Computer Science Unit Management Challenges in the 'Enwebbed' Age

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Abstract

This paper explores the proposed use of intranet / internet technologies to support the student learning environment provided by Edith Cowan University's Computer Science Department. The goal being equity of access to study materials for all students - internal, external and offshore working in an educational environment complicated by multi-modal, multi-locational, time-staggered course delivery. The need for management of the internet delivery process is established and some of the resources required are identified. Issues explored include electronic repository based storage of study materials, configuration management, student access control, study materials authorship, copyright and student support issues.

1 Introduction

The Computer Science Department of Edith Cowan University is conducting a program to deliver study materials by the internet to support the learning experience of internal, external and international students. This project has a limited time frame and is expected to be completed by the end of 1999.

One of the catalysts for this 'enwebment' project has been the movement away from the traditional limited unit offerings of two or three times a year. The familiar 'Unit Coordination' role has evolved to a 'Unit Management' role. Currently we offer our units internally on four campuses in two semesters. Our institution is seriously considering the trimester model. Some of our units are also offered under contract by other institutions both within the state and internationally in several countries. We also support delivery in the traditional paper based external mode and fast track short course offerings both on and offshore. These unit offerings do not run in a serial manner but rather in staggered parallel with some units being offered up to eight times a year.

Our Department has a goal to ensure equity by providing quality, technically current materials to all our students irrespective of their location, timing and mode of study. The challenge is to manage these multiple offerings of units which now run in multi-modal, multi-locational and time-staggered modes. In this new environment we still must provide for study and assessment materials and their continuing enhancement, and delivery

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mechanisms whilst retaining and improving quality and relevance to our students and institutional clients. A new and improved method of Unit Management is required.

We seek to systematically enhance the quality of student learning in a consistent manner across all modes of delivery. We intend to harness the ubiquitous and powerful capabilities of the internet to support this endeavour. This is an interesting challenge. This paper will outline some of the issues found relevant to Unit Management in an electronic environment.

2 Management Issues.

Internet usage in education has implications both for the quality of the product and the management of the production and delivery processes. Modern quality assurance techniques and process maturity models are based on the principle that a quality process will typically deliver a quality product [1]. Process issues such as project management, risk assessment and control, and quality assurance are vital. The development, maintenance and assured conformation to appropriate standards, the criteria used and conduct of evaluation of the product are as important in the internet world as they always have been to educational managers.

We have witnessed the recent and rapid evolution of the internet to what is now nearly universal access and acceptance at least in the more developed countries. Many of those now responsible for managing this task of providing education by the internet, lack experience in transporting their skills from the traditional people and paper based, to this electronic environment. There are few appropriate and useful models to guide them in this task.

The internet makes the dynamic delivery of changeable content possible. This is a new challenge. There may be in existence at any time many different versions of materials, perhaps requiring varying student access. As we move to multi-modal, multi-locational time-staggered unit offerings, it is conceivable that three or more versions of unit materials may be in concurrent use. In disciplines such as Computer Science which have rapidly changing technology based content, new versions will always be under development. Configuration management and version control will be imperative. Ownership, publication authorisation and automation of the internet publication of written materials are important process issues for consideration.

Other technical issues will require specialist input. Guaranteed availability of materials accessed through the internet may be nearly impossible to assure. Insufficient bandwidth in some areas particularly in nations where the communications infrastructure is outdated or underdeveloped, availability and cost control to the consumer student of internet access providers and ensuring adequate response time are all relevant issues. The vagaries of relying on electronic delivery and the inherent complexity and anarchic nature of the internet are also considerations. Solutions are being developed. Replication technology can duplicate data from

the internet to a local server. This dynamic and difficult area will require specialist technical input to maximise results for educationalists. Several commercial and University developed products are available which could be of assistance.

3 Availability and the Scope of the material

Publishing internet based study materials requires significant investment. Considerable resources are required e.g. academic and support staff time, training, software, hardware etc. It would be unrealistic to expect universities to make all of their internet published material freely available to the general public including other institutions competing in the same market.

Potential internet users of educational materials will have different needs and will require different levels of access. Obviously enrolled students should have full access to any materials relevant to the unit(s) in which they are currently enrolled. To protect the intellectual property owned by the University, the general public including prospective students should only have limited access to materials such as lecture notes and overheads, study guides, past examination papers, assessments. Other marketing materials of general interest and enrolment information should be made freely available.

4 Copyright and export controls

With the original internet ethos promoting the unrestricted use of content, a perception has grown that internet published materials are in the public domain and so free use can be made of them. This is inaccurate. Internet published materials are automatically protected by both Australian and international copyright laws [2] and so are not covered by the University's copyright agreement under the provisions of the Commonwealth of Australian Copyright Act 1968. This means that it is illegal to print and distribute such materials to students without specific authorisation from the authors. However, using the internet as a delivery tool, it is a rather simple matter to sidestep this copyright issue. A pointer (URL) can be provided allowing students to access the page where the material is available rather than providing them with a copy of the material itself. Students can then make their own "fair dealing" copy for study and research purposes[3]. The drawback of this method is that the University has no control over the changing material content. The dynamic nature of internet also means that the URLs need to be regularly checked to ensure that still point to the material.

Some governments have very strict regulations on using or exporting material that they consider to be of a sensitive nature. Other countries may not share their particular sensitivity concerns. It will be important to have mechanisms in place to ensure that any material students are asked to use or copy does not break or violate any Australian or international laws or regulations currently in place.

5 Access control

A commonly used method of controlling access to computers is the user name / password combination. The issue is not so much the selection of the access control method as there are no real practical alternatives to the user name / password combination but the everyday management and allocation of passwords. Within our University students are required to fill in an application form then get an authorisation from an academic before returning the form to IT support when a user name and password can be allocated. It is quite obvious that this method is inconvenient for students studying from remote or overseas locations.

An alternative to this paper based method is to use forms on the internet. When a student initially attempts to access restricted information, a user name and password is requested. If these are unavailable, an option is provided to apply on-line for an account. Instructions would be displayed on how to gain access to the restricted area and a form would be provided to be filled in electronically. This form would canvas personal details, student number, units enrolled etc. The student would submit this form and wait for a reply. After receiving the information the server would confirm that the student is enrolled in the unit(s) and provide a user name and a valid password to access all restricted material related to the specific unit(s). Access would not be provided to controlled material for units in which the student is not currently enrolled. This method should be feasible as information on student enrolments is already held electronically.

6 Regulatory Requirements

University requirements govern the supply of certain printed documentation to students e.g. unit outlines, assessments and exams. Authorisation traditionally delivered via a signature also presents difficulties in the on-line environment. These issues are receiving considerable interest and different solutions are being trialed as educational materials are moved onto the internet.

7 Student support issues

Traditional staff student communication outside specified contact hours in lectures, tutorials or workshops has involved face to face, telephone or written contact. Personal contact can be a problem geographically - getting two people together in one place and temporarily - finding times when it is convenient for both parties. Communication by telephone whilst in some ways more convenient, can also be a problem with the ridiculous worse case scenario involving voicemail returning messages to impersonal voicemail. Neither of these communication methods supplies a natural record of the communication content. Written communication has advantages. The very act of formalising a problem to be able to document it often prompts the student to find their own solution. Written communication has a further advantage in the natural record of the communication content that becomes available. The disadvantage of traditional written communication has been the delivery time for written messages.

The internet and electronic communications can add value to traditional student support mechanisms. Emails offer informal brief communication with almost instantaneous delivery. The mean time to reply may be another matter. Such messages and the replies can be filed and kept on line or rendered to hard copy. Email packages can apply rules to the routing and processing of such messages. Files can be sent as attachments retaining their specialised formatting or the text can be incorporated without special formatting within the body of the email message.

Edith Cowan University's Virtual Campus supports both external and internal students, offering student bulletin boards and 'chat' sessions where academic / student and student / student contact can be facilitated. Student / student contact, facilitated by the internet, adds value and a sense of belonging to the lives of the more isolated of our students. Academics can offer student support from a distance on a daily basis either by internet email messages or by chat sessions arranged at predetermined times. Video

conferencing and voice communication on the internet are growth areas which may well change our methods of student support in the future. The internet challenges us in this area.

Costs are significant. According to Marie Corrigan, manager of Edith Cowan's Virtual Campus (M. Corrigan, personal communication, December 6th, 1996) the costs of providing material electronically can be greater than traditional methods. Currently Edith Cowan University is carrying this cost but it is possible that in these times of constricted budgets, economic rationalism and accountability, these costs will be allocated on a user pays principle i.e. will be passed on to the student.

8 Current Situation

On the technological front, Edith Cowan University has a culture of utilising the internet to support all aspects of University life. We have an extensive intranet in place and considerable inhouse technical expertise. All Computer Science staff are familiar with the use of this intranet but only a few have the necessary skills to author their own internet pages. This is not seen as a significant problem as this expertise is available elsewhere within the university e.g. a process for converting study materials automatically to internet pages has been developed inhouse with a pilot project in place to put study materials on the internet.

On the educational delivery front, we are well positioned in the Indian-Pacific region with its rapidly expanding education sector. Our Asian neighbours support large distance education institutions including the Indian Indira Ghandi University (242,000), Indonesian Universitas Terbuka (353,000) Thai Sukhothai Thammathirat Open University (250,000), Korean National Open University (196,000) and the huge Chinese Central TV and Broadcasting University (330,4000) [4].

Australia has a proud history of using technology to support distance education going back to the days of the 'School of the Air'. The Open and Distance Learning Association of Australia (ODLAA) has more than 350 members drawn from all educational sectors and *'aims to advance the practice and study of distance education and open learning in Australia'* [4]. DEETYA (Department Employment, Education, Training and Youth Affairs) the national government educational body has commissioned the Queensland University of Technology *'to evaluate the scope for technology based delivery across territorial borders, alliances between global media networks and universities and the implications of such developments for our educational institutions'* [4].

Edith Cowan University has several years experience of course delivery in the external mode and the Computer Science Department has nearly half of its undergraduate units externalised in paper based form. A smaller number of units utilise the internet in their delivery. Most units have electronic support materials available e.g. lecture notes, and overheads (slide shows) and many lecturers make these materials available to internal students via the University networks.

Computer Science staff Unit Managers have embarked on 'enwebment' of their units, considering product standards i.e look and feel of web pages, structure and minimum standard content of electronic materials. Agreement has been readily reached. Beyond this minimum standardisation, units have different requirements and Unit Managers have preferred tools and modes of material preparation. For a centralised system to be successful, either these differences will have to be accommodated or staff must freely opt for the advantages of standardisation. Standardisation may be a contentious issue conflicting with some staff perceptions of Academic Freedom. However its benefits are most apparent in the delivery and supporting process mechanisms rather than the content area. Thus standardisation is many faceted and its level of adoption is one of the major challenges faced.

We are currently implementing the CRUM (Computerised Repository for Unit Materials) project which will implement an electronic repository to store the different versions of all unit materials. We are exploring how this repository, its 'check in', 'check out' and replication mechanisms could be implemented, managed and accessed. Information is being collected from other institutions involved in similar processes e.g. the UniServe Australia project [5]. We have come up with many questions and a few answers. There is still much to be achieved..

9 Future directions

Our vision for the future is a well managed, quality process in place for unit and course management. This would be responsive both to the needs of students and course providers. The core of the system will be a central electronic repository of all materials with controlled ownership, update rights and access. Academics would have their Unit Management tasks supported by such a system. Our students wherever they are, whatever their home institution and whenever their unit is running will have easy access via the internet to appropriate and current materials.

With a quality process in place, we would expect the quality of study resource materials to be enhanced with resulting benefits to students and staff. As we move further into the electronic age, our system will harness the available technology to better student learning outcomes. The Computer Science Department will be in an advantageous position re any future developments in the fast moving communications arena as we will have already taken the initial step to standardise and manage our materials electronically.

We are just commencing using the internet to support student learning. We are meeting the challenge and the work being accomplished today by us and others area has the potential to change educational delivery mechanisms as we approach the millennium. The critical accomplishment will be the provision of more choice for our students and enhancement of their learning opportunities. We have taken the first steps of our long journey but have much to learn and accomplish before we complete it.

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