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ABSTRACT: In 2009, Deakin University and the Chinese University of Hong Kong trailed the use of Web 2.0 technologies to enhance learning outcomes in a third year architectural design studio that was modelled on the Virtual Design Studios (VDS) of past decades. The studio developed the VDS further by integrating a social learning environment into the blended learning experience.

The Web 2.0 VDS utilised the social networking sites Ning.com, YouTube and Skype; various 3D modelling and video- and/or image-processing software; plus chat-software. These were used in combination to deliver lectures, communicate learning goals, disseminate learning resources, submit work, and provide feedback and comments on various design works in assessing students’ outcomes. This paper centres on issues of learning and teaching associated with the development of a Social Network VDS (SNVDS).

Keywords: design studio, architectural education, Web 2.0, social networks

INTRODUCTION

With the advent of Web 2.0 technologies, the Virtual Design Studio (VDS) has been revived in many schools of architecture around the globe. The recently evolving online Social Networks (SN) platforms, as instruments for learning, are providing a potentially fruitful operative base for VDS. The here presented Social Network Virtual Design Studio (SNVDS) is an innovative method of teaching students the skills required for their future professional engagements offshore and remote locations. The SNVDS enabled students to develop multimedia communication skills, evidence-based design strategies, and achieving learning outcomes that enrich their professional experience.

1. TOWARD A SOCIAL NETWORKED DESIGN STUDIO

This design studio is the outcome of collaboration between the authors in a design studio based at <name omitted>, Australia. The authors have evolved an approach to design studio pedagogy independently over the last decade based on their respective research areas (Ham 2008; Howe and Schnabel 2010). These research areas can be defined as the web-enhanced design studio and VDS. The web-enhanced design studio research relates generally to the use of the online environment to enhance design studio through a variety of methods. The VDS is a much more specialized area of design studio research involving digital tools to enable collaboration between remote parties to a design project. This paper represents an integration of these two research areas in a pilot SNVDS.

1.1. The Virtual Design Studio (VDS)

The early nineties saw the emergence of one particular form of design studio, which investigated various possibilities that digital media and Virtual Environments (VE) can offer to the learning and the exploring of architectural design (Kvan 2001). These Virtual Design Studios (VDS) established virtuality as acting while physically distant or as acting by employing digital tools (Maher et al 2000). VE were established by the choice of design (Achten 2001), way of communication (Schmitt 1997) or digital tools (Kurmann 1995). Later the VDS developed into real immersion within a VE, the medium for design interaction being the VE Design Studio (VeDS) (Schnabel 2002). With the advent of Web 2.0 technologies, it became apparent that the next logical step to develop the VDS was collaboration within a social learning environment. Ease of communication, leadership opportunity, democratic interaction, teamwork, and the sense of community are some of the improved aspects that are offered by SN (Owen et al 2006). Mitchell (1995) also refers to the need for an ongoing evolution of the VDS towards a fully integrated studio where the borders between realms, professions, tools and mode of communications are dismantled. Subsequently the advancement of VDS moves design education beyond conventional boundaries and curricula, and engages participants socially from diverse backgrounds, locations and fields. This leads to novel learning activities that match with the students’ way of interaction and communication; subsequently enhancing deep learning within a social intelligent network of learners.

1.2. The Web-enhanced Design Studio

The web-enhanced design studio research has evolved over a period of ten years, starting with a government funded Committee for University Teaching and Staff Development grant. This grant involved the development of digital “Games” in design education (Woodbury et al 2001), leading to student-created online construction learning resources (Ham et al 2002). These involved the framing of projects around an online case study, wherein students
contributed to the case study through the creation of web-based research projects. Further developments include the integration of construction management and architecture units online (Ham 2002) and the application of an industry-based content management system as a precursor to the University’s Learning Management System, Deakin Studies Online (DSO) (Ham and Dawson 2004). As online technologies have evolved, this research has re-focused on the use of Web 2.0 technologies such as blogs to overcome the learning overheads for students to work online.

2. THE SOCIAL NETWORKED DESIGN STUDIO

The architectural design studio presented here is a core third year design unit in the Bachelor programme at <name omitted>. The studio operates in on-campus mode with an enrolment of 108 students. The unit is the last unit in the undergraduate degree and thus represents a capstone experience. The unit guide included the following description:

SRD364 is the culmination of a sequence of design studies within the Bachelor of Design (Architecture) […]. This curriculum has been put together to promote your ability to integrate the knowledge and understanding you have gained during your studies for this degree and sit alongside units in complementary streams […].

The theme of Architecture Design 3B is “Sustainable architecture in the International Context”. The exact nature of the project work will be revealed as the unit progresses. The focus on sustainability (environmental, social and economic) in the unit intends to address the immediate issues of climate change that “we” have allowed to develop to a crisis level. Architecture, as part of the building industry contributes greatly to resource depletion and ecological degradation. Architectural design-the focus of this unit- has the potential to minimise this contribution through the creative implementation of sustainable thinking into the design process […]. (Architecture 3b Unit Guide)

The unit was hosted on Ning.com. “Ning competes with social sites like MySpace, Facebook and BigTent by appealing to people who want to create their own social networks around specific interests with their own visual design, choice of features and member data. The central feature of Ning is that anyone can create their own social network for a particular topic or need, catering to specific membership bases”. (http://en.wikipedia.org/wiki/Ning.com accessed 15th August 2010) Ning.com is easy to use and has an interface that allows different skins, plug in applications and user options to suit different network needs and user preferences. The authors set up the basic infrastructure of the course network named www.deakin2009.ning.com, then invited students to join and take ownership of the network. Similarly to Facebook users set up their own profile, have their “my page”, and upload images, videos and participate in discussions and commentary of all network activities. Alerts and events can be set up, with notifications going to all or individual members. Students use the network for most of their collaboration and presentation undertakings as well as their social platform to interact with their peers, tutors, instructors or external guests. The DSO was used only for the mandatory minimum requirements as defined by University policy.

The Architecture 3b SNVDS comprised two projects: a four week project designing a ‘Future House for the year 2050’ (weighted 30%) and a seven weeks project based on the design of a pencil tower in Hong Kong (weighted 70%). Each project utilized different attributes of Web 2.0 technologies within a blended learning environment to achieve complementary learning goals. The unit was staged so that students were exposed to complementary elements of Web 2.0 technologies.

2.1. Project 1: Future House

The project outline described provided the background and basis for Project 1:

You are asked to design a house for the future. The year is 2050; the site will be a vacant block in the Deakin Waterfront carpark in 5 Cavendish St, Geelong […]. Your client is a company that specialises in sustainable housing for the contemporary market. Your team has been engaged to design a contemporary house that is “loose fit”, adaptable to the needs of the “typical” family of the 2050’s and sustainable in energy usage, and low-impact materials (SRD364 Project outline)

The project required students to think about the future and the future of architecture. It introduced students to concepts of modularity, prefabrication and sustainable construction methods. Studio sessions were conducted in traditional ‘face to face’ mode over the duration of the project. Complementary to this mode of delivery, students were asked to present their design work in the form of an eight to ten minute video.

Students set up their own YouTube accounts, then posted their videos to YouTube. Students submitted their projects in the form of an email to the unit chair with the embedded html-code linking to their video on YouTube. In 2006 the School’s IT staff had already created an online Virtual Gallery called “a+b Gallery” (www.ab.deakin.edu.au/online). The current work was subsequently added to this gallery (http://www.ab.deakin.edu.au/online/blogs/srd364-2009.php). This Virtual Gallery was built simply by setting up a table in html, then pasting the embed code (derived from YouTube). Alongside the link to the YouTube videos, an email-link was added to allow comments to be emailed directly to the respective students with a copy to the unit chair (Figure 1). To facilitate international feedback on students’ work, an invitation to review was emailed to colleagues and peers of unit staff. These external reviewers included architects, academics and educators from Hong Kong, China, America and universities around Australia. Their comments were then used to inform assessment and provide students with additional feedback of how their work was perceived within an international context.
The design of this project intended to provide students with an alternative to the conventional paper-based poster and review format of assessment. YouTube based submissions challenged students to express their design in a different medium, allowing their designs to be exposed to a different audience that ranged from friends, over peers to professionals all over the world; additionally students could compare their own design and progress with their peers’ solution.

**Figure 1:**  Future House Virtual Gallery: www.ab.deakin.edu.au/online

2.2. Project 2: Future City
The second design project in the studio sought to engage in Web 2.0 technologies to complement understandings of the potential of the social network in the design studio. The principle device was the location of the design studio outside of the “home” country of Australia. In furthering the unit theme of “Sustainable architecture in the International Context”, the location of the project on a site in the district of Tsim Sha Tsui in Hong Kong represented serious challenges for students. Many students had not travelled extensively through Asia, only a handful of students had visited Hong Kong and no students (other than exchange students) had designed a project outside of Australia. The two drivers for the unit were outlined as follows on the project description:

In developing this unit, we had uppermost in our minds the need to address a significant shortcoming in student design work to date- the composition of tightly planned spatial arrangements that minimise wasted space but result in spaces that enhance the wellbeing of people that live and work within them.

A second key driver of this unit was the desire to challenge students with unusual, complex and difficult briefs that represent challenges appropriate for the third year of University.

The project required students to ‘design a multi-storey building using the footprint of the existing building that responds to the cultural and commercial contexts of the site and surrounds’. The building brief required a fifteen storey mixed use ‘pencil tower’ with a flagship ground floor store, five levels of mixed retail, four levels of offices and three levels of restaurants within a footprint of approximately 8m x 10m.

The key learning resources of the selected site in Tsim Sha Tsui (CAD plans, photographs, videos, reading references, respective governments departments’ websites, etc) were made available to the students allowing them to get started with their own investigations. The placement of a design project in such an overseas location required independent learning and social exchange and engagement to understand local planning and building regulations, culture and local context, climatic conditions, etc. These challenges were overcome through the use of Hong Kong-based virtual studio instructor, who possessed the knowledge and experience required to ensure effective project delivery and accuracy. Students also engaged directly with online acquaintances of Hong Kong via their various networking channels (Chat, Facebook, YouTube, etc). This allowed them to tap into their own social capital by using the collective intelligence to enlarge their own knowledge.
3. THE POTENTIAL OF SOCIAL NETWORKING AS FACILITATOR OF DESIGN EDUCATION

Social networking acted as a facilitator for a design education experience that provides an alternative experience to the traditional design studio. Traditional design studios generally consist of a number of projects delivered in face-to-face mode on campus, based on sites that are accessible physically by students. Lectures are delivered on design topics in lecture theatres, with occasional industry guests complimenting design studio staff in delivery. Weekly studio sessions and formative and summative review sessions are held in the studio. Project submission is usually in the form of posters and models, with students presenting their work to review panels comprising industry practitioners and academics. This model of studio education is a derivation of the Ecole Royales des Beaux Arts academy model, wherein the design problem assigned to the student early in the term and developed under close tutelage with peers. They began as an esquisse, or sketch problem, and ended en charrette (in cart) for review by studio masters (Schön 1985).

3.1. Technologies of the SNVDS

As all reported in VDS over the past decades, technologies have a big impact on the design studio. However, many of these challenges are overcome by the advancement of digital instruments and the expertise of the participants. Dependency on skills, hard- and software as well as familiarity with the media and learning environment are greatly removed. Some of the features that contributed significantly are presented in the following.

3.1.1. Skype

Skype is a free programme that allows high definition video and voice communication over the Internet. Skype acted as an enabler of the SNVDS by allowing a line of communication between students and staff from <name omitted> and staff, students and people from Hong Kong. To enable Skype interaction, school IT staff had to reconfigure the Skype proxy settings to overcome the University firewall. Once this was done, full Skype access was enabled.

Virtual studio staff delivered a number of lectures via Skype to lecture theatres in Geelong allowing the dissemination of important knowledge on the Hong Kong site. Skype lectures were delivered in a similar manner as traditional lectures, with the video image of the virtual studio staff project on the lecture theatre screen and a laptop with camera directed to the students and in-situ staff. In this manner, the virtual lecturer was fully engaged with the class. Both sides did not perceive a distance between them due to the medium of communication despite occasional limitation of internet bandwidth creating delays in voice or breaks in the video streams.

This method could be expanded in future through the ‘Mobile Skype Lectures’ in-situ of the remote location of the site. Potentially, virtual studio staff with laptop and mobile Internet access could conduct site visits and relay video and sound footage live to classroom, studio crit or student collaboration. This would greatly increase the sense of immersion into the site environment in a way that cannot be achieved through photos, videos and online sources alone.

Skype was also used in the final review for the project. Although the project submission was conventional in the form of posters and models, and reviews were conducted at Deakin face-to-face, virtual studio staff contributed to the reviews through the Skype interface. This was achieved by setting up a laptop computer with speakers in the review session to enable the virtual reviewers to participate directly on the review session. Digital images of posters were posted at the online gallery to enable independent analysis. The additional element of the design crit builds on the findings of Kvan et al (2005) whereby comments or questions posted in the chat window of Skype contributed actively to the de-liberation of the presented work. Questions and comments were asked by all the audience, virtual and in-situ staff while responses were then given to the presenters. Whereby the medium of the communication did not interfere with the flow and presented no perceived difference. Thus, the virtual reviewer possessed a real presence and reality and virtuality was blended into a mixed realm of concurrent presence. Some limitations can occur depending on the use of an appropriate audio and video system as well as available bandwidth.

Significant potential exists for the further use of Skype in the design studio. A problem identified in a recent professional evaluation of the Architecture Degree at Deakin is the potential for further engagement with industry practitioners. The location of the Deakin campus away from the capital city reduces the availability of practitioners willing to donate their time for studio sessions, lectures and reviews. Skype has been used in this studio to bring in virtual studio staff from Hong Kong (Schnabel and Howe 2010). More recently in 2010, Skype-based lectures have been used in the design studio for Melbourne-based practitioners to deliver a talk from their office setting. This could significantly improve industry engagement into the programme by enabling industry lectures with a reduced overhead from the guest lecturers. Project slides and other media can be simultaneous delivered via free online slide hosts (such as www.slide.com).

3.1.2. Ning.com

The location of the design project in Hong Kong was ideal for a VDS that is facilitated and aided by a SN platform. Students were surveyed at the beginning of the semester on whether they used a SN and what their attitudes towards the use of social networks in the design studio were. Over 90% of students already used Facebook or MySpace. Students demonstrated an overwhelmingly positive attitude to the use of SN in the design studio prior at the start of semester, with over 80% of students considering social networking as a positive contributor to the design studio. The issues of privacy of personal information and the redundancy of joining a secondary SN (Ning, in addition to Facebook) are the only negatives raised during this brief survey. Yet the Ning allows for several level of privacy that can address all raised concerns.
The Web 2.0 interface Ning (Figure 3) served not only as an information repository for research related to the project but also as meeting point for discussion, exchange and exploration of ideas. Students were asked to undertake research relating to their design task, such as site-conditions, Hong Kong’s culture, climate and building regulations, etc. and then post this information as a shared resource for all participants. Staff, both in-situ and virtual, were able to add videos and images to assist in the building of an online project resource. The flat hierarchy, the possibility to take ownership as well as the social interaction are key elements that make the SN successful. The course Ning site acted only as an empty shelf that was subsequently filled and populated through the social engagement of the participants, regardless of their background or expertise. By giving full responsibility to the students, they took ownership of their work within their social learning environment allowing for a high social intelligence to grow that was free of private ownership, or taking of individual advantages.

Peer-to-peer feedback became a natural process through the social component the interface offers to participants. Students were removed from a single authorship design and shared their learning resources as social interaction among them: images, drawings, CAD models, collages, texts, photos of physical models in development. Students were not confined to studio and class time only, but could contribute at any location and time via mobile phone, WiFi and remote network access, while feedback could be given similarly remotely by peers, facilitators or WWW-guests. The Web 2.0 VDS was undertaken in groups of three, students set up their own sub-network within the Web 2.0 VDS framework, which enabled them teamwork remote and co-located, and while at the same time any sub-network was part of the overall VDS.

Significant opportunities were provided for students by the ability for student-staff interaction online, outside of studio hours. Traditionally at <name omitted>, this is limited to emails and telephone calls only in circumstances where special consideration is required for illness or other problems. The SN environment allowed students to post their latest project work for staff to offer brief comments to assist progress. This was done by on-campus and off-campus (in-situ and virtual) staff alike in a manner that further blurred the distinction between virtual and real. Learning and teaching within a SN reflects the communication needs and styles of the ‘Generation Net’ (Oblinger & Oblinger 2005). However, it method of engagement is receiving some aversions by conventional studio instructors. Their concerns relate to the issue of ‘out-of-hours’ contact, whereby students would expect similar response from others instructors.

In 2010, Ning.com decided to charge for their services and discontinue their free availability. As a result, the next design studios will employ a group in Facebook as platform of the upcoming SNVDS.

3.1.3. YouTube

Great potential exists for expanded use of YouTube as a medium for the delivery and submission of design projects. YouTube is being used at this institution in construction technology units as a repository of student-authored construction case studies. Engagement in the medium of video offers a very different learning experience for students, and enables the capacities of sound, motion, voice-over and text to be integrated into studio projects. As the sole vehicle for the delivery of design information, every piece of design information needs to be included in these videos- with no opportunity for students to enhance limitations in their outcome through a review conversation.

Figure 2: Ning social Network screen shot: www.deakin2009.ning.com
Video-making is not taught in the class, but the ease of freely available programmes such as *iMovie HD* and *Windows MovieMaker* – in conjunction with countless tutorial videos posted to YouTube – overcome the skill training overhead inherent with any digital instrument. This was not raised as an issue in student unit evaluation, which indicates that students overcame technological issues easily. The high quality of the output indicates a relative ease of digital mastery amongst the cohort. Thus, YouTube became the submission and presentation medium as well as the outlet demonstrating the learning of other skills and proficiencies in technology required for projects.

Key to the success of the project was the ability to create a Virtual Gallery (see above) from the cohort’s YouTube-based submissions. This gallery places all videos on one website and, with an email-link, allows instant feedback from academics, professionals, peers and the general public. YouTube and similar sites offer video albums and playlists as one of their features. Significant potential exists here in future developments using multimedia in the design studio to overcome the problems identified above in relation to limited professional and industry exchange with design studios.

### 3.2. Online Student Engagement

This SNVDS resulted in several thousand online interactions. In the last month of semester, the www.deakin2009.ning.com website reported 3,928 visits, with between 74 and 229 site visits per day by members culminating in 36,945 page views. Unit evaluation revealed 76.6% agreement with the statement that ‘the on-line teaching and resources in this unit enhanced my learning experience’, a 13.2% increase for the same studio in 2008 using DSO and blogs. Agreement with the statement that ‘the technologies used to deliver the online content in this unit performed satisfactorily’ increased from 68.2% in 2008 to 76.0% in 2009.

End-of-semester anonymous student evaluation yielded a range of comments in relation to the engagement in social networking. Students were asked ‘what is the best aspect of your unit?’ Most of these revealed a positive attitude towards the idea of the SNVDS:

The online feedback and interaction through Ning, the guest speakers via Skype, a new direction in the design briefs for Projects 1 & 2 compared to previous years. YouTube and the competition like presentations.

The on-line use of NING.com was excellent and greatly assisted in the subject. The online feedback and the ability to post photos and videos onto the pages for the unit within the Ning social network.

Students appeared to understand the relationship between the use of these technologies and the setting of the project overseas:

**Getting out of my comfort zone and having to think about things in completely new ways**

Was the range of designs, possibilities, the way taught and interaction between staff, students and outside opinions. Such as Skype calls which concerned the projects. Every area was covered well for each submission never having to question what needed to be done, if there were it was quickly sorted out. Thoroughly enjoyed the final submission review, with competition style by which allowed more students to look at others work and give helpful advice and opinions.

**Being able to design something very different to other years**

The brief for project 2 and the movie concept for project 1 are to be congratulated. Hong Kong was a great project, a scale foreign to most of us.

Students were also asked ‘What aspects of your unit were most in need of improvement?’.

Problems were revealed in the high workload, tutor’s understanding of the project requirements and some operational aspects of the unit. The placement of a project in Hong Kong meant that both students and staff were required to learn, so the safety net of traditional project did not apply in this case. A selection of comments revealed some of the problems with the SNVDS:

**Maybe a few extra weeks for the semester would enable us to get some more sleep!**

The use of ning.com as our ‘DSO’ was difficult to navigate, and I believe are more user friendly site could be found in the future.

**Perhaps make it compulsory for online interaction with a grade allocation of 10%**

**Ning: most of the stuff I tried posting disappeared into a black hole and I never saw it again.**

From a cohort of 108 students in 2009, 16 students failed, 26 obtained a Pass, 38 credits, 35 distinctions and 5 high distinctions. Some consideration may be given that every cohort is different; however, a SNVDS adds additional challenges associated with the virtual project work compared to conventional studios. Comments such as ‘Extremely challenging and took a lot of time at uni and at home, however learnt a great deal which was fantastic’ provide an insight into the learning outcomes for the students. The SNVDS allowed students to engage with each others as well as with instructors and professionals in an advanced way, which in return may cost time for individual learning.
However, social capital and social intelligence is not evaluated in the current grading schemata of higher education. All results can be explored at the SNVDS-website: www.deakin2009.ning.com (Figure 3).

**CONCLUSION**

Most approaches to problem-based learning are sequential, not surprising since its original format comprised seven steps (Schmidt 1983). However, linear formats can be limiting because they impose a structure that does not always fit well with the iterative and reflexive processes that facilitate deep learning. Although one of the great strengths of problem-based learning has been its integration of the social learning environment into the blended learning experience, its linear formulation can inhibit creative knowledge development. Flexible interplay between the “step” components better reflects the social experience of students of the Net-generation (Oblinger & Oblinger 2005). Hence, in student-focused learning and teaching it becomes important to integrate the various online participatory media, which sup-port multi-channel learning, now possible with Web 2.0 technologies.

Online technologies of Web 2.0, in embracing problem-based learning, has utilized blended learning formats where face-to-face discussion is supported by didactic or web. However, the internet, when envisaged as a filing cabinet for resources or post-box for online interaction, is too unwieldy to generate the experience of flow that motivates deep learning. Most universities are employing Learning Management Systems (LMS) that provide platforms to meet the basic needs of online or blended learning; however, its effectiveness is limited by a typical Web 1.0 approach to learning and teaching. Real potentials exist for working within an online social network setting, where educators can create a learning environment that relates to, and responds to the needs of the Net-generation.

SN technologies offer new opportunities for creative development of problem-based learning because disciplinary, professional, institutional and national boundaries are by its definition more easily permeated and removed.

In a non-linear model of these processes, which allows for movement between the components at any stage of the problem-based learning process, learning is informed by a variety of blended activities allowing for a networked experience that is already an embedded part of our students’ current socio-cultural environment. Problem-based learning is shifting from its centralised facilitated and directed mode to a syndication of personal communication. Learners have access to information in ways that fit their learning profile. This is a fundamental development in the learning environment that educators now must address. Social multi-nodal networking sites, such as Ning, YouTube, Google Docs, Doodle, Wiki, various multi-dimensional software platforms, real-time video streaming and image-processing, as well as interactive chat-environments, like Facebook and even Twitter can be meaningfully integrated in learning activities, which communicate learning goals, disseminate learning resources, create knowledge and original ideas, provide feedback and finally align with assessment of learning outcomes. The next generation of technologies is already elevating problem-based learning to an even more sophisticated interchange of discovery and synthesis. These interactive technologies will revolutionise evidence-based research. Providers of integrated portals, like Google Wave or Microsoft’s Connected Services Framework, are already facilitating multi-channel engagement. These media-rich platforms allow us to reframe our problems and subsequently the ways in which these problems can be explored in learning activities, thus enriching our current praxis of problem-based learning.
In most current usage, problem-based learning sustains social interaction but essentially focuses on the development of the individual learner. When enriched by these new technologies, which are much more effective at tapping into social capital, it becomes possible to achieve higher levels of collective intelligence. The learning process is less dependent on the teacher’s formulation of the problem as it becomes possible to tap into global professional and other communities. Thus, the social networking of the learners and their sharing of embedded knowledge not only contributes to their own deep learning but also ultimately returns their gained expertise to the social environment. The challenge remains the same: to facilitate student learning. It is the way in which we engage each other in these activities that is evolving to match today’s communication needs.

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