2001

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Abstract

The implementation of a studio-based approach to teaching and learning in the Bachelor of Information Management and Systems (BIMS) at Monash University has instituted a new teaching model in which the traditional lecture theatre/tutorial environment is replaced by a model based around the development of collaborative learning and professional environments. Students are learning and practicing the skills and techniques required in the discipline in an environment that simulates the working environments they will encounter subsequently in their professional careers. The information technology infrastructure required for this model of teaching and learning requires just as much re-thinking as does the curriculum and pedagogy.

The paper describes the network, hardware and software requirements, and the peripherals required to support the studio-based model underpinning the BIMS degree. A number of the pitfalls and lessons learnt during this development are also included in the paper.

Keywords

IA01, IA03

INTRODUCTION

The Bachelor of Information Management and Systems (BIMS) at Monash University, is a vocationally oriented three-year IT degree with a strong practical focus. It aims to prepare students for careers in the development and management of information systems, and does this in a purpose built 'studio' environment.

The studio-based model has its origins in the Bauhaus school of design's model for teaching and learning. Though the Bauhaus was established in the early 1920s, a number of its educational concepts appealed to the BIMS development team. One of the aims of the original Bauhaus was 'to encourage the individual artisans and craftsmen to work cooperatively and combine all of their skills'. Another aim was 'to maintain contact with the leaders of industry' (Flores). These aims, together with the industrial style of the Bauhaus design have had a strong influence on the curriculum, the pedagogy, and the physical design of the teaching and learning space.

The traditional lecture theatre, tutorial room and laboratory environment has been replaced by seminars, integrated curriculum, problem-based learning, and collaboration, all occurring in a physical space that is similar to what students will encounter in their professional careers.

Whilst students undertake their degree they are exposed to a teaching and learning model that encourages them to practice skills and techniques, learn new concepts, learn from mentors, and collaborate whilst working in an environment that encourages learning by doing, and one that is supported by information technology.

The following sections provide background to the studio model adapted for the BIMS degree with respect to the teaching and learning approach, the physical structure of the studio precinct, and thirdly, the context of this paper, the IT infrastructure required to support the studio model

THE PHYSICAL ENVIRONMENT

The design of the studio precinct includes a number of spaces; the studios themselves, an Internet cafe, a meeting room, and an area for technical support staff. The main teaching space for the studio subject is the 'studio'. There are currently two studio spaces. Studio 1 is the foundation space where basic critical skills could be acquired and developed. Each of the six half elliptical shaped tables have two high powered desktop computers, and six chairs (Figure 1).

Studio 2 (Figure 2).has been designed as a space where more intense teamwork can be undertaken. The large conference-type table in the centre of the room is used for discussions with up to 25 students/staff, where the smaller 'D' shaped tables on the room's perimeter is used for groups of five. Each 'D' shaped table has two high powered desktop computers

Figure 1: Studio 1

Figure 2: Studio 2

There are three other spaces within the studio precinct that have been designed for students use throughout their course. These are a meeting room (Figure 3) and an Internet cafe (Figure 4). The meeting room has been designed as a professional space with high quality furniture and facilities. It is used for consultations, studio group meetings, student meetings, presentations, and ad hoc purposes.

The cafe is the informal meeting place and social centre of the BIMS studio precinct and its design and location reflect this. The cafe has computer network faculties and a high end Macintosh computer. As the studio precinct is available twenty-four hours a day, seven days a week, the cafe has kitchen facilities.

Figure 3: The Meeting Room

Figure 4: The Internet Cafe

THE CURRICULUM AND PEDAGOGY

Central to the BIMS program is a compulsory (or core) year-long studio subject in each year of the program. Other core subjects encompass areas such as information systems, information management, systems analysis and design, project management, the Internet, and multimedia. In addition to the core subjects there are semester long elective subjects. One of the features of the studio-based approach in the BIMS course is the integration of the core subjects at each level in the degree.

Twenty-five percent of the program is devoted to teaching in the studio space where the studio subject draws on content, concepts and skills learnt in the other core subjects. Complementing the integrated curriculum is the use of a problem-based learning approach which gives students an opportunity to develop strategies, cooperate, collaborate, be individual, and acquire or develop the required skills to solve a problem. The value of integrating core curriculum into 'studio' and learning by doing has been reported by Lynch et al (2001), Carbone et al (2000) and Gonsalves et al (2000), and as such is not covered in this paper.

Students present their work throughout the year as a portfolio. This portfolio exhibits the skills they have gained, the knowledge they have acquired, and often includes a reflection of their development throughout the program. A percentage of the portfolio is dedicated to items that the students select themselves, the rest of the portfolio is dedicated to set of mandatory tasks. Many of the tasks are the results of group work. Over the semester and subsequent year, the portfolio is used for reflection (Schon, 1983).

The environment and the curriculum have been designed for students to give the students as many opportunities to develop skills, knowledge and many of the 'life-skills' required to be an effective member of the IT profession.

INFORMATION TECHNOLOGY INFRASTRUCTURE

One of the basic ideologies behind the BIMS studio-approach is to simulate professional practice. With this in mind, the IT infrastructure has been designed to support the students whether they are within the physical space, away from it, on campus or off campus. Together with this professional environment, the IT infrastructure has been designed to support the curriculum and the pedagogy. Figure 5 shows students working in the studio precinct, and using the available technology for their work.

Figure 5: Using the technology

The IT infrastructure can be divided into four areas; network, hardware and software, peripherals, and the electronic community.

Network

All BIMS computers are connected to the Internet, the university student network, and the SIMS network. Connectivity to each of these networks allows students to become familiar with complex computer systems, and enables them to select the most appropriate system for the task at hand. The university student network provides shared server space that can be accessed anywhere within the university.

The SIMS network uses a Citrix Metaframe (thin client) environment. Citrix technology uses server-based applications for end users operating a variety of client devices and platforms. All applications are installed, updated and maintained on a central server instead of on each individual client. The applications execute 100 percent on the server, with an increase performance because Citrix software requires only keystrokes, mouse clicks and screen updates to be transmitted over the network between the server and client. Using this environment, students can access software from within the studio precinct or access it remotely using a Web browser. The ability to access the software via the Web is beneficial to the students, and conforms to the overarching philosophy of the studio-model under which the program operates. Students can access the specialist software without requiring their own software license, a high-end computer, or a specific operating system.

There is also a radio frequency (RF) network throughout the studio precinct. There are two Apple AirPort Base stations are installed in the studio precinct. The network uses radio signals to communicate through solid objects, have a range of approximately 45 metres and run at 11 Mbps. The RF network is accessible throughout the studio precinct and within its perimeter – including the grassed areas adjoining the building. The versatility of this network allows laptops equipped with a radio frequency network card to access a variety of networks without being confined to the 'classroom'. Tutors, students and staff can have their private laptops configured to use the Studio RF network.

Hardware

The student computer network run under Windows 2000 operating system and the Macintosh computers operate under OS9. There is two configurations for the studio computers ranging from a standard multimedia computer configuration (128 Meg RAM, 17"monitor), and floppy 'drive-less' computers The decision to have one studio without internal floppy drives was to made to encourage students to think and work electronically. There are USB floppy drives available for loan.

To enable the students to explore other computer environments, an Apple iMacDVD is in located in the Internet cafe and numerous Apple iBook notebooks are available for student use. A Windows laptop is also available for use within the studio precinct or off site. All notebooks/laptops have RF network cards installed and configured for use in the Studio RF network.

Software

The majority of software applications are served using the Citrix network. In addition to the University standard applications, specific software as determined by academic staff and suggestions by students, is installed on the Citrix server for network access. Some software is installed on the individual computers' harddisk, but this is kept to a minimum due to high level of maintenance. A software image of the Studio computers is made every semester, or more regularly if required. This image ensures that any one computer can be re-built in as short a time as possible.

Peripherals

In tune with the overall philosophy of the BIMS studio-based teaching and learning environment, equipment has been purchased for students and staff. A loan system has been developed to administer the movement of the peripherals. Most of the equipment can be borrowed for use on or off campus, though borrowing is limited to overnight unless special arrangements are made. The equipment includes digital cameras, desk-top video conferencing cameras, iBook and Windows notebook computers, USB and serial, USB floppy drives, USB/parallel scanner, microphones, headphones, and a variety of zip drives copyright free clipart/image CD-ROMS. A small, high luminance data projector is also available for student in-precinct loan, or staff loan. Each studio contains a high quality colour laser printer/photocopier/scanner. These printers are used on a cost-recovery basis using a card system for both printing and photocopying, scanning is free. The card system used is compliant with other systems within the University.

Electronic community

The studio-based model used in the BIMS program is premised on the assumption that the most appropriate teaching environment for future professionals in IT-related careers is one that blends the use of technology with traditional teaching approaches and with studio-based teaching. Currently the School of Information Management & Systems operates, though not solely, a Lotus Notes environment of which several of the facilities within Lotus Notes are used. Students are encouraged to use technologies that enable and assist them in collaborating with their peers, and communicating with tutors and academics. Students are taught how to effectively use communication technologies throughout the course of their work. The following communication technologies are used to support the environment:

- Asynchronous threaded discussion groups (Lotus Notes),
- Synchronous communications (ICQ, NetMeeting),
- Use of video and audio telecommunications (Real Networks, NetMeeting),
- Short message service.

The teaching and learning community is also supported through the use of:

- Computer-aided assessment (in-house product), in the form of Web-based multiple-choice questions.
- Seminar notes, studio exercises, and numerous resources are available in either HTML or PDF format.
- Class schedule and general information available o the Web (uses Lotus Notes)
- Limited software, such as Visual Basic and Access, available through a Web browser (uses the Citrix client)
- A web-based simulation using Flash5. The simulation was developed to supplement one specific area of the IMS1000 curriculum. This application, called AD PC, simulates the assembling and disassembling of a basic personal computer.

PITFALL AND LESSONS

A student survey was conducted in semester two of 2000. This survey focused on the students' perception of the teaching and learning approach, and the physical environment (spaces and facilities), as compared to the traditional university teaching and learning approach. This paper focuses on the IT infrastructure sections of the survey.

In general students gave positive feedback on the IT infrastructure supporting the studio environment. With students commenting on the 'professional' nature of the IT infrastructure, and the availability of equipment for loan or for use within the studio precinct.

The most overwhelming negative issue raised was in relation to the number of times students were required to log-in to networks. This has been resolved through the consultation with, and assistance of University network administrator to streamlining the log-in procedures. The second major concern that became evident in the survey was the conflict between some applications served through Citrix. Once again this has been solved through re-installation of the software.

The final negative issue was access to the printer/photocopier, basically there was none. There was a major difficulty with the network printing working. The original plan was to print using the University central print services, but due to a number of technical problems, this could not happen, so a card system was implemented for both printing and photocopying. After endless delays, the printers and card systems have been installed, and assess to printing and copying has been resolved.

From an administrative point of view, there have been other issues of concern. The most prominent one was having fully functional software running thought the Citrix server. The main problem here was that there was a limited amount of Citrix expertise, and as time grew closer to when software was required, the more 'patches' were required and a greater frustration developed.

As time has passed, changes to staff and expertise have given rise to more issues, some of which still need to be resolved.

CONCLUSION

The moving from a traditional teaching and learning model for the delivering of a tertiary IT program, to one that places more responsibility on the students in an integrated and collaborative 'professional' environment is still in its infancy of development and evaluation. If early comments from questionnaires and general comments from students, academic and technical support staff are any indication, the studio-based model used in the Bachelor of Information Management & Systems seems to be giving the students an edge and a greater understanding and experience of the IT profession. But one thing is certain: To be an efficient and supportive environment, the IT infrastructure requires planning and at the same time as the curriculum and the pedagogy. Otherwise, it doesn't matter how good the innovation is, it will faulter in the implementation.

REFERENCES

Apple Computer Australia http://www.apple.com.au/airport/ [Accessed August, 2001]

Carbone, A., Lynch, K., Arnott, D., and Jamieson, P. (2000) Introducing a studio-based learning environment into Information Technology. In proceedings of the Australian Society for Education Technology and the Higher education Research and Development Society of Australia Conference: Flexible learning for a flexible society. (ASET/HERDSA) 2-5 July. Toowoomba, Queensland. Available online at http://cleo.murdoch.edu.au/gen/aset/confs/aset-herdsa2000/procs/carbone.html

Citrix MetaFrame http://www.citrix.com/ [Accessed August, 2001]

Flores, G. *The history of the Bauhaus* (date not available) Available online at: http://www2.ucsc.edu/people/gflores/bauhaus/b1.html [Accessed August, 2000]

Gonsalves, C., and Atchison, M. (2000). Implementing studio for experiential learning. In proceedings of the Fourth Australasian Computing Education Conference (ACE2000). 4-6 December, Melbourne Australia. p116-123

Lynch, K., Carbone, A., Jamieson, P., and Arnott, D. (2001) "Adopting a Bauhaus Philosophy into the Teaching of an Undergraduate IT Degree". Presented at The Learning Conference, Summer, Island of Spetses, Greece. Available online at http://www.learningconference.com/2001/abstracts/LynchK_CarboneA_ArnottD.html [Accessed August, 2000]

Schon, D. A (1983) *The Reflective Practitioner: How Professionals Think in Action* London: Temple Smith

ACKNOWLEDGEMENTS

I wish to acknowledge the work conducted by co-authors of proceeding papers: Angela Carbone, David Arnott, and Peter Jamieson.

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