"Just-in-Time" Multimedia Systems: A case study of on-line delivery of a first year teaching unit

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Abstract

Introduction to Multimedia Systems is the initial core unit in CQU's new Bachelor of Multimedia Studies degree. It provides an overview of the use and development of multimedia and introduces students to a number of areas which may be studied in greater depth in later units.

The initial offering of this unit occurred in the first semester of 1997. Unit materials had not been prepared prior to the start of semester except for the unit profile and selection of a textbook; the pre-semester period also coincided with a Chancellery imposed freeze on all non-essential purchases.

Eighty-five students enrolled in this unit for its first offering, fourteen of whom were enrolled in the multimedia degree with the remainder taking the unit as an elective. As a result computer literacy, multimedia, programming, and "people" skills varied widely.

This paper describes the development and "just-in-time" delivery of this unit, with a particular emphasis on the electronic delivery of course materials, classroom demonstrations of computer-based multimedia products, computer-based discussion groups, and a dedicated web site. A basic specification for a first year multimedia student laboratory is also included.

Introduction

Central Queensland University is a regional university with five campuses in Queensland and two interstate campuses for international students, plus domestic and overseas programs which utilise the university's ability to deliver tertiary units at a distance. The university was, for example, the first in the world to offer professional computing studies at a distance and offers a number of information technology (IT) courses, all with an applied focus.

In 1996 the Faculties of Applied Science (Department of Mathematics and Computing), Arts and Business jointly developed an undergraduate award course, the Bachelor of Multimedia Studies (Table 1), as an entry level qualification for multimedia professionals. The new course is primarily a repackaging of current offerings with only four new units specific to the degree. It was first offered in the Autumn semester of 1997 with the introduction of the core first year unit 00101 Introduction to Multimedia Systems. Subsequent years of the course will be offered in 1998 and 1999; delivery to students studying at a distance has been rescheduled to begin in 1999 because of resource constraints, some of which are discussed in this paper.

Year	Semester 1 Units	Semester 2 Units
1	Professional Writing[2] Introduction to Multimedia Systems[1] Information Systems 1A[3] Elective (general)	Programming A[4] (C/C++) Fund Computer Tech (H/W)[4] Elective (multimedia) Elective (general)
2	Programming B[4] (C/C++) Multimedia Design[1] Biol Foundations of Psychology Elective (general)	Multimedia Development[1] Human-Computer Interaction[3, 4] Elective (multimedia) Elective (general)
3	Network Multimedia[1, 2] Project[3, 4] Cultural technologies[2] Elective (general)	Professional Issues[3, 4] Elective (multimedia) Elective (multimedia) Elective (general)
Notes	[1] New units for this course [2] Units from current BA [3] Units from current BBus(IS) [4] Units from current BInfoTech	Electives (general) may be taken from any degree level program; maximum of three first year units. Electives (multimedia) must be selected from a specified list according to the student's degree emphasis.

Table 1: Course Structure of the Bachelor of Multimedia Studies degree from the 1997 CQU Handbook.

Introduction to Multimedia Systems provides an overview of the use and development of multimedia and introduces students to a number of areas which may be studied in greater depth in later units. This unit requires staff with broad experience as it is meant to be a "fun" unit, providing an opportunity for students to explore the breadth of the discipline.

Unfortunately, the initial offering of this unit occurred when one of the two lecturers designated for the unit was on study leave and the other had just returned from study leave. Unit materials had not, therefore, been prepared prior to the start of semester except for the unit profile (a brief outline of unit objectives, structure, assessment style, etc.) and selection of a textbook (Hofstetter, Fred 1995, *Multimedia Literacy with CD-ROM*, McGraw-Hill). A Chancellery imposed freeze on all non-essential purchases meant that the installation of the first year multimedia teaching laboratory was delayed beyond the start of semester.

Eighty-five students enrolled in this unit for its first offering, 14 of whom were taking the multimedia degree. The others were primarily business and information technology students taking the unit as an elective. As a result computer literacy, multimedia, programming, and "people" skills varied widely. The skills of the teaching staff varied almost as widely. The lecturer (the author) is an experienced non-commercial multimedia designer and developer but is not a programmer. The tutors were Business Information Systems graduates with considerable enthusiasm and student rapport but minimal multimedia and programming skills.

Institutional constraints and lack of preparation might have suggested delaying the start for another year. However, the unit was delivered in a "just-in-time" format using "IT to teach IT", primarily e-mail and web-based technologies for distributing materials and communications. Students met each week in one of the university's multimedia lecture theatres for a two hour face-to-face session organised as one hour of "lecture" and another of

demonstration or class instruction. As well, there were weekly two-hour small group tutorial sessions scheduled in the computer laboratory (maximum 20 students per session) and the lecturer demonstrated multimedia technologies on an 'ad hoc' basis. Assessment was by assignment—two introductory exercises to demonstrate competency with the technology (10% each) and a group assignment (40%) to develop a small project—and final written exam (40%).

At the end of the semester eleven students did not sit the exam, thirteen received a Fail mark, fifteen a Pass, twenty a Credit, fourteen a Distinction, and nine a High Distinction.

This paper examines the difficulties of delivering this unit and provides some suggestions for others considering the use of "just-in-time" technologies for the delivery of a high-tech unit.

Issues in the Unit Delivery

Timetable Conflicts: Scheduling problems were common at CQU during 1997. The multimedia sessions were scheduled to avoid conflicting with other degree units but students, who were taking this unit as an elective were not so lucky. Many stayed with the class but skipped lecture or demonstration sessions, with implications for the last assignment as they did not know their classmates.

Textbook, Lectures and Demonstrations: The textbook provided a general introduction to the discipline and was augmented with class visits from working multimedia professionals. The CD-ROM examples were relevant but the presentation software was a demonstration version only and could not be used (as was anticipated when the textbook was selected) for the assignments.

The lecture and demonstration sessions in the large theatre followed the designated topic schedule. The author's initial difficulty using the theatre projection system would have been much more significant if he had not purchased a laptop computer with an appropriate video output; other colleagues using the lecture theatre often had to install software and presentations on the theatre computer every class. In the end-of-term assessment most students indicated that the presentations were acceptable although the demonstrations did not always work as planned due to hardware limitations.

Scheduled Tutorials: The scheduled tutorials, conducted in the multimedia computer laboratory, received a mixed review. Unlike tutors in the programming units, the multimedia tutors did not normally conduct a formal lecture-type session. Many sessions started with a demonstration or assignment activity, followed by an opportunity for students to work on their assignments. Some students appreciated the opportunity to ask the tutor for assistance when necessary, knowing that the tutor would guide them towards a solution, others wanted a more formal presentation and demanded 'answers'.

Facility and time constraints resulted in one of the tutors resigning about four weeks prior to the end of the semester. Rather than attempting to recruit another tutor at this time the author took on these tutorial duties but moved the sessions out of the computer laboratory. This was quite effective as most of the problems by that point in the semester related to group organisation and similar issues.

Optional Demonstrations: After about five weeks it became apparent that some students needed more depth than was possible in the class demonstrations, particularly for more sophisticated multimedia development processes (eg video capture and CD-ROM production). An optional weekly session was scheduled and, although these sessions conflicted with many students' timetables and were conducted in a small tutorial room, they were enthusiastically received.

Minor (Technique) Assignments: The first assignment required students to learn and use PowerPoint and provided a good introduction for novice computer users. The second required students to create a page in html (Figure 1) and replicate it to display supplied images.

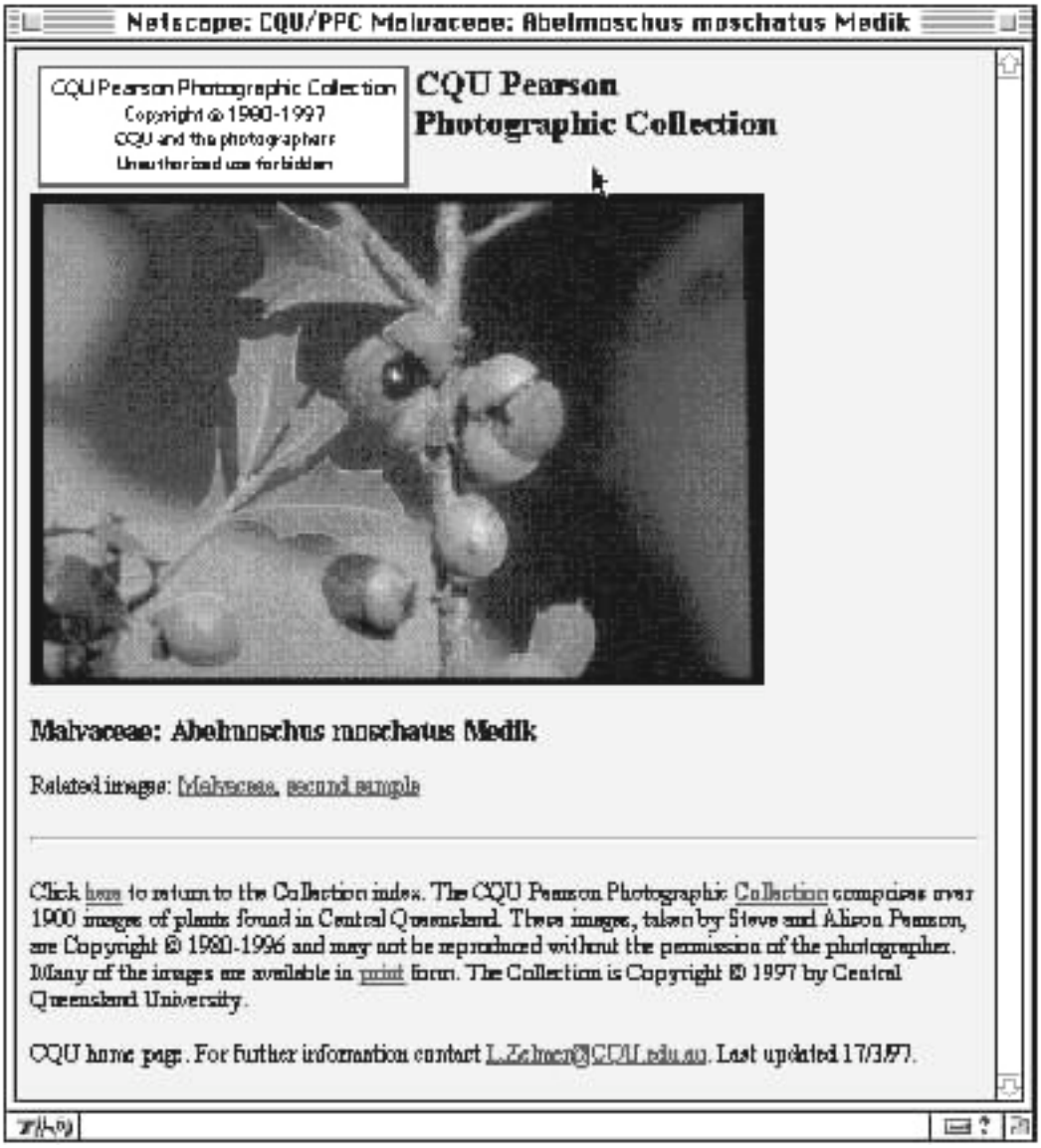

Figure 1: Sample page to be replicated for HTML assignment; each student received 10 JPEG files to be displayed in a similar manner.

Major (Group Project) Assignment: As is normal with group assignments, some students participated fully, others did not. In the following exchange (some spelling and punctuation errors in the e-mail messages below have been corrected for readability), two of the students in one group finally made contact through the class discussion list, even though other messages had failed.

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>You asked:  [response follows long message]
>>After making initial contact with the CP of group 4, I have sent a number of
>>email messages that have gone unanswered, and, with assignment 3 due in 5
>>days, and not having heard from anyone in the group for the past 2 weeks I
>>am a bit on the concerned side.
...
>At the very least I suggest that you need to prepare a final report,
>including your difficulties with the group process. I assume that you have
>done whatever you had agreed to do as part of the project, thus you can
>hand that in as well.
...
I've seen the CP [name deleted] a couple of times but for the last 2 weeks he
has just disappeared... so too speak. I myself am in the same trouble as I'm
in Group 4 and sad to say I've done no work due to the fact that we have not
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> come together to work on it... whose fault is it...most probably our own... I can't pin it on [name deleted] just because he's the CP...but I'm very concerned that my emails to him have gone unanswered just like [name deleted]...hopefully there's a happy ending to this.

Some students were justifiably critical of the process:

> My feedback to you is that to some extent, I consider you have set us up to fail...I consider the time-frame to be entirely unrealistic, given the complexity of the required task and the well known difficulty in developing and coordinating groups.

Others suggested that there had been significant learning from the experience:

> So to get to my point that this is easy compared to the real world. OK we have all had trouble about the assignment 3. However, can anyone complain that they have not learnt some thing out of this?

Marks for several projects went missing for some days, either because of a failure to maintain proper quality control over the mark sheet, or a group's Chair forgetting to submit project components, or the assignments coming in too late for marking by the normal tutor/marker. The e-mail list was invaluable for solving such problems.

Exam: Although there were no major problems experienced with the exam the marks were not as high as expected. Many of the questions came directly from the textbook, a disadvantage for those students who didn't purchase (or read) the textbook, but the remainder tested the ability to apply information from the unit. Assuming that the exam format remains relatively consistent marks should be higher in the future as students will have access to a sample exam.

Infrastructure: The student lab consisted of 20 new networked (pre-MMX) multimedia capable Windows-based computers with video cards and CD-ROM drives and was operational with e-mail, Internet access, Microsoft Office and Visual Basic by the end of the third week of classes. Minor utilities, however, were not allowed to be installed, the computers were so close together that it was difficult to put a book on the benchtop, there were problems with e-mail reliability and a promised flatbed scanner was not installed until the last week of the semester.

The student lab was in one building; one of the tutors (part time tutor, full time administrator) had an office nearby but the other (part time staff member and postgraduate student) was in another building and almost all of the students' classes, including their programming labs (no multimedia capable machines), were in other buildings.

Three digital cameras were borrowed for use in the assignments. One, tethered to a desktop machine, had limited utility, others almost bankrupted their users—students discovering that batteries were a significant expense.

Since video cameras and related equipment were available from a central pool several groups originally intended to use video segments in their projects. Digitising problems (one video card didn't work properly and the second produced a movie which could be viewed on a Macintosh but not, at that time, on a Windows machine) meant that only one group followed through with their plans.

Students were encouraged to subscribe to an unmoderated e-mail based list. When the system worked, subscribers received responses to any questions posed by fellow students as well as more general assistance with the class, details of changes and resource availability. The volume of traffic on this list, however, may have caused some students to unsubscribe (or ignore messages), resulting in communication problems with the group project.

Finally, the university experienced several computer virus attacks during the semester. The author, for example, lost several hundred megabytes of files, including e-mail messages from students and the class grade sheet. Fortunately, one of the tutors answered queries on the discussion list during this time and most students were minimally affected.

Class Web Site (http://vl-zelmer.cqu.edu.au): The author created and managed a web site for the class containing links to all class materials, including unit profile, assignment details, images for the first two assignments, marks and comments on completed assignments, and lecture notes (Figure 2). During the course of the semester this site was expanded to include sample multimedia presentations, etc. While it might be more appropriate for class materials to be made available on a university server, rather than on a staff member's "feral" site, policies and procedures did not permit easy updating and maintenance and officially require all on-line materials to be approved by a university committee prior to posting.

Basic Infrastructure Requirements

Students taking an introductory multimedia unit need access to networked multimedia enhanced computers (perhaps in the ratio of 4 Wintel to 1 Macintosh) with CD-ROM drives, sound systems with headphones, large hard drives, etc., for:

- viewing and evaluating current multimedia products and tools,
- accessing information sources and resources (local and Internet), and
- designing and developing basic multimedia presentations.

Other required facilities include:

- monochrome laser printer for text, and colour inkjet printer for presentations,
- consumer level digital cameras,
- video recorder and playback facilities;
- inexpensive video cameras for network videoconferencing with appropriate software;
- audio recorder and microphones;
- flatbed or handheld colour scanner;
- colour slide/negative scanner with appropriate software;
- audio and video digitising facilities with appropriate software;
- graphical input tablet(s);
- CD-ROM recorder(s); and
- removable hard disk storage devices (Zip/SyQuest, on the network and for student loan).

For most efficient use these peripherals should probably be installed in a small number of faster machines which can be used as shared workstations. A Power Macintosh with the integrated Avid Cinema card and video editing software, for example, would be ideal and could also support the flatbed and slide/negative scanners.

Software includes appropriate operating systems, network tools, browsers and e-mail, virus checkers and other utilities, sample multimedia projects and tools for review, plus at least one presentation tool (PowerPoint in 1997) and one development environment (VisualBasic in 1997) and tools/utilities for developing basic projects. Other production tools could be light versions of industry-standards such as PhotoShop Lite and a range of shareware utilities.

Students also need good access to "productivity" tools (word processors, etc.) for completing assignments and a secure but easily updated web/ftp site or equivalent for the distribution of student resources and the display of student projects.

Access to a collection of copyright free resources (digitised photos, video, audio, illustrations, backgrounds, etc.) is important for assignment use (in 1997 these were supplied from the lecturer's personal collection) since students at this level typically lack image production skills.

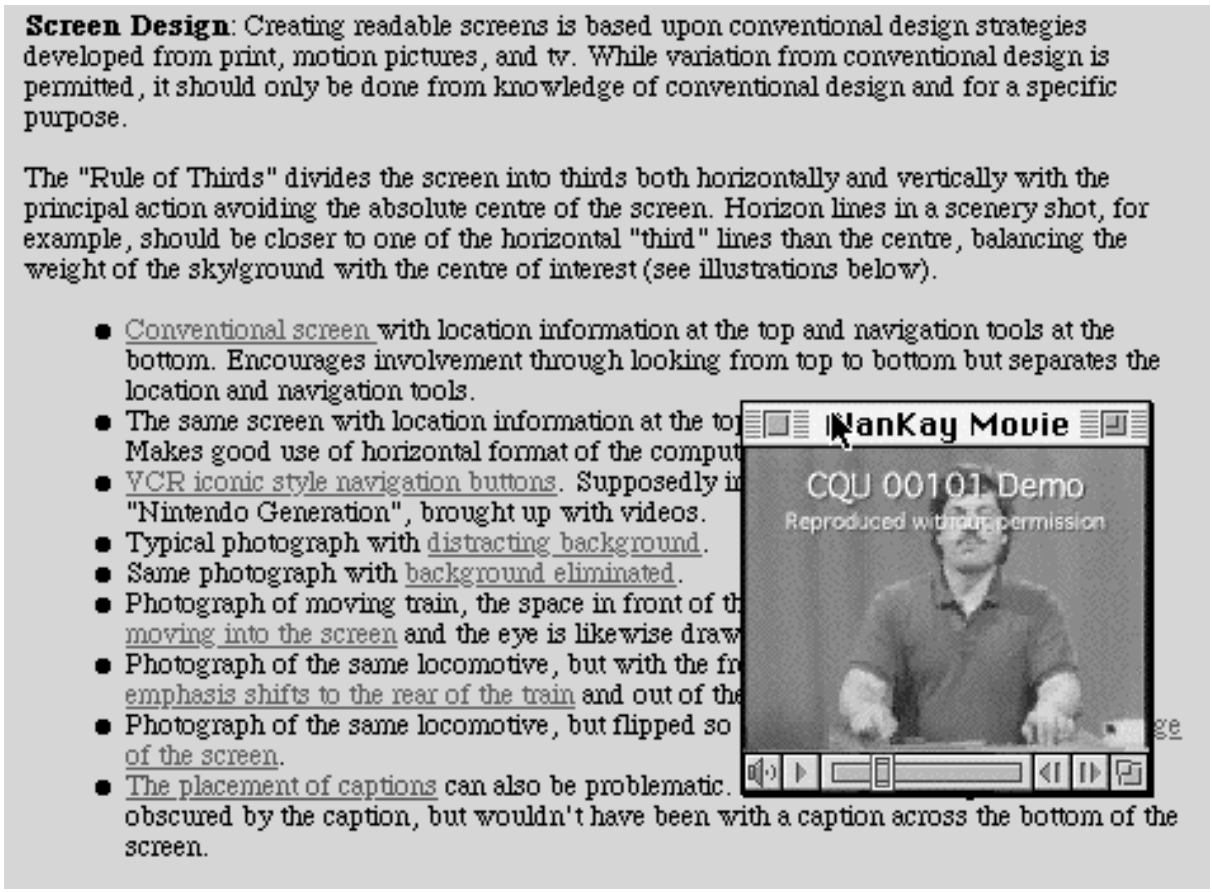

Figure 2: Lecture note extract with a superimposed image from one of the links.

Conclusion

Some aspects of 'just-in-time' delivery should be adaptable to tertiary education but we need to remember that the automobile and other industries using this approach invest in planning and infrastructure prior to initiating their programs. This unit was both challenging and rewarding but new units should not be delivered in an 'ad hoc' fashion, even if the Internet and on-line tools enable us to do so. Most students, while agreeing that the unit had its moments of fun, would argue that there were too many delivery problems. In particular, they would highlight the inadequate resources for completing assignments, the late start to the optional small group demonstrations of industry standard software and techniques, and the difficulties with the groupwork in the third assignment. None of these issues are insurmountable but all must be overcome prior to the next offering of the unit.

Multimedia offerings, especially when delivered on-line, require significant infrastructure funding. The author's request for digital cameras, scanners and other basic tools for first year students was characterised as a 'Rolls Royce' approach. CQU may never have the funding to provide Silicon Graphics or similar workstations to its students, and indeed should not do so if it is to deliver the course to students at a distance, but administrators and others need to understand that quality education requires adequate resources.