest lesson provided by the Design Online Project is, that if you determinedly push beyond the techno-mentality of the LMS you discover that online education can enable rich and sustained human interaction.

Case Study 2: Hypemagazine.com.au

As demonstrated in the Design Online project, there has been a radical shift in the roles and thinking of educators and students when working in online environments. In this model staff have initiated a move to a Blended and Constructivist style of learning, where students perceptions of the world and task at hand are the starting point to problem solving and the teacher becomes more of a facilitator of student-led and self-initiated learning (Laurillard, 2002; Whitehouse & Wragg, 2006). In this capacity, the lecturer is no longer seen as the source of knowledge but rather uses their specific experience to work with the students to support the process of problem solving. Educational theorists calling for new pedagogies inclusive of technology, position the user as the driver of learning (Laurillard, 2002; Prendergast, 2004; Stevenson; 2001; Whitehouse & Wragg, 2006), and argue for new pedagogical models or educational logic that addresses new cognitive activities that occur in computer mediated environments. Like Bennett our hand-ons experiences have lead us to believe that e-learning is an evolutionary process that is best developed through experience rather than theory (Bennett, 2003). The Hypemagazine project is one such example of how an individual student project has evolved into a group project since its first iteration in 2003.

The Hypemagazine project – an online student magazine designed and maintained by students, was initiated as the solution to an individual Honours student project. Recognising the potential of this project as an educational tool, Multimedia Design staff developed the project as an authentic learning experience where the Multimedia Design students would learn ‘by doing’ and users, being the FoD students would learn through interaction both within the forums and through the site. The idea was to establish an ongoing project that would be passed to a new group of students on a yearly basis. This way, the site would stay fresh and attract membership.

Faced with challenge of converting an individual project into an ongoing collaborative group research project, in which, Multimedia Design students had to think about user-centre design, interactivity, usability, functionality, socialisation and engagement, we sought to establish a less prescriptive brief that allowed the students to explore their

ever-increasing understanding and mastery of telecommunication, digital technologies and interactivity. The students were required to interpret the brief and create a return brief that outlined their aims and intentions of the site. The Hypemagazine project was multifaceted as its purpose was to educate and inform Multimedia Design students through the creation of a platform that facilitated communication, exhibition and archiving that enabled socially, creative interaction and discourse.

Our experience of Hypemagazine as an ongoing project into the Honours curriculum has been an interesting and at times, frustrating journey which we will now reflect upon and the implications, for both teachers and students participating in the project. Well into its fourth year, Hypemagazine involves the development of a cross-disciplinary online design portal. Its membership is primarily design students and lecturers within the FoD but also outside the FoD community. Using a Blended teaching model with a weekly face-to-face studio supported by discussion via Blackboard, online working spaces and technical tutorials, students researched existing knowledge and perceptions of the site.

Hypemagazine: Issue 1

The first iteration of Hypemagazine was in the tangible form of a tradition magazine complete with 'pages' that turned like those of a physical publication. The focus of the first issue was self-publication. The original designer used it as a vehicle to promote her individual art and design. While the first magazine site was not marketed to the student body and therefore unsuccessful in building a following, it established the validity of Hypemagazine as an online Studio space, setting the foundations for its ongoing development.

Hypemagazine: Issue 2

The next team to work on Hypemagazine included the original designer. The look and feel was similar to the first version, but included design content from a range of Multimedia Design students. Unfortunately the collection of work from the various discipline at FoD has eluded all the hype teams to date and the second iteration suffered because of this. There was, however, a larger readership in Issue 2 due to amore thorough marketing of the site. Based on Issue 2 a team of students in the Honours stream recognised strength of the idea as a community platform and took on the job to overhaul the existing site as part of their project work the following year.

Hypemagazine: Issue 3

While Issue 3 replicated the stylistic approach of Issues 1 and 2, the page flip and navigation was vastly improved and much easier to use. The emphasis in Issues 3 was on content rather than esoteric art and design pages. The team developed an issue featuring the FoD student experience of Industry Placement (IP). The exposé included a review of the IP exhibition, interviews of IP students and information on how to apply. Additionally Issue 3 also featured design work from their Honours peers in Multimedia Design. While this team developed an information rich site, there was still the vexed issue of interactivity and usability that hadn't been effectively addressed. The navigation was more sophisticated than previous versions, in that the user could skip pages, however, the overall perception of the site was linear, while its aim to enable the user to contribute content to the site was limited to a blog that listed current design activities.

To be fair to the initial pioneers of Hypemagazine, the project was too big for a group of two or three people. Working simultaneously on concept, design, content development and collection, layout, functionality and coding, alongside other university projects was a massive task. The project had already proved its strength as an authentic learning experience, however it still lacked membership.

Educators involved with Hypemagazine had to address certain issues: interactivity was not resolved; the user experience was still largely passive; the site didn't enable user contribution and the visual look remained static in between student handover. While the forum enabled communication between students, interest waned due to the lack of changing content. Educators worked with students in the next iterations of Hypemagazine to address interactivity, functionality and rebranding. It was vital for the of viability Hypemagazine that the site was visually seductive and give a reason for their peers to want to engage in Hypemagazine.

Hypemagazine: Issue 4

Learning from their predecessors, the Hype team for Issue 4 shifted the focus to function and, more specifically, to user-centred design. Beginning with questioning their users needs and wants (Whitehouse & Wragg, 2006) the students identified key areas that required changing, such as users disliked the page-flip preferring a much simplified design and interface. Users also wanted Hype to function outside the FoD community. Through an online survey, users indicated they wanted an interactive community website that connected them to a wider world of design culture and

industry. In terms of design, the user respondents identified needs including design inspiration and creativity in conjunction with clear navigation systems, information hierarchy and quality of information. They wanted links to students' work, design websites, competitions, jobs, images and student databases. This user-centred process enabled the design team to form a better picture of their user, their viewing likes and dislikes and their motivations for visiting specific websites.

With Hypemagazine source files readily available they were able to review production of the first three issues thoroughly, analyse aesthetics, useability, layout, navigation system, features, level of interactivity and engagement. Researching other design portals such as K10K and australianinfront.com, the team explored various working models, inspiration, ideas, accessed coding support and information downloads. In the process, they developed cooperative modes of working, splitting the group of nine into three groups of three, with each group responsible for different aspect of the site.

The final design brief was to rebrand Hypemagazine.com.au and develop a Content Management System (CMS) and user interface with greater flexibility that would engage and bring individuals together as a community. The team's clever CMS enabled students and staff, across all year and disciplines, to contribute special features, exhibit work, participate in forums, contribute reviews, and network with industry (Whitehouse & Wragg, 2006). The CMS was so thorough in its development, that its handover the following year level sparked controversy amongst teaching staff. While some lecturers believed Issue 4 to be an outstanding success, others acknowledging its success still believed that future groups of students could build upon and learn from Issue 4, with additions to content, brand management, marketing or the development of folio and alumni micro-sites housed within Hypemagazine.

Hypemagazine: Issue 5

Now into its fifth redesign, the biggest challenge faced, was selling the somewhat old brief to the Honours students. Additionally we needed to inspire and engage them to rework a seemingly well thought through CMS. After working with the CMS created in Issue 4, however, a number of functional anomalies emerged. To update content, for instance, the user had to be given access by the design team, who in this case had graduated. The job of updating issue content and cover design fell to the lecturers, which contradicted Hypemagazines' objectives. The 'pinkness' of Issue 4 continued

to attract debate, as some male students felt they were entering a 'girly space', while other students and lecturers complained of the linearity of the issues section both in its navigation and the way in which the content was displayed and progressively viewed. After much consideration, we pitched an open brief that enabled groups of students to develop micro-sites for Hypemagazine, stressing user accessibility. The groups comprised of five or six students in which each member was responsible for specific areas such as design, development, innovation, motion, interactivity, and so on. The aim of the brief was constructivist in nature, allowing students to interpret the project based on their experience of ICT's and analysis of Issue 3 and 4.

Through analysis and teacher consultation, the emphasis in Issue 5 has been interactivity by creating a CMS that, unlike its predecessors, enables easier user access in contributing to content. The gallery is the main platform where students can upload images, movies and sounds in much the same way YouTube operates. The order of images, like YouTube, is based on a rating system; in other words students will vote on their favourite image or video. The highest rating images will appear on a Widget, which is downloadable and operates in a similar fashion to Dashboard, Sidebar and Yahoo! Widgets. The Widget link directly to the Hypemagazine gallery and serve as a shortcut to the site, prompting students to visit Hypemagazine. Interestingly, this group of students have sought to address community and readership by developing a self-maintained site that will constantly update through user contribution. Through their research they have explored the notion that community is built more effectively through the active engagement, which, in turn will encourage a following and promote discussion.

Other marketing approaches have also been developed such as a series of motion graphics to be screened around the campus, posters, competitions that offer monthly prizes. Within the games section, computer games can be uploaded or downloaded, while the special features section with reviews and student projects remains a staple from the previous section. The forum has been simplified and can be used to discuss anything from social events to technical trouble-shooting. Refreshingly, the current Honours students have accepted the maintenance of the site for the remainder of the university calendar, with a view to promote competitions and boost readership.

Teaching Hype

Hypemagazine involves both face-to-face and online methods of teaching, breaking with the time and cost intensive one-on-one practices of the traditional Studio. By

enabling students on and off campus to connect and engage, in their own time and under the guidance of their lecturer, in the collaborative process, they tacitly develop the new cognitive skills and further enhance their understanding of the Internet and the behavioural patterns of users needed for their future practice. The need to engage users forces their focus to shift from techno-centric to human-centred communication. Understanding their user enables them to develop an outcome that's user driven rather than technology driven. Now into its fourth year Hypemagazine, like Rick Bennett's impressive Omnium Project, points to the potential and responsibility of design education to explore alternative online educational spaces which accommodate and support different pedagogies and open the way to new learning opportunities (Bennett, 2003; Whitehouse & Wragg, 2006).

For the educators involved in the Hypemagazine project, the shift into new roles has led them to review pedagogical attitudes and methods of assessment. Pooling their various design and technical experience they are developing new resources that support learning communities. They have identified the decline of on-campus learning communities and restructured the Hypemagazine brief to reflect the ever-changing nature of the web. Through the research and analysis process involved in user-centre design, students are developing of new knowledge in the fields of research, design, interactivity and usability. Significantly, these changes have produced a depth of response from students not often encountered in more prescriptive projects, and a marked improvement in their understanding of Multimedia Design.

Conclusion

As Bennett contends, online learning is now part of mainstream culture. As such, the challenge is for both educators and students to learn how to act creatively and work within the digital space to make the experience engaging and rewarding for all users (Bennett, Chan, & Polaine, 2004; Whitehouse & Wragg, 2006). As designers of the future Multimedia Design students will play a pivotal role in the development of new concepts of communication and community, creating interaction between users and interaction between users and brands. Their communication and technological skills will shape future user's online experiences and access to information, products and entertainment (Whitehouse and Wragg, 2006). Through the challenges of both the Design Online project and the Hypemagazine project we glimpse the potential of the online environment and convergent technologies to facilitate learning spaces that support student-led communities and experiential learning. These students

responding to an ever-changing world of ICT will be spending the next 30 to 50 years living and working with technology. They need to fully understand the significance and impact of ICT on society and their working environments. What we have developed within the Design Online and Hypemagazine projects are new pedagogies and supporting ICT that educate our students in the human engagement of ICT in conjunction with the design and creation of user centre initiatives that are facilitated through ICT. Through authentic experiences, our design students develop the skills and intelligence to focus their technical knowledge in a more holistic way that sees the end user as crucial.

Bibliography

Baskin, C. (2001) 'The Titanic, Volkswagens and collaborative group work: Remaking old favourites with new learning technologies', Australian Journal of Educational Technology, Vol. 17 No. 3, pp. 265-278. Date accessed March 10, 2006. <http://www.ascilite.org.au/ajet/ajet17/baskin.html>.

Bennett, R. (2001) 'A research initiative proposing strategies for quality, collaborative on-line teaching and learning', Education, Communication and Information. 1:1. Link page: 104. Open University (UK) & Harvard (USA). Taylor and Francis/Routledge Press. Date accessed May 10, 2006. <http://www.omnium.edu.au/project/research/omnium/papers/>

Bennett, R. (2003) 'The Omnium project: Proposing a framework for creative online interaction', Create Ed 200, Conference Proceedings, RMIT, Melbourne. Date accessed May 10, 2006. <http://www.omnium.edu.au/project/research/omnium/papers/>

Bennett, R., Chan, L. K. & Polaine, A. (2004) 'The future has already happened: Dispelling some myths of online education', ACUADS Conference Proceedings, Canberra. Date accessed May 10, 2006. <http://www.omnium.edu.au/project/research/omnium/papers/>

Bennett, R. & McIntyre, S. (2004) 'Encouraging quality and purpose in online art and design education', ACUADS Conference Proceedings, Canberra. Date accessed May 10, 2006. <http://www.omnium.edu.au/project/research/omnium/papers/>

Bennett, R. & Dziekan, V. (2005). 'Online collaboration in the creative process: Working with the most interactive community of designers we have [n]ever met', Designs on E-

Learning Conference, The University of the Arts, London. Date accessed May 10, 2006.

<http://www.omnium.edu.au/project/research/omnium/papers/>

Brabazon, T. (2002) *Digital hemlock: Internet education and the poisoning of teaching*, University of New South Wales Press, Sydney.

Broadfoot, O. & Bennett. R., (2003) 'Design studios online?' Apple Consortium Academic and Developers Conference Proceedings. Date accessed May 10, 2006, from <http://www.omnium.edu.au/project/research/omnium/papers/>

Brook, C. & Oliver, R. (2003) 'Online learning communities: Investigating a design framework', *Australian Journal of Educational Technology*, Vol.19 No. 2, pp. 139-160.

Buxton, B. (2004) 'The Interface,' In Mau, B. & The Institute without Boundaries (2004) *Massive Change*, London; Phaidon, pp. 89-99.

Commonwealth of Australia, Department of Ageing (2002) 'National strategy for an ageing Australia: An older Australia, challenges and opportunities for all', Government Printer, Canberra.

'Design Online Survey and Questionnaire,' (2005) Swinburne, Faculty of Design, Melbourne. Survey conducted by D. Robbie & D. Whitehouse.

Dong-Hoo, L. (2005) 'Women's creation of camera phone culture', *Fibreculture Journal* 6:mobility. Date accessed March 12, 2006.
http://journal.fibreculture.org/issue6/issue6_donghoo.html.

Friedman, K. (2000) 'Design education in the university: Professional studies for the knowledge economy', *Re-inventing Design Education in the University Conference*, Curtin University of Technology, Perth, November.

Friesen, N. (2003) 'Three objections to learning objects and e-learning standards'. Date accessed May 10, 2006.
<http://www.learningspaces.org/n/papers/objections.html>.

Hjorth, L. (2005) 'Locating mobility: Practices of co-presence and the persistence of the postal metaphor in SMS/MMS mobile phone

customisation in Melbourne', *Fibreculture Journal*. 6:mobility. Date accessed March 18, 2006.

http://journal.fibreculture.org/issue6/issue6_hjorth.html.

Hung, D.W.L. & Chan, D.T. (2001). 'Situated cognition, Vysotskian thought and learning for the communities of practice perspective: Implications for the design of web-based e-learning', *Education Media International*, Vol.38 No.1, pp. 3-12. Date accessed March 18, 2006.
<http://www.tandf.co.uk/journals>

Kennedy D.M, McNaught, C. (1997) Design elements for interactive multimedia. *Australian Journal of Educational Technology* 13(1), 1-22

Lambert, S. (2003) 'Collaborative design projects: Evaluating students' online discussions', in Thiele, G. C. D., Scholten, I., Barker, S. & Baron, J. (Eds.), *Interact, Integrate, Impact: Proceedings of the 20th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education*. Adelaide, December 2003.

Laurillard, D. (2002) *Rethinking university teaching: A conversational framework for the effective use of learning technologies*, Routledge, London.

Lawson, B. (1980) *How Designers Think*. The Architectural Press Ltd, London.

Leaver, T. (2003) 'WebCT: Will the future of online education be user-friendly?' *Fibreculture Journal*. 2: new media, new worlds. Date accessed April 18, 2006.

http://journal.fibreculture.org/issue2/issue2_leaver.html

Lin, A. (2005) 'Gendered, bilingual communication practices: Mobile text-messaging among Hong Kong college students', *Fibreculture Journal*. 6:mobility. Date accessed March 18, 2006. http://journal.fibreculture.org/issue6/issue6_lin.html.

Mallinen,S. (2001) 'Towards online pedagogy: Teachers' beliefs about learning and ICT in instruction at Lahti Polytechnic', *Masters in Education Studies*, Loughborough University, UK.

McLoughlin, C and Luca, J. (1999) Lonely outpourings or reasoned dialogue? An analysis of text based conferencing as a tool to support learning. Proceedings of the 16th Annual Conference of the Australian Society for Computers in Learning Tertiary Education (ASCILITE'99), Brisbane, Australia, 217-228.

<http://www.ascilite.org.au/conferences/brisbane99/papers/mcloughlinluca.pdf>

Oliver, R. (2003) 'Welcome address: Achieving a true networked learning environment', Blackboard Asia Pacific Users Conference, Melbourne, November.

Owen, M. (2007) 'The learning now arriving at platform...' Date accessed March 1, 2007. <http://flux.futurelab.org.uk/2007/01/15/the-learning-now-arriving-at-platform/>

Prendergast, G. (2004) 'Blended collaborative learning: Online teaching of online educators.' Date accessed April 23, 2006.

<http://www.globaled.com/articles/GerardPrendergast2004.pdf>

Salmon, G. (2003) E-moderating: The key to teaching and learning online, Routledge, London.

Sherry, L., (2001) 'Internet and World Wide Web Usage in an Institution of Higher Learning', in Johnson, D. Lamont & Maddux, Cleborne D. (Eds.) The Web in Higher Education: assessing the impact and fulfilling the potential, Hawthorn Press, New York, pp. 91-106.

Stephenson, J. (2001) Teaching and learning online: Pedagogies for new technologies. Kogan Page, London.

Whitehouse, D. (2000) 'Developing the trinity: History, theory and criticism', Re-inventing Design Education in the University Conference, Curtin University of Technology, Perth, November.

Whitehouse, D. (2002) 'The question of relevance', In K. Connellan (Ed.) Opening Pandora's Box: Curriculum research into history and theory of Design in Australia, University of South Australia. Adelaide: pp. 142-152.

Whitehouse, D & Wragg, N (2006) 'Engaging online learning communities – the way of the future', in Anderson, L. & Jackson, S. (Eds.), The New Design Nexus: ICT,

changing demographics and sustainability. Lab3000 – leading by design, Melbourne, Australia: pp. 55-73.