INTERACT
INTEGRATE
IMPACT

Proceedings of the 20th Annual Conference
of the Australasian Society for Computers in
Learning in Tertiary Education (ASCILITE)

Adelaide, Australia
7–10 December 2003

Editors
Geoffrey Crisp, Di Thiele, Ingrid Scholten, Sandra Barker, Judi Baron

ascilite
**Australasian Society For Computers
In Learning In Tertiary Education**

IMPACT ON TEACHING OF THE FLEXIBLE WIRELESS CLASSROOM

June Gassin
Faculty of Arts
The University of Melbourne, Australia
juneag@unimelb.edu.au

Som Naidu
Department of Teaching, Learning and Research Support
The University of Melbourne, Australia
s.naidu@unimelb.edu.au

Abstract

The Faculty of Arts at the University of Melbourne has implemented three flexible wireless classrooms for teaching and learning in the Humanities. These classrooms are designed to support innovative teaching practices and enhance natural human interactions. This paper reports the results of a survey of the impact on teaching in these classrooms. Results indicate that the opportunities provided by these flexible wireless classrooms substantially influenced particular teaching practices. These included strategies for teaching, engagement of students with the subject matter, socialization and interaction in class and providing feedback to learners. Attributes of the classrooms that had the greatest impact on teaching were the ability to configure space, move about in the classroom and use a variety of technologies.

Keywords
Wireless Classrooms, Impact on Teaching, Flexible Learning Environments

Introduction

Wireless technology is rapidly being introduced throughout the world for education, business, and commerce. In the United States prestigious universities such as Carnegie Mellon and Dartmouth have already implemented ubiquitous wireless computing throughout their campuses (http://www.cmu.edu/compouting/wireless/; http://wwwdarmouth.edu/comp/wireless/using/index.html). Many other institutions around the world are adopting wireless technologies to varying degrees (see Berger, 2001). Wireless technology, however, like any other technology, is not in itself a panacea (Clark, 1994). Reflection on how it can be used to support and encourage the teaching / learning process through the enhancement of interaction, socialization and engagement is required (Bleed, 2001).

The Faculty of Arts at the University of Melbourne has implemented three flexible wireless classrooms for teaching and learning in the Humanities. This paper reports the results of a survey of staff perceptions about their teaching practices in these innovative classrooms. The purpose of this survey has been to ascertain the extent to which the specific features of these flexible wireless environments may have made an impact on common teaching practices. This survey represents the first step of an ongoing investigation into teaching and learning in the wireless classroom. Follow-up interviews to the present survey will focus on the nature and description of actual teaching practice and how it is evolving over time. This topic will be addressed in a subsequent communication.

The Flexible Wireless Classroom

The Faculty of Arts pioneered the concept of the flexible wireless classroom within the University. The first such classroom, the VITAL (Versatile, Integrated, Teaching and Learning) environment, was implemented in 1999 and inaugurated for teaching in March 2000. A complete technical description of the facility and a virtual tour can be found at http://www.artsit.unimelb.edu.au/facilities/vital/

The development of the VITAL environment took place in the context of a large-scale integration of IT and multimedia into the Arts curriculum. The project responded to a range of perceived needs: the need for a high quality electronic space for small group teaching in the Humanities; the need to support and encourage innovative teaching practices involving technology and collaborative learning; and the need to conduct research into teaching and learning with digital technologies in the classroom setting.

The success of the VITAL environment gave rise to the development and implementation of two further wireless classrooms at Melbourne University in its Sidney Myer Asia Centre, which houses the Melbourne Institute of Asian Languages and Societies and AsiaLink. These new wireless classrooms are dedicated to language learning and teaching and have been especially designed and equipped for that purpose. They are unique in Australia and opened for teaching in July 2002. They comprise two 25-place wireless classrooms joined by a central multimedia control room.

Rationale
The rationale for the development of the flexible wireless classrooms was based on both pedagogical and theoretical considerations. It is widely acknowledged that the quality of human interactions in the traditional computer laboratory is unsatisfactory. Everyone is familiar with the difficulty of establishing eye contact and encouraging student interactions when monitors, wires and machine noise combine to prevent natural human interactions. The physical set-up of the traditional lab with computers in rows and each student seated behind his/her computer is generally unsuited to collaborative or team work. Neither students nor teachers can move about freely. The traditional lab also makes a strong statement about what to expect from the teaching/learning situation: technology is clearly the focus of attention.

Theoretical reasons for the innovation mirrored changes in teaching philosophy and practice among academic staff. The extensive integration of IT and multimedia into the Arts curriculum over the past five years has resulted in new modes of teaching, many of them based on constructivist learning theories and collaborative learning approaches. These innovative teaching approaches (cf Debski, 2003; Wallace, Jagose & Gunn, 2003) require new types of teaching spaces and generate new types of classroom dynamics. Socialization, the very cornerstone of constructivist philosophy, remains a crucial aspect of both face-to-face and online learning.

Concept
The basic concept for the wireless classroom was to create an electronic space that was as flexible and versatile as possible. We were familiar with the Flexible Class-lab at Stanford University (http://acomp.stanford.edu/roomsflexLab.html) and used it as a model in the development of the VITAL environment.

We wished, however, to create an environment particularly conducive to natural human interactions and in which technology became almost invisible. The primacy of quality human interaction became an important aspect of the original concept. We believed that technology needed to be integrated into the teaching space in an unobtrusive way. It needed to support rather than direct learning; it needed to enhance and enrich the teaching/learning experience but not dominate it. At the same time we wished to create a teaching space that was easily re-configurable and could be shaped to meet the changing needs of the learning situation. We conceived of the environment in an organic way, allowing movement of both students and teachers as the flow of activities required.

Design
The principal design features of the wireless classrooms are flexibility, mobility and wireless connectivity. Each classroom is equipped with lightweight modular furniture that can be easily re-configured. Tables

are trapezoidal in shape to maximize flexibility. The VITAL environment has a movable data projection system installed on a trolley so that students or teachers may project their work onto any wall of the room. There is no fixed place for the teacher to sit or stand thus creating a space that is less teacher-centred. An entire wall of whiteboard in the VITAL is a design feature. Fifteen Apple iBook laptop computers and the base stations for the Airport wireless technology are stored in a cupboard. The iBooks are easily accessed when required.

The classrooms in the Sidney Myer Asia Centre are larger and are equipped with standard overhead projection facilities, VHS, VCRs, audiotape and CD-ROM units. There are fifty laptop computers in all, twenty-five each of Apple iBooks and Toshiba portables. They are stored on trolleys that are wheeled into the classroom. Teachers therefore have the choice of using either Apple Macintosh or PC machines. The choice of platform is an important consideration as language teachers have different preferences in this regard. Wireless network connection is provided by Cisco Aironet technology.

Professional architects designed all the rooms. Colour schemes and lighting were chosen to create an impression of simplicity and unity. The classrooms also have cameras and microphones installed in the ceilings for security and research purposes.

Teacher perceptions

Although we have obtained quite a lot of anecdotal information regarding the success of teaching in the wireless classrooms, we wished to begin the process of gathering data for a more formal evaluation. We were interested in finding out what effects, if any, the specific attributes of the flexible wireless spaces might have had on teaching practice. We decided to begin with a survey of teacher perceptions.

Method
A brief questionnaire was used to carry out this survey. General information sought from respondents comprised the following:
- Subjects they taught in the wireless classrooms;
- Length of experience with teaching in the wireless classrooms;
- Any experience with teaching in a traditional computer laboratory;
- If yes, how would they describe their teaching experience in the wireless classroom in comparison with teaching in a traditional computer laboratory; and finally
- How they would rate their overall teaching experience in the wireless classrooms.

The remainder of the questions in the instrument focused on the impacts of the flexibility afforded by the wireless classrooms on specific aspects of their teaching. Flexibility afforded by the wireless classroom was specified in the following ways:
- Ability to reconfigure the physical space.
- Ability to move around in the classroom.
- Ability to use a variety of teaching technologies.
- Ability to connect wirelessly to the Internet.
- Ability to move laptops around in the classroom.

We wanted to ascertain the extent to which the foregoing affordances of the flexible wireless classrooms influenced the following attributes of teaching:
- Selection of *teaching strategies*.
- Planning for the *engagement of students* with the subject matter.
- Organization of *socialization and interaction activities* in class.
- Providing *feedback* to learners.

These attributes were drawn from an analysis of the fundamental principles of teaching outlined by Naidu (2003) and Merrill (2000). They seemed particularly relevant to the current project on wireless classrooms.

Data Gathering

The questionnaire was sent out in a paper-based format to 20 faculty members who had taught in the wireless classrooms. We asked them for their names, telephone numbers and email address in order to be able contact them for further information if necessary. Fourteen out of twenty questionnaires were returned. That is a 70% response rate.

Results

Subjects taught in the wireless classrooms included:
Cyber Society, Critical Thinking, Latin Paleography, EXETER Anthology, Introduction to Computer-Assisted Language Learning (CALL), Japanese (various levels), Multimedia Japanese, Introduction to Translation (Japanese), Advanced Grammar (Japanese), Reading Contemporary Texts (Japanese), Advanced ESL-IT, Project-based Communication Skills, Language and Media, CALL Software Evaluation, Online Language Learning Media, CALL Software Design and Implementation, Structural Editing and Editorial English, Business and Professional Communication, and Exploring Style and Meaning in Language (ESL).

Five of the fourteen respondents had taught in the wireless classroom for one semester while nine of them had taught in it for 2 or more semesters (3 had taught for 2 semesters, 5 of them had taught for 3 semesters, and 1 for more than 3 semesters). Eight of the 14 had taught the same subject in a traditional computer laboratory, while the other 6 had not. Seven with experience in both settings (wireless classroom and traditional computer labs) described their experience teaching in the wireless classrooms as more effective while one respondent was unsure. Moreover, all 14 rated their overall experience in the wireless classroom as positive (6 Positive, and 8 Very Positive).

On the selection of teaching strategies

One of the most important aspects of the teaching process that we sought to observe was the selection of teaching strategies in the wireless classroom. We were interested in the extent to which these were influenced by the flexibility afforded by these innovative teaching spaces.
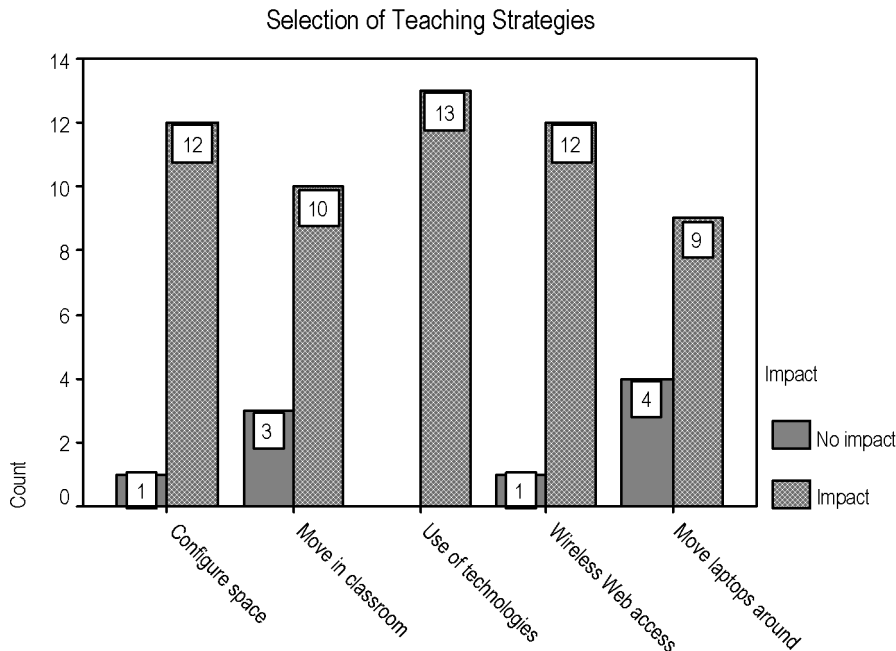

Figure 1. Impacts on the selection of your teaching strategies

Figure 1 shows the extent to which specific affordances of the wireless classroom influenced teaching

strategies in the classroom. These included the ability to reconfigure the physical space, move about in the classroom, use a variety of teaching technologies, connect wirelessly to the Internet, and move laptops around in the classroom. Clearly, the majority of the teachers reported that these capabilities influenced their teaching strategies in the classroom. No impacts were reported in a few cases such as in the cases of the ability to move about in the classroom and move laptops around in the classroom.

Planning activation (i.e., engagement of students) in learning

A second fundamental principle of teaching that we were interested in observing was the activation of the learning process, which is the engagement of students with the subject matter content. We were interested in observing the extent to which this had been influenced by various opportunities afforded by the wireless classroom.
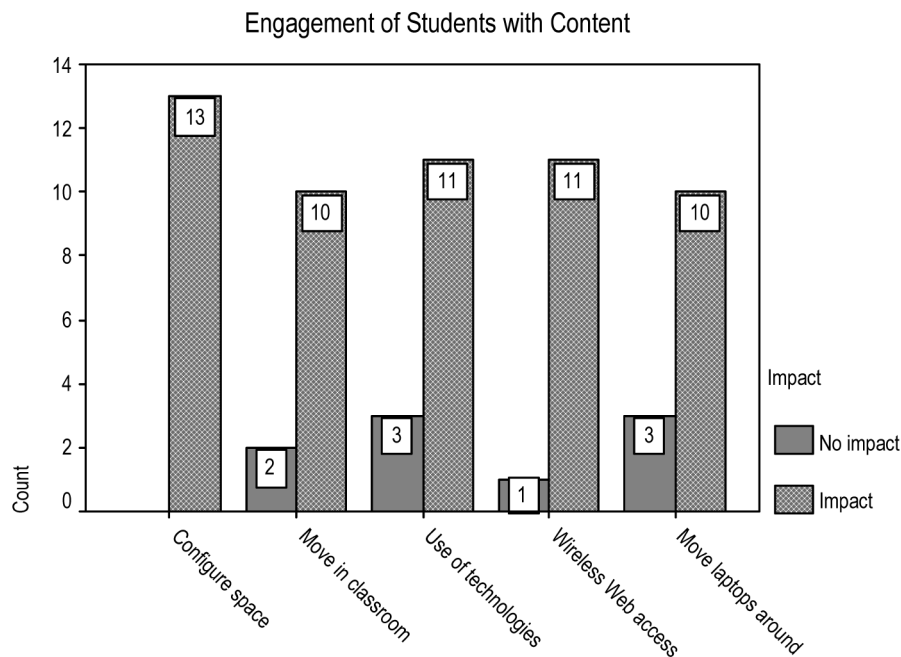
Figure 2. Impacts on the engagement of students with subject matter

Figure 2 shows the extent to which various affordances of the wireless classroom influenced teachers' ability to activate learning by engaging students with their subject matter content. Clearly, the majority of the respondents felt that the various attributes of the classroom had an impact on how they went about with this aspect of their teaching. Note, especially, the impact of their ability to reconfigure the physical space, move about in the classroom, use a variety of technologies, and connect wirelessly to the Internet.

Organization of socialization and interaction in class

Another fundamental principle of teaching that was the focus of our attention was the organization of socialization and interaction activities in class. We were interested in seeing if the use of these activities as part of one's teaching were being influenced by the capabilities afforded by the wireless learning space.
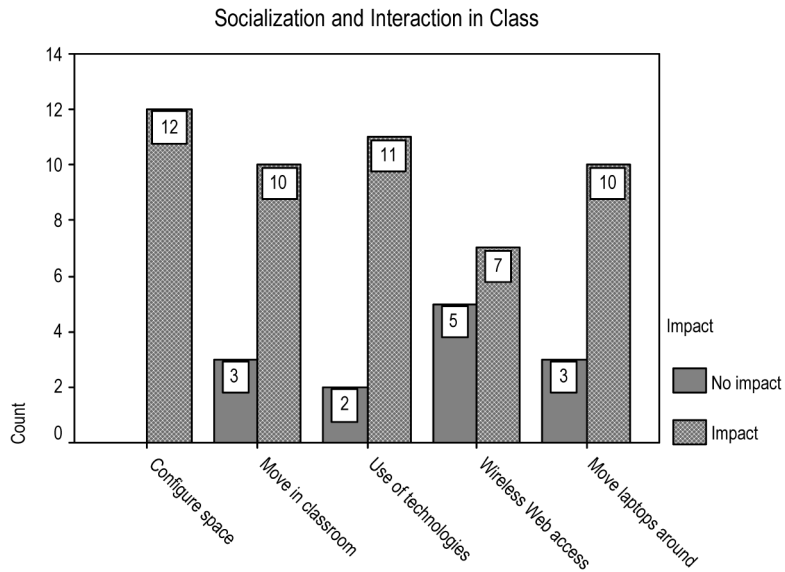
Socialization and Interaction in Class

Figure 3. Impacts on socialization and interaction in class

Figure 3 shows the extent to which specific affordances of the wireless learning space is reported to have influenced the organization of socialization and interaction activities in the classroom. Most noticeable among the affordances, in the extent of its impacts on this aspect of teaching, is the ability to reconfigure the physical space. Except for the ability to connect wirelessly to the Internet, other critical opportunities had similar sorts of influences.

Providing feedback to your learners

Finally, not of any less interest to us were strategies that lecturers used for providing feedback to the learners as part of the teaching and learning process. We were interested in seeing if the flexibility that the wireless classroom afforded, had any impacts on how the teachers went about providing feedback to their learners.
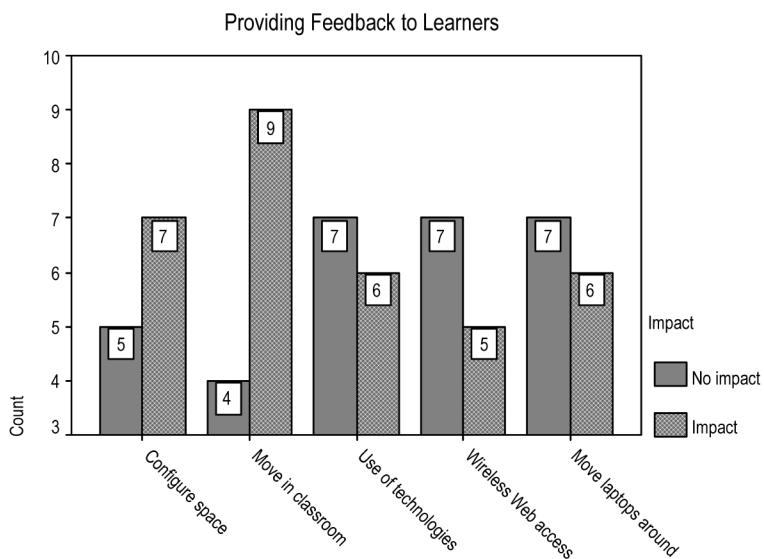
Providing Feedback to Learners

Figure 4. Impacts on providing feedback to learners

Figure 4 shows the results of this analysis. The two factors that seemed to have had substantial impacts on this very important aspect of any teaching activity are the ability to reconfigure the physical space and move about in the classroom. The other factors seemed to have influenced the feedback strategies adopted by fewer numbers of the respondents. The reasons for this observation could be several, and probably have little to do with the opportunities afforded by the classroom itself.

Discussion and Conclusions

This survey did not set out to uncover any association between attributes of the flexible wireless learning space and learning achievement. Rather it sought to see if the specific opportunities afforded by the flexible wireless classroom had an impact on teaching practices.

Our results show that the particular attributes of the flexible wireless classroom have substantially influenced teachers' approaches to teaching. The attributes of the classrooms significantly affected their choice of teaching strategies, how they activated student learning and how they organized socialization and interaction. The attributes of the classrooms also affected, although to a much lesser extent, how teachers went about providing feedback to learners. Nine respondents felt that moving about the classroom had an impact on providing feedback.

In some cases teachers reported no impacts of the physical space on their approach to teaching. From this survey, we could not ascertain the reasons for this response. Was it because of the subject matter they taught, their teaching style or philosophy? This is something we intend to explore in the follow-up to this survey.

What we can confirm from the results of this preliminary investigation is that the flexible wireless environment has had a considerable impact on the choices teachers made about some of the fundamental processes of teaching. In addition, seven out of eight of those teachers who had taught their subjects in both a traditional lab and in the wireless classroom reported that they felt their teaching had been more effective in the flexible space. All fourteen respondents reported that they had had a positive teaching experience in the new classrooms. There are important implications of these outcomes. How we design and build our learning and teaching spaces is critical if we want to seriously influence teaching practices.

References

Berger, C. (2001). Wireless: Changing teaching and learning "Everywhere, Everytime". *Educause Review*, 36(1), 58-59.

Bleed, R. (2001). A hybrid campus for the new millennium. *Educause Review*, 36 (1), 16-24.

Clark, R. E. (1994). Media will never influence learning. *Educational Technology Research & Development*, 42(2), 21-19.

David, M. (2000). *First principles of instruction*. Retrieved 6 June 2003, from http://www.id2.usu.edu/5Star/FirstPrinciples/index.htm

Debski, R. (2003). Technology and second language learning through socialization. In S. Naidu (Ed.), *Learning and Teaching with Technology* (pp. 129-145). London: Kogan Page.

Naidu, S. (Ed.) (2003). Introduction. *Learning and Teaching with Technology: Principles and Practices* (pp 1-9). London: Kogan Page.

Wallace, L., Jagose, A., & Gunn, C. (2003). Virtual learning in cultural studies: matching subject content and instructional delivery. In S. Naidu (Ed.), *Learning and Teaching with Technology: Principles and Practices*. (pp. 97-112). London: Kogan Page.