

## **Learning to learn with technology:**

### **Integrating the Internet into an undergraduate subject.**

**Katina Zammit, Phil Nanlohy & Gerry Corrigan**

**University of Western Sydney Macarthur**

**Faculty of Education & Languages**

**PO Box 555**

**Campbelltown. NSW 2560**

#### **Abstract**

This paper will present preliminary findings from a project involving the inclusion of the Internet and on-line resources as part of the mode of delivery for a second year undergraduate core course for the Bachelor of Teaching (Primary) - English and Science & Technology. The project was assisted with funds from the University of Western Sydney Teaching Incentive Grant Scheme. The paper will begin with an introduction to the subject and its website then present a critique and identify the issues related to the development of the website, the use of a multi-mode delivery and the Internet for the subject. It will conclude with suggested recommendations about this method of delivery for subjects at an undergraduate level.

#### **Introduction**

The "Learning to Learn" of the title applies to both the students and the lecturers involved in this project. The lecturers were employed in the primary teacher education program of the faculty and this was their first attempt at replacing face to face tutorials with on-line learning experiences. The students had some previous experience with the university's intranet but this was the first time that they had used these technologies for instructional purposes.

During 1997 and 1998 the Faculty of Education and Languages (FEAL) at the University of Western Sydney, Macarthur (UWS, M) has been developing the use of its Web site as a support for teaching and learning. A small number of subjects used this means to provide resources to students. Five sets of subject support pages were available to students in the first year and ten in 1998. These subjects were delivered in traditional ways with the web support being limited to subject documentation and tutorial resources, e-mail links to the lecturing team and in a few cases, asynchronous e-mail discussion of key issues. The subjects were drawn from a number of divisions and were created by one of the education academics using a Web site creation and management software package. In 1997 two additional academics from this division of the faculty decided to trial the provision of learning experiences on-line and to compare students reactions to on-line learning versus traditional face to face tutorials. This paper is the story of that experiment and a recount of some of the lessons we learnt.

## **The changing nature of university education and the need for flexibility**

In the delivery of Teacher Education subjects, opportunities to develop philosophic, theoretical and vocational understandings need to be provided as students learn about the context and practice of their future profession. The writers of the subject described in this paper sought to explore ways in which Information Technologies (IT) may be used to provide students with such opportunities. In preparing the content for this subject the lecturers had an opportunity to consider what it was that they wanted the students to learn, how that learning might be assisted by the available technologies and how the students learning might be assessed. The composition process focused the lecturers on a reassessment of the subject and asked them to examine what they "really want their students to know and to be able to do." (Nightingale et. al., 1997 p. 6).

The changing nature of universities has been characterized as a response to the changed environment in which they operate. The assumption of equal opportunities for all citizens and the reduction of unskilled or low skilled employment opportunities has led the demand for university education to rise sharply. At the same time governments who fund universities are responding to public demands to reduce expenditure. As Lewis (1998) has observed these conditions have resulted in; increased student numbers and diversity, expectations of flexibility in providing the skills students feel they have paid for while declining state funding means a reduced human and physical resource base.

Flexible Learning is enabling learners to learn when they want (frequency, timing, duration), how they want (modes of learning), and what they want (that is learners can define what constitutes learning to them)." (Van den Brande, 1993 p. 2)

Flexible responses to the changed university environment has been discussed by a number of writers (Spender 1995, Le Grew and Calvert, 1998, Latchem and Moran 1998, Lewis, 1998). Spender believes that communication and information technologies have changed the basis on which society rests. She believes that we are witnessing a move from a print based society to a computer based one. She believes that universities will have "to change their purposes and their practices. Scholarship, knowledge, research and teaching are significantly differently when done electronically" (1995, p. xxiii). Le Grew and Calvert describe the changing political and economic climate in which universities operate and suggest that the key factor stimulating changed practices in universities in a "dramatic rise in participation" (1998 p. 5). Three reasons for the rise in participation are changing aspirations of an increasingly diverse student population, an increasing need for university qualifications in order to gain paid employment and a need to participate in life long learning in order to maintain credentials in a rapidly changing employment environment.

Relatively few Australian universities are "as yet taking a whole-of-institution approach to ... flexible delivery" (Latchem and Moran, 1998, p.67). These writers identify one important dimension for university based flexible delivery is a move "from a teacher-dominated,

transmission-based process to a learner centered, constructivist process;" (1998. P.67). This is also true in the field of Teacher Education. Hacker and Sova state that "in the area of Initial Teacher Education (ITE) there has been less use of computer mediated delivery of courseware" (1998 p.335).

Lewis and Merton quoted in Lewis (1998) suggest that the application of technology to flexible learning has been "patchy" in that it has met with mixed results. Technology in flexible delivery can support students by providing;

- Σ "Information on the curriculum
- Σ Recognition for existing achievements and advice on appropriate learning routes;
- Σ Flexible access to resources, facilities, and program content;
- Σ Opportunities to practice and apply learning." (Lewis p. 27).

Particularly important are the uses of technology to "maintain contact between students and tutors" (Lewis, 1998, p.27) A CUTSD funded evaluation of the Australian experience of IT based Flexible Learning found an increase in time commitment is needed by lecturers who engage in such delivery patterns (Alexander, 1998 p. viii). The one-to-one desk bound nature of e-mail based interaction is a major cause for the increase in time taken to answering students' questions.

### **The context at UWS, Macarthur**

The subject under consideration in this paper was part of an undergraduate program that was initiated in 1992. After a review completed in the previous year the Education division of the faculty decided to adopt an integrated organisation for the Bachelor of Teaching. This was demonstrated in a number of ways. The two that are of relevance to the present discussion was the organisation of curriculum subjects and the mode of teaching about educational computing. The philosophy of the new degree saw discrete curriculum areas integrated into one subject. In this way the series of "Curriculum Studies " subjects were combinations of two of the NSW education system's "Key Learning Areas" (KLA). The UWS, Macarthur calendar describes the Curriculum Studies subjects as, "Six subjects in this strand introduce students to all Key Learning Areas of the primary curriculum and develop sufficient skill and knowledge to enable teaching of these areas to children." (1996a, p.435) The Curriculum Studies 6 (CS6) subject combined the study of the English and the Science and Technology KLAs and sought to develop appropriate links between these two discipline areas.

The course review process also adopted a "permeated" model for the integration of Information Technologies (IT) into the new degree program. The value of this model has been argued by a number of writers (Pratt 1993, Oliver, 1994 and Robertson 1996) as being superior to the more traditional approach of a separate, compulsory educational computing

subject within a teacher education program. "The permeation model ... involves the integration of educational computing as a methodology in curriculum areas through provision of computer based tutorials in appropriate subject units within the degree course" (Nanlohy, 1997 p. 177). In the 1997 running of the subject a World Wide Web site was used for the delivery of subject experiences. The subject also called on students to complete a major assignment that focused on the construction of a web page for primary school students' purposes. In this way the philosophy of permeation was exemplified as the university students modelled their future students' use of the technologies for educative purposes.

### **Philosophical context**

The designers of this subject sought to move beyond a transmission model of learning that used the IT as an alternative to paper based stores of information and task descriptions. Their view of the role of the subject site was based on "Constructivist conceptions of learning (that) assume that knowledge is individually constructed and socially co-constructed by learners" (Jonassen, 1998, p.1). Jonassen poses two views of instruction which he says are often viewed as incompatible but are in fact complementary. These are Objectivist and Constructivist conceptions of learning. Jonassen argues for a Constructivist perspective on instruction so that learning potential of students is maximised. For example, the lecturers who designed the subject intended to create a computer mediated public communication space to encourage a public discussion of the issues within their subject.

The development of the subject was a collaboration between members of the project team and was an example of reflective action research. While a workshop that discussed, in part, the use of the university intranet for subject delivery had been held prior to the design of the subject the project team were working with very little prior knowledge of the logistics of mounting an on-line subject. The team members learnt to use the enabling technologies by themselves and with each other. Their experience points to the importance of a broad collaboration between members of university faculties that intent to innovate in these ways. The story of the development of IT assisted subject delivery should not be about the work of small isolated teams. It should be "about an holistic approach which encourages a critical reflective community in which new educational technologies are created to improve or enhance practice." (Evans & Nation. 1998 p. 51).

### **Additional Student Benefits**

In addition to the completion of a core curriculum subject the students have been assisted to meet university and industry computing competencies. The subject is part of the faculty's efforts to develop the students' IT competencies. UWS Macarthur Competencies Policy (UWS, M. 1996b, p. 152) requires a specific set of skills and understandings that are developed in this subject. The subject experiences also addressed the beginning teacher proficiencies recommended by the Ministerial Advisory Council on the Quality of Teaching (MACQT). The Council's encouraged universities "to incorporate all required proficiencies ... into the compulsory core of their teachers education programs." (1997 p.26). It is probable that the benefits reported in the Alexander study of 104 Australian University Information Technology projects (1998 p. ix) will occur for these students too. These benefits were summarised as improved quality and productivity of learning and improved students' attitudes to and access to learning.

## The Subject - Curriculum Studies 6: English and Science & Technology

The Curriculum Studies 6: English and Science & Technology (CS6) subject is a core course for the Bachelor of Teaching (Primary) at UWS, M. The 1997 running of the subject was presented through a combination of lectures, tutorials, workshops, email discussion groups and independent tasks. Attendance was expected but was not a requirement for successfully passing the subject. The outline for the course was available for viewing or downloading from the CS6 website located on the Faculty of Education web site in the Teaching On-Line node. A team of four lecturers worked on the subject - two English and two Science teacher educators.

Figure 1: Semester Overview

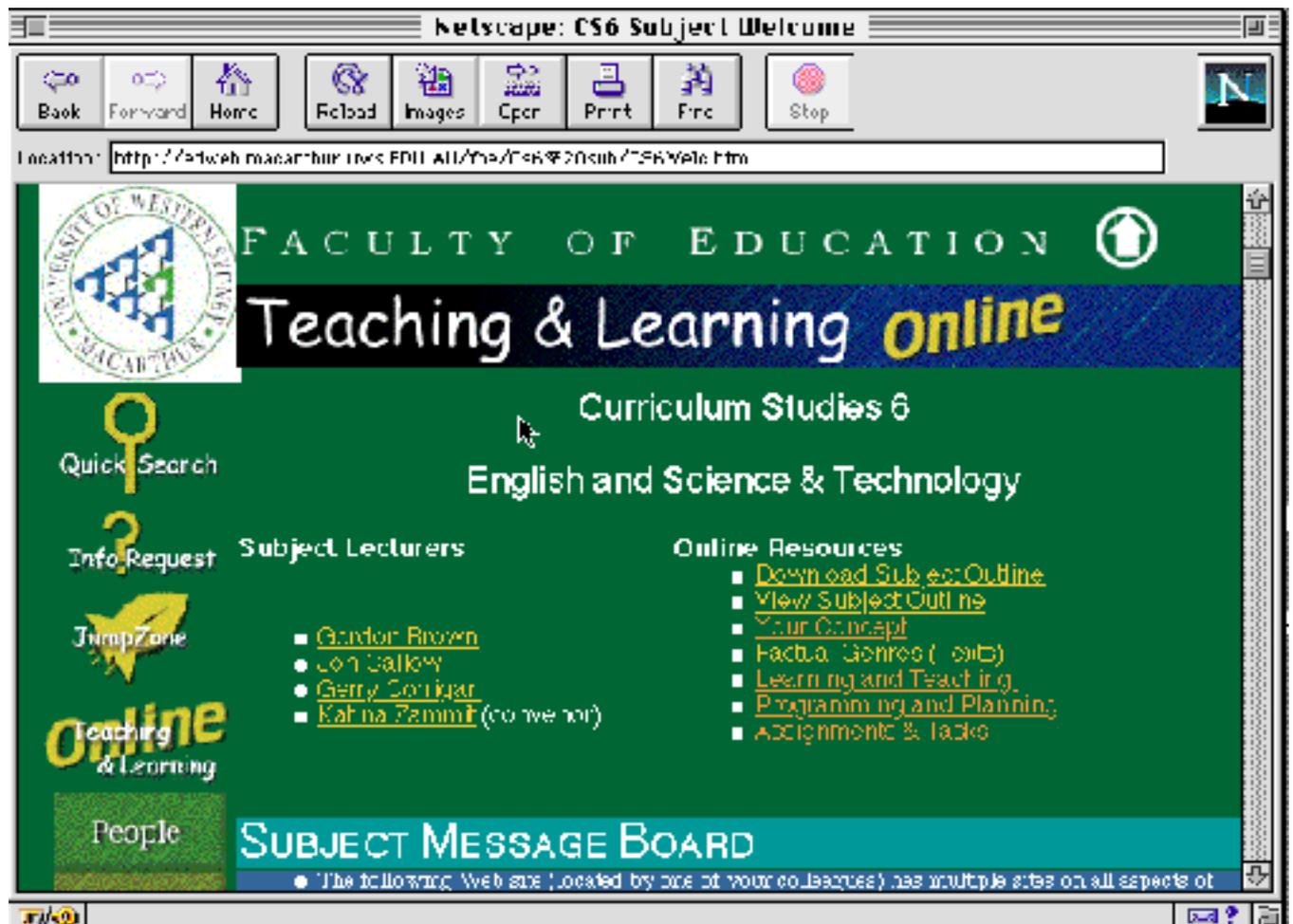
Week	On Campus Location	Format	Guide to Content
1	LT4	Lecture	Introduction Course requirements Mode of Delivery
1	SL1 & CL4	Tutorial	Your concept Introduction to the Internet Using email
2	SL1 & CL4	Tutorial	Developing your concept Constructing web pages
3	SL1 & CL4	Tutorial Task: Discussion group	Refining your concept
4		independent work	
5		independent work	
6	LT4	Lecture	Introduction to Factual Genres in Education
6	SL1 & CL4	Tutorial	Looking closer at factual genres
Semester Break			
7	SL1 & CL4	Tutorial	Teaching and learning in Science and technology and

			English			
			Matching genre and concepts			
8	SL1 (Literacy group)	Tutorial  Discussion group/task	The teaching and learning cycle (E)  Activities for teaching/learning Science and Technology and English			
9		independent work				
10		independent work				
11	SL1 & CL4	Tutorial	Programming, planning and assessment			
12	SL1 (Science times)	workshop;  independent work	Sequencing activities for teaching and learning ; sharing of ideas.			
13		independent work				

### The CS6 Website

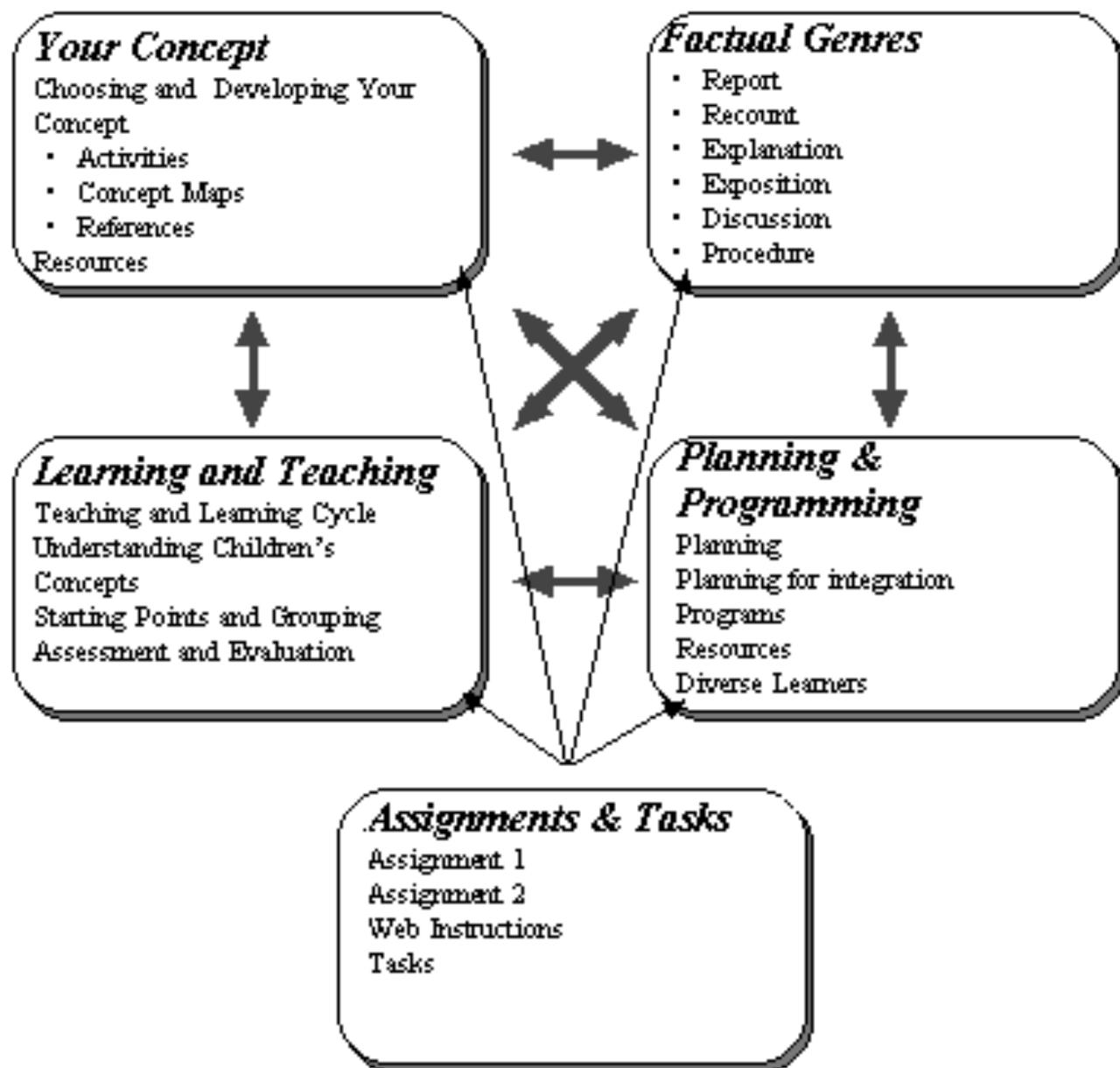
The front end of the CS6 website was based on a standard template that was used for all the subjects that provided on-line teaching resources for the Faculty. (Fig. 2) It contained contact names and sections (nodes) of the site, plus a message board. The names of the lecturers teaching in the subject were linked to an email form so students could contact a lecturer by clicking on their name, typing in the message and sending it using their browser's mail option. The list of links under the heading "Online Resources" provided the access point to the information contained in the site for students to use.

Figure 2: Front page of CS6 Website



Students could access the site either via a bookmark set on the computer or by moving through a number of levels beginning with the University's home page. In the initial lecture and tutorial these were demonstrated to the students. Both were required as it could not be guaranteed that the bookmark of the site on the computers in the university computer laboratories would be there for the whole semester. The Online Resources node of the subject site contained the content of the subject that was interlinked using hypertext. Each information node was set up in a hierarchical way. When students clicked on that node, the next screen provided students with an overview of the pages or sections of the site. (Figure 3)

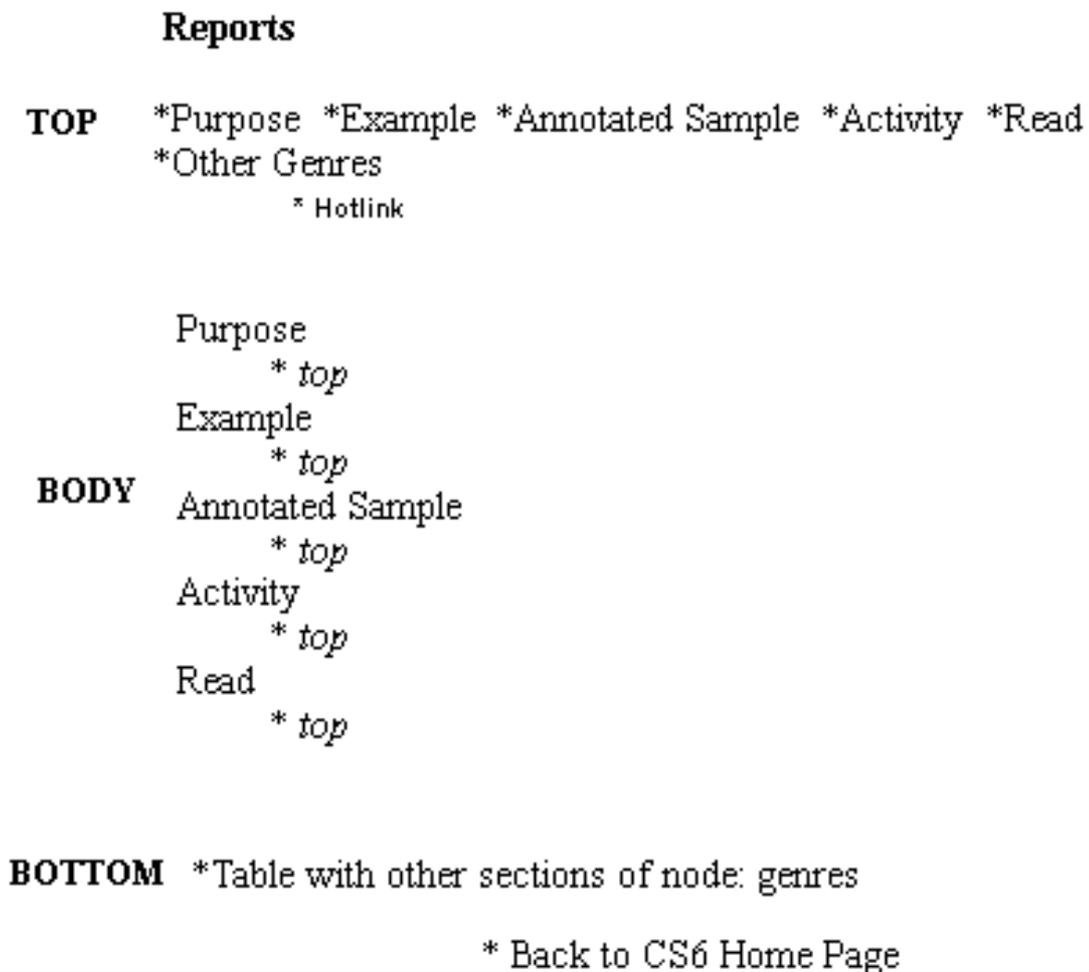
*Figure 3: Organisation of CS6 Website*



Consistency of layout and navigation design across each node was seen as important by the subject authors. The name of the subject appeared at the top of each page (section of a node), the author and date of last update was at the bottom of each page as well as a [BACK TO CS6 HOME PAGE](#) link. General navigation within the nodes was provided through menus at the bottom of the page. Other sections of the node were linked via hypertext. A list at the top of the page outlined the content of the page and acted as a table of contents for that section of the site. Each sub-heading was hotlinked to the relevant section on the page. Each section was linked back to the top of the page. In this way students could select which section of the node to visit, revisit or leave for later viewing. Where no explicit navigation icon or path was provided, movement back to a previous page or node was via use of the BACK button in the browser navigation panel.

Within each page, hypertext was used to link to other pages within the CS6 site. This was an attempt to demonstrate the integration of the two learning areas as well as the interrelationship of the content placed in the site. One drawback to the user was the lack of a navigation bar for the entire site. This meant students had to return to the CS6 Home Page in order to move to another node.

*Figure 4: Overview of a Page*



Some of the pages included activities for students to complete. These were designed to enable students to learn about the content of the subject and to engage with activities that assisted their learning in an on-line environment. These activities were completed without the support of face-to-face contact. Some of these online tasks were to be completed during independent study weeks and these were not duplicated in tutorials. Some of the information on the website was not covered during face-to-face teaching. However, these parts were considered important information for the students in their future teaching of the two key learning areas.

## Development of the Website

The refinement of the subject and development of the CS6 website was supported by funds provided by a University of Western Sydney Macarthur Teaching Incentive Grant. This provided teaching release of twenty four hours each for the two lecturers authoring the web pages: Katina Zammit and Gerry Corrigan, and 12 hours for Phil Nanlohy, the lecturer who managed the site. The authors had expertise in one of the curriculum areas, English and Science & Technology respectively. None of the team members are IT technicians. Phil Nanlohy lectures in educational technology and is one the Faculty's "web workers".

The amount of hours dedicated to the planning, development and authoring of the site was far in excess of the hours funded by the Teaching Incentive Grant. However all members of the project were committed to the trial of this mode of delivery for the subject, spending many hours and days getting the site up and running for the beginning of Autumn semester, 1998. The information that follows is drawn from the journal of one of the developers, the notes of meetings, e-mail exchanges and anecdotal comments of the team. The critique of the development closely matches the development process and the issues are closely linked to the learning of the developers.

The two content developers of the team determined the design of the website. Our initial meetings were spent mapping out the site on paper: the nodes, possible sections in nodes, links between sections. We discussed the site in relation to what we wanted the site to achieve for the students. Neither of us had attempted such a concept before. We started from scratch, basing our plans on the previous year's subject. We had to decide what we wanted to include, how we wanted to present the subject and what combination of tutorials, lectures, independent work would be included. Consultation with the rest of the lecturing team prior to the publication of the course outline. One of the authors, who was also subject convenor, had been to ASCILITE 97 conference (Association for the Study of Computers in Learning in Tertiary Education) and had seen how other subjects had incorporated the internet into their design. Many of these were post-graduate subjects but they provided excellent ideas for the development of the CS6 site. However neither of the developers had extensive talks with other academic developers. As a result we had an image of the design of the web site and what we wanted to achieve. This wasn't matched by the final product, mainly due to a lack of time and expertise.

The plan has been to prepare the materials for each node of the site then uploaded that portion to the Faculty's server for testing and evaluation by the lecturing team. However this process did not progress smoothly. The content authors were composing directly into a Macintosh HTML authoring package (Claris Homepage). As a node or set of pages were completed, they were delivered to the "web worker" to be placed in the subject site. The conversion from a Macintosh to an IBM platform (Frontpage) meant that the placement of images, text formatting and links within the subject had to be redone when a new page was added to the site. All this increased the time it took to get the subject ready for the students.

A further complication arose from an attempt to mirror the subject site within the TopClass Web shell software. (See Alexander et al ,1998, especially p111-124 and Foley and Schuck,

1998 for a description of this instructional delivery product.) TopClass provides an asynchronous communication environment that would assist the subject designers to achieve their constructivist aspirations and assist in creating a community of learners amongst the students undertaking this subject. Technical difficulties, inexperience with the software and shortage of time prevented the second half of the translation of the subject material from the Web site into the TopClass database. The subject ran with the Web site only and a more cumbersome e-mail based discussion group for student to student communication. The duplication of work load and learning from trial and error are part of the lesson that the authors take from the experience.

The discussion groups were set up using the email addresses of students. The students were randomly placed into groups within their tutorial group. Once the groups were set communication between group members was possible using individual email accounts. This proved to be time consuming work for the convenor. It wasn't the one off administration activity it seemed to be when planning the subject. Some students had their own email accounts through another provider and wanted to be able to work from home or access their email from home. Individuals had to inform the convenor who contacted the Information Technology Service branch and the students email address was changed, other wise they asked their group to 'cc' to their home address. An online discussion group would have been a more valuable tool for students learning.

The issues relating to the development of the website can be broadly grouped into the following categories:

- Σ Time and Expertise
- Σ Working across platforms and Software limitations
- Σ Access to the subject site for content developers

Although each will be dealt with individually there is a great deal of overlap between these issues.

### ***Time and Expertise***

During the development of the content for the CS6 site it became obvious that the amount of time needed to create a page, a section or a node, with links within and between pages was far in excess of the two hours per week received in the Teaching Incentive Grant. Even with two people writing and authoring the pages, the amount of content necessary to provide students with enough information to enable them to learn from the site and the activities was the equivalent of the construction of a text book. A conservative estimate of the amount of time required would have been approximately 160 hours (2 to 3 weeks each fulltime).

All the developers of the subject site were novices in creating home pages. They had some knowledge of using computers and of the authoring software but none were experts and no

source of advice was readily available. The 'expertise' was learnt along the way, when it was required. One of the valuable outcomes of the project was this professional development however it took place in isolation and not with the support of a "reflective community" as promoted by Evans & Nation (1998 p. 51). The students had to create a home page to complete their first assignment and task of assisting the students further increased the expertise of the subject developers. Perhaps with a greater knowledge of the software and the authoring process and an opportunity for discussion with more experienced peers the amount of time required to create the subject site would have been less.

Setting up the discussion groups was another time consuming task. However as discussion groups can assist students to learn from each other and support each other while learning online they should be continued. It would be more beneficial for the whole cohort if discussions were not limited to just student to student in their small group but could also be student to anyone in the subject. The limited expertise of the site developers also influenced the visual design of the site and the pages.

### ***Working across platform and Software limitations***

The cross platform working environment and the different software packages used resulted in compromises that reduced the quality of the subject site and therefore of the students' learning experiences. When completed pages were given to the team member who had responsibility for maintaining the subject site they usually had to be significantly edited and needed all the hyperlinks to be re-established. This was mainly because of incompatibilities between the different software packages in use. The site management software had a built in group discussion facility that was tested with a small subject in 1996. Due to difficulties with student registration this feature was ruled out for the larger CS6 subject. An attempt to provide a group discussion facility by transporting the completed CS6 site to the TopClass web platform failed because of time constraints.

The software we were using did not enable us to develop, in the time frame, a stand-alone interactive environment where students could complete activities on-line and send them to the lecturer. The process students had to perform in order to complete the independent and compulsory tasks was 'messy'. Students had to move in and out of different programs to work on the subject tasks. For example, some tasks required the students to copy the task description from the website and paste this into a Word document. Alternatively they could print out the task and type up the activity from this copy. They then had to paste the completed task into an e-mail message or send it as an attachment to their lecturer. The limits of the developers expertise did not extend to the use of online tasks to completed on screen. This is an avenue to pursue for the next running of the subject.

### ***Access to the subject site for content developers***

Being able to work from our own computers directly on the site would have been a great advantage. As the team became more proficient direct access to the website to change content would have allowed a better response to student requests and needs. During the running of the subject all access had to be through the team member who was managing the

site. As a result this impediment and of our lack of technical expertise the content developers occasionally became frustrated with the development process we were using. As the site was built 'on the run' we had to go through the subject site manager to for updates to be made. This lecturer in turn sometimes had difficult access issues to the Faculty server. Experience with this subject and others suggests that subject convenors should own and manage their subject support sites.

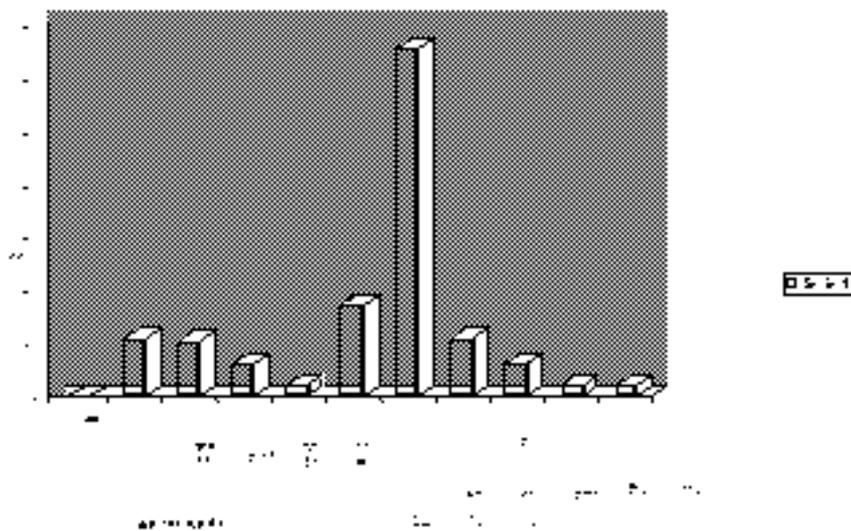
### **Multimode delivery of the Subject and the Use of Internet**

Three instruments were used for assessing students' background and experiences of the subject, including the subject web site: a pre and post-completion survey and a mid-semester open-ended evaluation. The pre-completion survey provided information about the learning and technology background of the students. The mid-semester open-ended evaluation, where students recorded three positive and three negative comments about the subject, and post-completion survey provided information about the structure and content delivery of the subject.

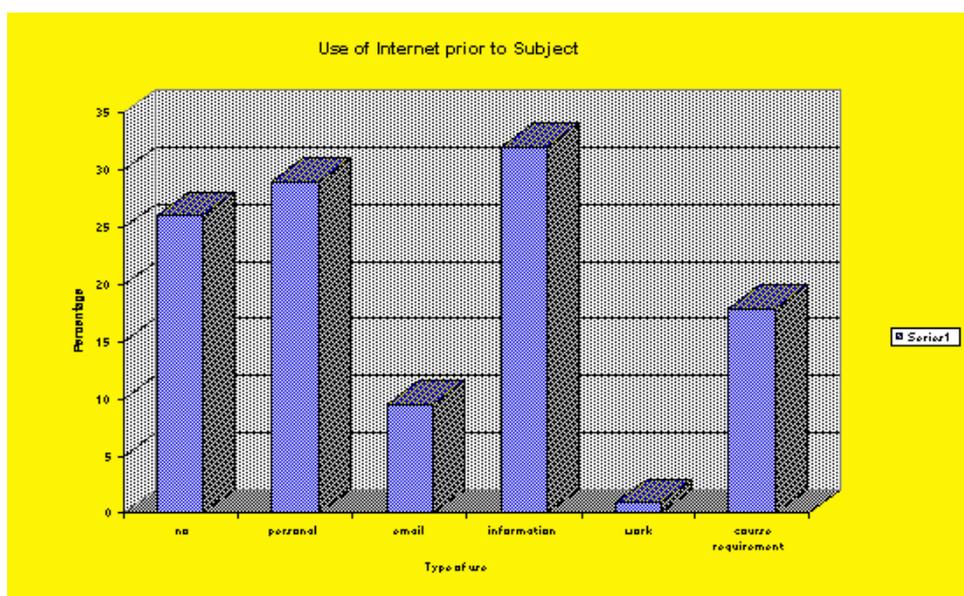
The viability of this method of delivery is questionable for students with little prior use of the Internet. The students had used computers primarily for word processing. However in undertaking this subject students were learning about the technology while using the technology. This is a valuable form of experiential learning as it engages the students in purposeful use of technology.

At the outset of the subject, students acknowledged that they primarily used computers for word processing (Fig. 5). Some students had used the Internet and when further questioned about their use of the World Wide Web (WWW) and Internet a large proportion of the students had used it before: for personal use, for information or because it was a course requirement (Fig. 6). However they did not prefer to take instruction or to learn with technology (Fig. 7).

*Fig 5 Use of Ce*



*Figure 5: Use of Computers prior to Subject*



*Figure 6: Use of Internet prior to Subject*

As a result of the subject experiences students were actively engaged in learning by using technology. They were accessing information, contacting lecturers, learning about the technology and constructing web pages. By the end of the subject a small majority of students responded positively to when questioned about working with computers (51%) (Fig.8). The main difficulty for the students was in gaining access to computers, with a significant number using the university laboratories or both the university laboratories and their home computers. The main other difficulty related to technical problems of the homepage authoring software that was used by students to complete their first assignment.

When considering the viability of alternative modes of delivery one also has to consider students preferred learning environments. Most of the cohort of students preferred to either work individually or with other students in a small group but under the direction of a lecturer (Fig. 9).

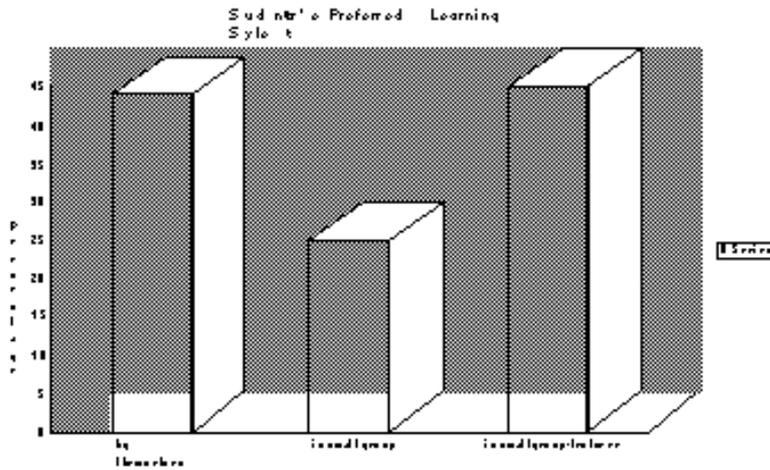


Figure 9: Students' Preferred Learning styles

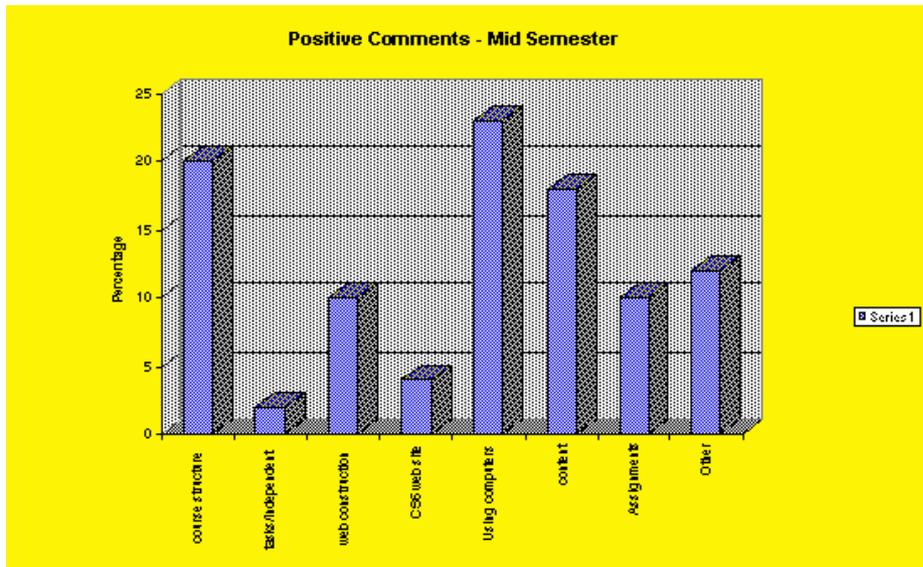


Figure 10: Positive comments - Mid Semester

Students' preferred learning styles need to be taken into account when the delivery of the material, the organisation of activities and the structure and content of a web site are being planned. This, combined with the students preferred use of the Internet to access information as opposed to obtaining instructions, presents issues of style which impinge upon the effectiveness of the use of the Internet in subjects.

However, students appreciated the flexibility of the course structure. The independent study weeks, the independent learning, the organisation of attendance being favourably commented upon at mid semester (Fig 10) and at the end of the subject (Fig 11 & 12). A few students found the flexibility, attendance pattern and independent weeks less valuable and a bit confusing (Fig 13) .

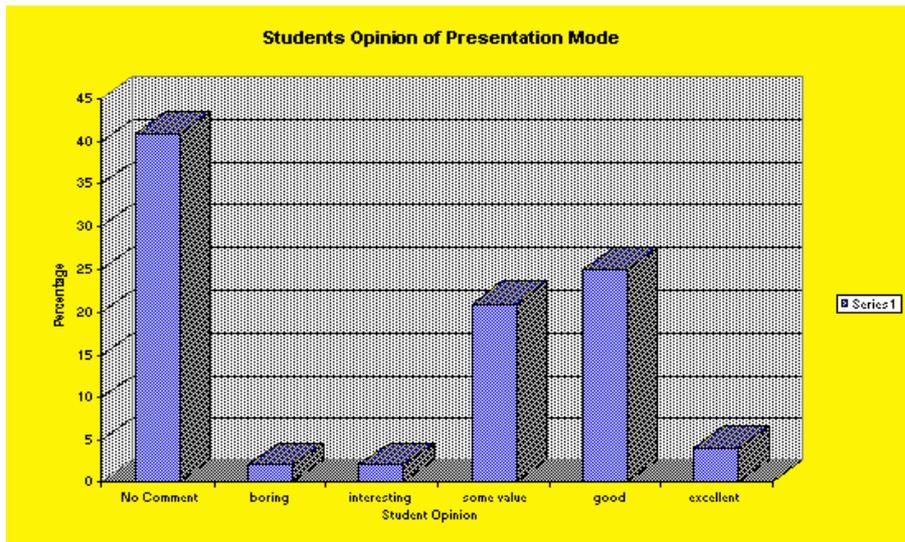


Figure 11: Students opinion of Presentation Mode

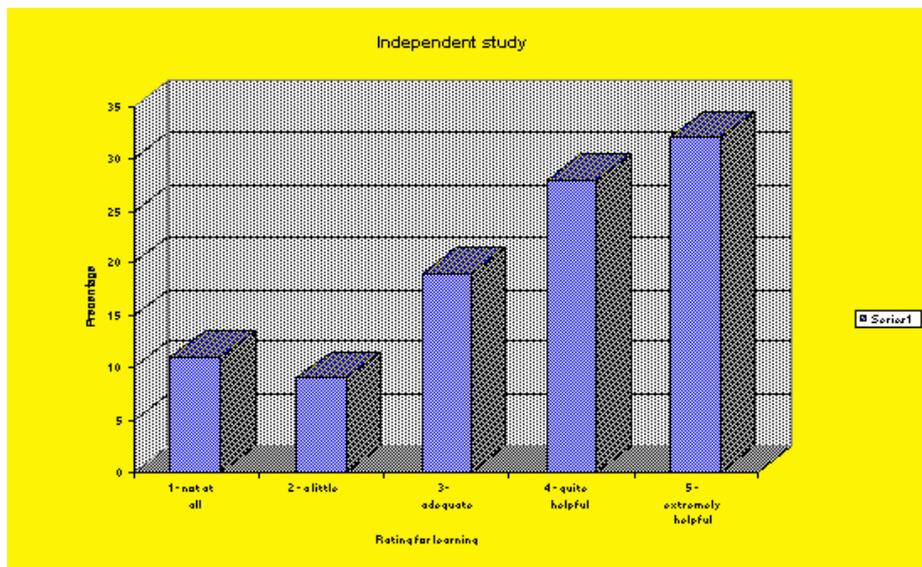


Figure 12: Independent study

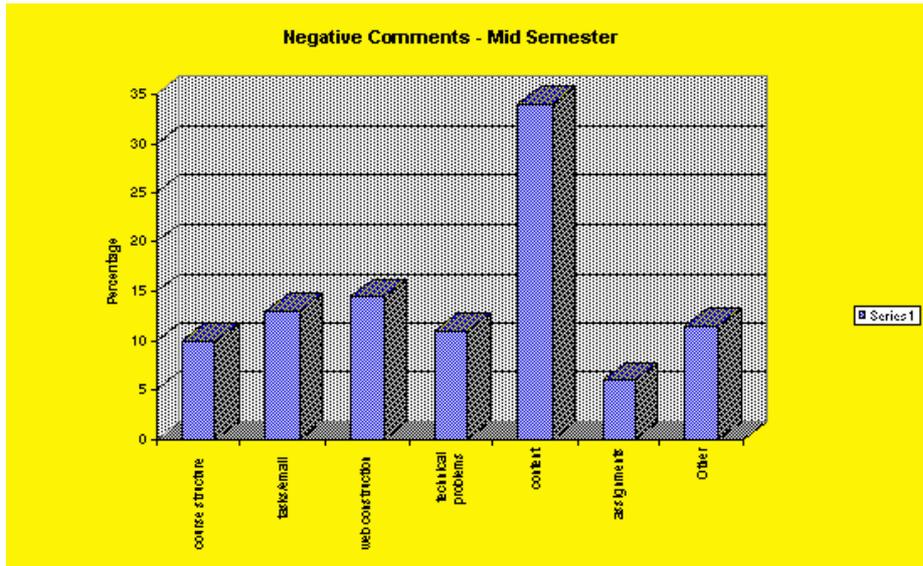


Figure 13: Negative comments - mid semester

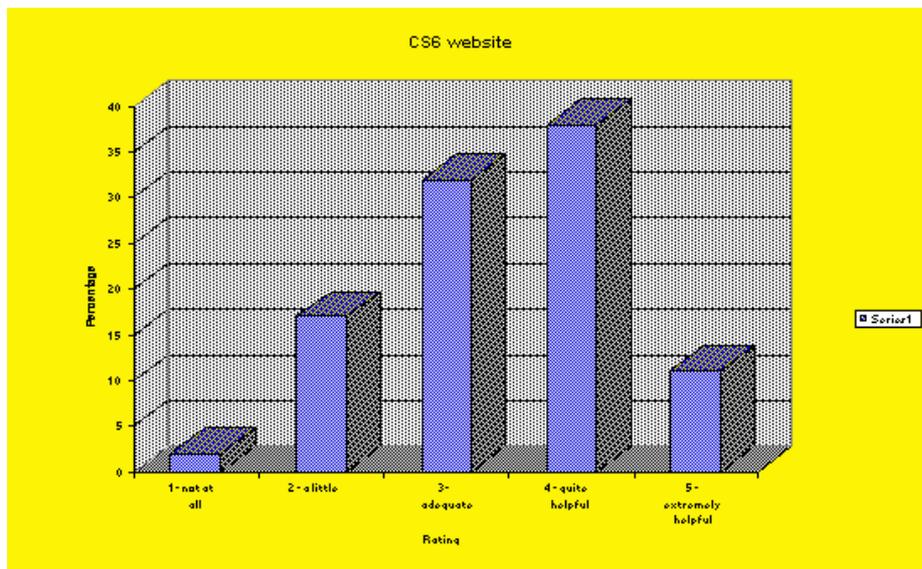


Figure 14: Usefulness of CS6 Website for learning

The usefulness of the subject's (CS6) website and the nodes in assisting student learning was rated helpful, or higher, by a majority of students (Fig 14). Although there were not many comments made, the most were positive, focusing on the ease of location of information and the 'newness' of the experience. The negative comments reflected the issue of perceived poor access to computers. The value of providing students with alternative access to subject content and information that they can access independently for revision or assistance with assignments is made plain by the ratings and comments of the students.

When students were asked for comments about using the CS6 site, a lower number of responses were made, with 42% of students choosing not to answer this section of the

evaluation (Fig 15). Most of the comments were positive and confirm the rating of the site. Of those students who commented about finding information on the site, 48% were able to locate what they were looking for and only 4% could not. Students used the site to different degrees, with 29% using it sometimes, 38% using it often and 13% using it a lot. There were no students who had not used the site.

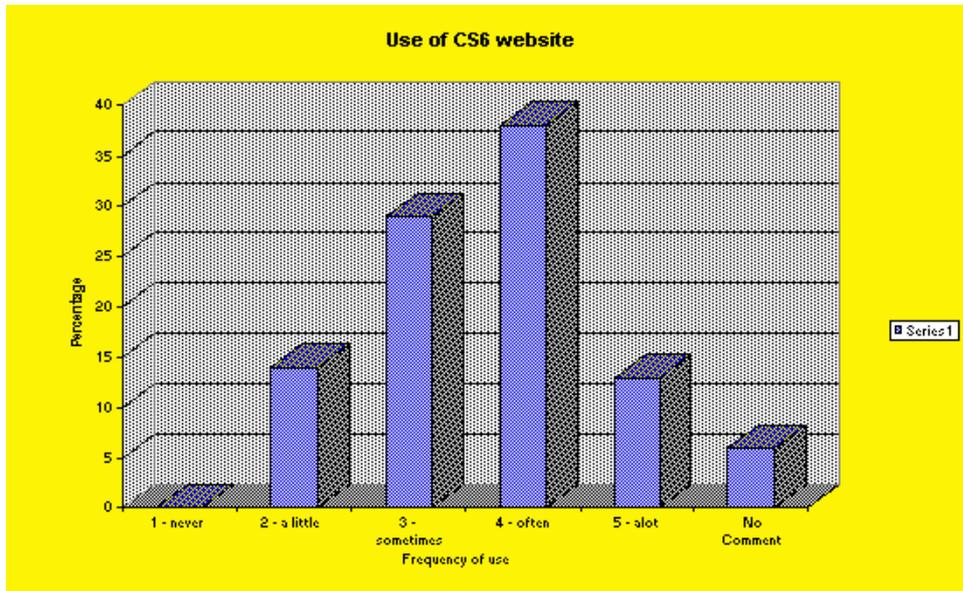


Figure 15: Use of CS6 website (Frequency)

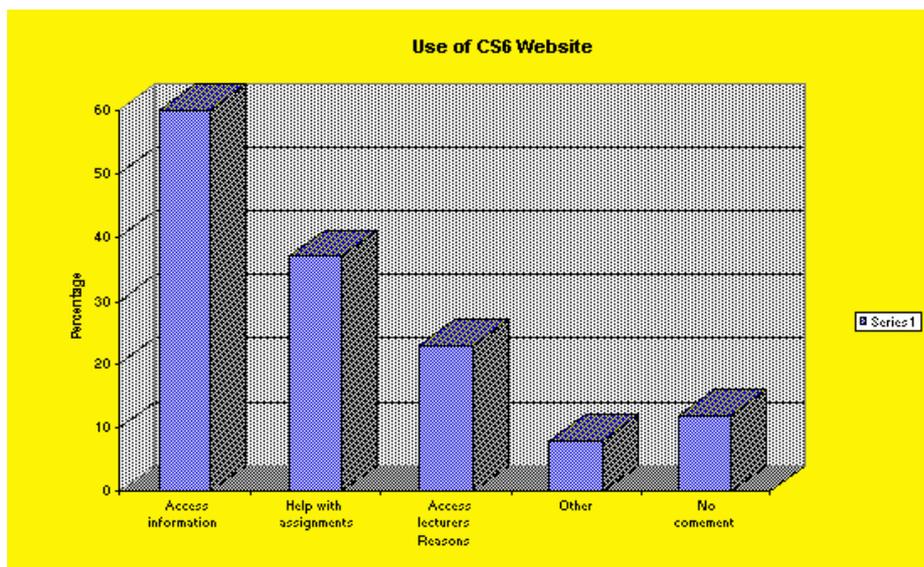


Figure 16: Use of cs6 website (Reasons)

Some students used the subject site for many purposes and gave multiple responses to the reasons for using the site (Fig 16). In particular students used the site to access information: information in general, information on tasks, information on genres, examples of genres (60% of students), help with assignments (37%) and to gain access to the lecturers (23%).

From these responses it can be stated that a large majority of students found the CS6 site and the nodes of assistance to them in their learning in the subject. The web pages helped in providing content, practical information and hence aided assignment preparation. Students provided no information about the integration and links between the sections of the site nor the on-line activities embedded in some of the pages.

The flexible mode of delivery asked students to complete tasks, placed on the CS6 website, during their independent study weeks. The Science tasks were compulsory and the English ones were voluntary. Students thought the Science tasks assisted their learning (54% helpful to quite helpful) but a large percentage ( 46%) felt they were of no or little help (Fig. 17). The positive comments related to assisting the students to organise their time, and the relevance to their assignments. The negative comments mentioned feelings of confusion and difficulty in organising their group to complete the tasks.

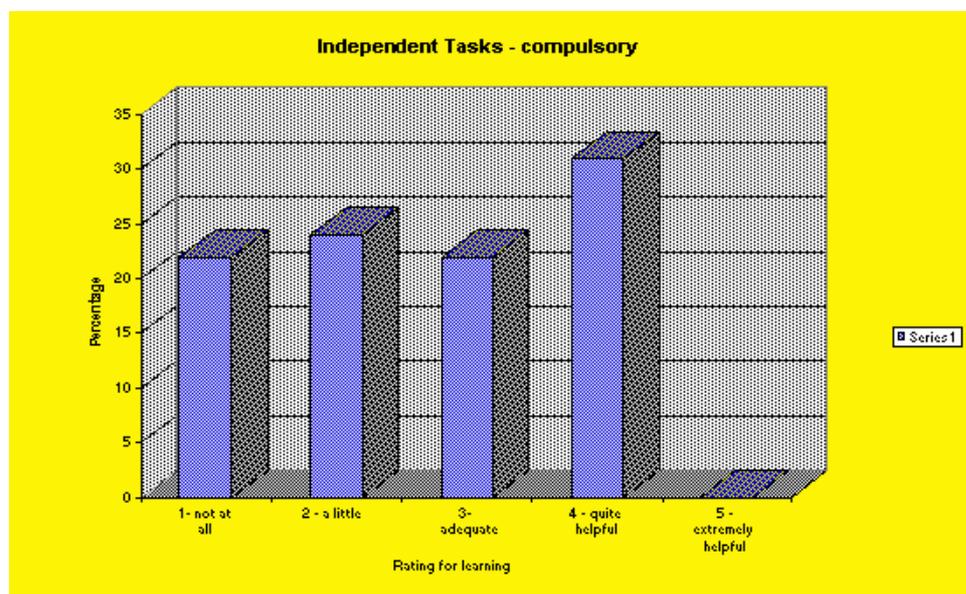
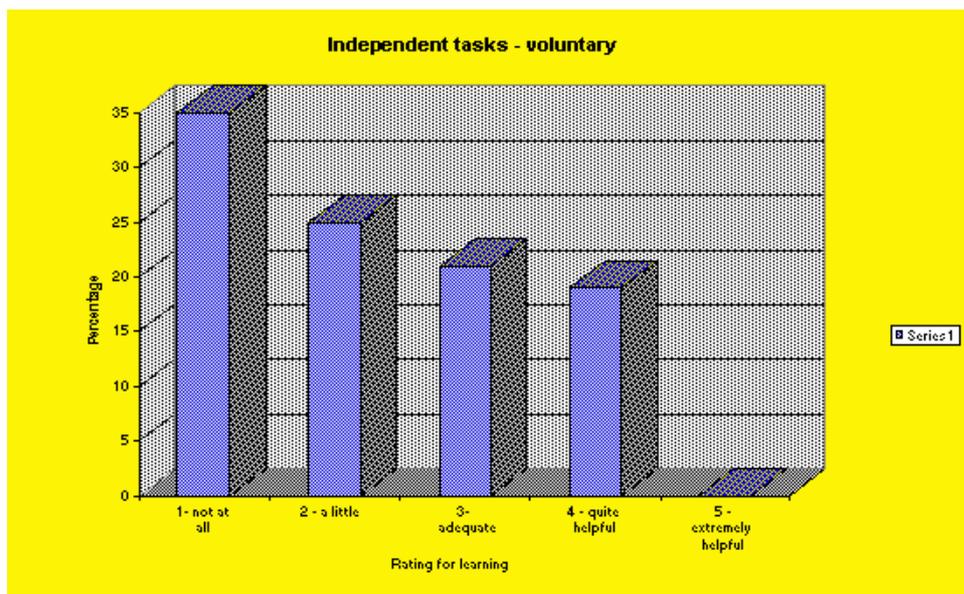


Figure 17: Independent tasks - compulsory

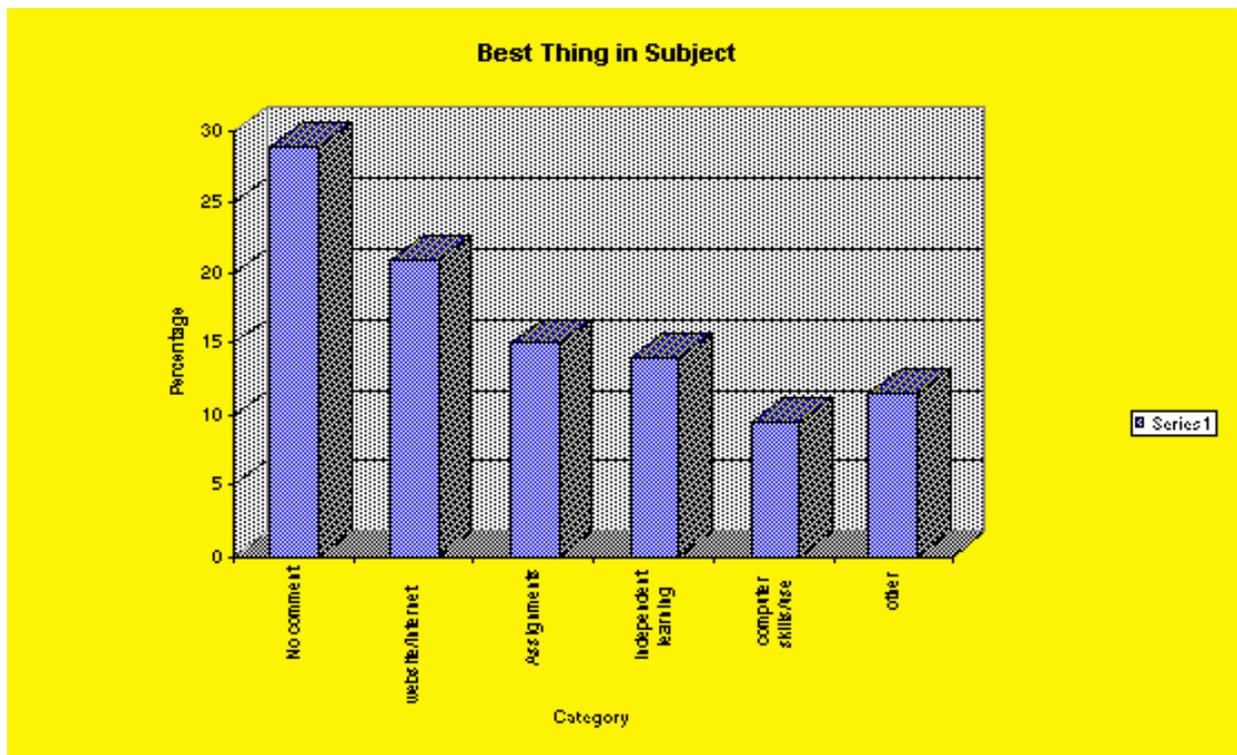


*Figure 18: Independent tasks - voluntary*

The English tasks were voluntary and the majority of students (60%) found little (25%) or no value (35%) in these (Fig 18), commenting on a lack of understanding about their purpose and difficulty in organising their group to complete the task. A few commented that they should have been compulsory and assessable. On the positive side those students who found the tasks of value felt that they provided relevant information, helped meet assignment needs, and familiarised them with the website.

In relation to the overall course content students made both positive and negative comments mid semester (Fig 9 & 12). Of all the comments made about the content the majority were positive (17% compared to 4.5%). Positive comments related to specific knowledge gained, for example clarification of genres, use of the teaching/learning cycle, concept maps, and general content areas, for example English tutorials, tutorial topics, integration. In the final subject evaluation, a large number did not complete the section about what they thought of the content of the subject. Of those that did, use of information technology figured high on 'the best thing' about the subject (Fig 19). If one considers this in light of the evaluation of each section of the CS6 website then students generally found the content practical, interesting, challenging and accessible.

Figure 19: "Best thing about this subject"



### Future use of IT in subjects at UWS Macarthur

The experience of designing and delivering this subject has helped the authors identify a number of issues that will guide their future use of IT in the flexible delivery of their subjects. From the student evaluations completed over the semester the following issues can be identified:

- The changing nature of the student population and their preferred learning style may require a change in lecturers' teaching styles. A greater diversity of students means that lecturers must also adopt more flexible ways of teaching.
- Allowances need to be made for the range of preferred students' learning styles. Most students preferred to work in a group under lecturer instruction. The challenge of flexible delivery is to develop strategies so that the interaction one wants to occur in an on-line environment can occur.
- Students lack of familiarity with the Internet prior to undertaking the course is a restriction that affects the viability of this mode of delivery.
- The main difficulty reported by students was in gaining access to computers and thus to the subject site. The need for equitable access means that subject designers must assume the lowest possible access conditions for their students. At UWS, Macarthur this means that we must assume that our students only have access to technology on campus and further that we must reserve time in the computer labs for them. In the subject under consideration

most students reported using the university laboratories only or both the university laboratories and their home computers.

- The technical problems with the web page authoring software used by students to complete their first assignment negatively affected their experience of the subject. While there is no immediate answer to such unforeseeable difficulties subject lecturers should expect them and be ready to react quickly as the need arises.
- The tasks that were included in on-line sections of the subject need to have grades associated with them or students will choose not to complete them and will not consider them to be important for their learning. The construction and number of on-line tasks, the format they take, their timing and grading needs to be considered when developing subjects using this mode of delivery.
- Students require time to learn, to practice, to feel comfortable in an online environment. Opportunities to learn online and how to be an independent learner need to be incorporated into subjects.
- Lecturers require time to develop skills in order to provide the best learning environment for their students.

## Conclusion

The changing nature of tertiary education means that students need to learn how to learn in an on-line environment. They need to learn how to take responsibility for their own learning. In a mixed mode of subject delivery greater emphasis is placed on students learn how to learn for themselves. The value of providing students with alternative access to the course content was demonstrated by the evaluation results. By the end of the subject students ease and use of technology had increased as had their knowledge of and skills in using the on-line learning environment and their comfort with independent learning. This was shown in the comments regarding the "best thing about the course" (Fig. 19)

The subject developers felt that they tried to do too much in a short time frame but that they had achieved a huge amount that directly benefited the students. Their learning curve was at times very steep and frustrating but at other times they found the experience to be exhilarating. Their learning to work in an on-line environment is unfinished. The adjustments for next year's running of the subject will be based on their own learning and on the feedback from this first group of students.

It is true that Western Society is moving into an Information age. The implications of higher education are manifold. Spender suggests that the "concept of a university degree - based on sequential combinations, graded units, specific content requirements etc. - will become rapidly and increasingly inappropriate ... These days, there is wide spread recognition that learning is an ongoing process" (1995, p. 138). Teacher educators are in a privileged position to respond to these imperatives. They are able to offer experiences to their students that will help them to in turn prepare the students they will teach for the changing world.

## References

Alexander, S., McKenzie, J. and Geissinger, H. (1998) An Evaluation of Information Technology Projects for University Learning. Canberra: CUTSD

Evans, T & Nation, D. (1998). Research and Staff Development in Open and Distant Learning. In C. Latchem, & F. Lockwood, (Eds.). Staff Development in Open and Flexible Learning, pp. 45-53. London: Routledge

Foley, G, and Schuck, S., (1998). Web Based Conferencing: Pedagogical assest or constraints?*Australian Journal of Educational Technology*, 14(2), 122-140.

Hacker, R. & Sova, B. (1998) Initial Teacher Education: a study of the efficacy of computer mediated courseware delivery in a partnership context. *British Journal of Educational Technolgy*,29(4), 333-341.

Latchem, C. and Moran, L. (1998) Staff Development Issues in Dual-Mode Institutions: The Australian experience In C. Latchem, & F. Lockwood, (Eds.). Staff Development in Open and Flexible Learning, pp. 65-74. London: Routledge

Jonassen, D. (1998b). Designing Constructivist Learning Environments, In Reigeluth, C. M., (Ed.), *Instructional theories and models*, 2nd Ed. Mahwah, NJ: Lawrence, 1998. Erlbaum. Accessed on 2/11/98 at <http://www.ed.psu.edu/insys/who/jonassen/cle/cle.html>

Le Grew, D & Calvert, J. (1998) Leadership for Open and flexible Learning in Higher Education. In C. Latchem, & F. Lockwood, (Eds.). Staff Development in Open and Flexible Learning, pp. 3-12. London: Routledge

Lewis, R. (1998). Staff Development in Conventional Institutions Moving Towards Open Learning In C. Latchem, & F. Lockwood, (Eds.).Staff Development in Open and Flexible Learning, pp. 23-32. London: Routledge

Ministerial Advisory Council on the Quality of Teaching (MACQT) (1997). Report: Computer Proficiency for Teachers. Sydney: Department of Training and Education Co-ordination.

Nanlohy, P. (1997). "An adventure in integrating Educational Computing within Teacher Education" in Passey, D. and Samways, B. (Eds.).Information Technology Supproting change through teacher education. London: Chapman & Hall

Nightingale, P., Te Wiata, I., Toohey, S., Ryan, G., Hughes, C. and Magin, D. (1997). Assessing Learning in Universities, Sydney: Professional Development Centre University of NSW South Wales.

Oliver, R. (1994) Information Technology Courses in Teacher education: the need for integration, *Journal of Information Technology for Teacher Education* Vol. 3 3, 135-146.

Pratt, D. (1993) Effective strategies for Information Technology in Teacher Education: the use of an evolving permeation model. *Journal of Information Technology for Teacher Education* Vol. 2 1, 53-61.

Robertson, J. (1996) Promoting IT competencies with student Primary teachers., *Journal of Computer Assisted Learning*, **12**, 2-9

Spender, D. (1995) Nattering on the Net Women, Power and Cyberspace, Melbourne: Spinifex.

UWS, Macarthur, (1996a) UWS Macarthur Competencies Policy, *University of Western Sydney Calendar*, p152

UWS, Macarthur (1996b) Bachelor of Teaching (Primary) Course description, *University of Western Sydney Calendar*, p435

Van den Brande, L. (1993). Flexible and Distance Learning, Chichester: John Wiley.