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A Model for the Delivery of Subjects to Train CBI Developers at a Distance

Debbie Clayton, Phillip Farrands, and Lynn Zelmer
University of Central Queensland

Abstract

The University of Central Queensland offers a sequence of two subjects that provide formal training in the design and development of CBI courseware. In 1994 these subjects will be offered in distance mode. This paper describes the process that the development team went through in designing the distance delivery of the subjects and how the teaching and learning resources were developed. Specifically it discusses issues of the

- availability of authoring software,
- provision of CBI products,
- development videotapes of seminars by CBI practitioners,
- selection of resource readings and texts,
- design of appropriate assessment activities.

Comments relating to the authors' experiences in using this process as a model for the design and development of resources for such subjects conclude the paper.

Keywords

computer-based instruction, instructional design, distance education, tertiary training, problem-based learning

1. Background

The maturing of the Computer-Based Instruction (CBI) discipline is evidenced by the introduction of formal tertiary courses designed to produce professional developers, for example, the Graduate Diploma in Computer-based Education (Sims and Roc, 1992). Such courses are currently offered in an on-campus mode. There is evidence of a need for such training to be offered in a distance learning context so it is accessible to a wider section of society.

In 1993 the Department of Mathematics and Computing at the University of Central Queensland commenced offering an honours programme in computing. Delivery of courses in computing to distance students has occurred since the late 1970s. A requirement in the design of the honours programme was that all subjects would be delivered in off-campus mode.

The authors, all members of the department, had for some years been involved with the application of computer technology to the educational process. This experience meant that a stream of subjects on CBI was seen a natural component of the new course.

In the first iteration there are two CBI subjects, *Computer Applications in Learning and Training A* and *Computer Applications in Learning and Training B* (CALT A and CALT B). A number of factors and assumptions influenced the design, content and delivery of the CBI stream. These are now discussed.

2. Resource access

Students studying at a distance do not have the same ready access to facilities enjoyed by on-campus students. Specifically journals, conference proceedings and some texts in a central library are in limited supply and cannot easily be borrowed by off-campus students. Some specialist software and hardware that would normally be shared by a number of students and staff on campus are not accessible to the distance student. In the distance mode, tutorial group discussion is limited to teletutorial activity.

3. Student background

The authors envisaged the CBI subjects having appeal to students from a wide variety of backgrounds. To make the course accessible to non-computing professionals, the material is not built on a detailed technical programming foundation. Students are expected to use programming tools appropriate to their programming knowledge and abilities. A software engineering professional could apply the concepts using a normal third generation programming language. A person with little programming expertise would be more likely to use a high level authoring language. The course does not attempt to discriminate against either group.

Much of the CBI research is based on educational theories. Computing graduates are unlikely to have received any training in that discipline. A significant thrust of the course is to provide a broad overview of education theory, especially adult education, as it applies to CBI.

The course is not intended to be suitable for undergraduate students. Whilst it is difficult to identify specific concepts that could be viewed as strictly postgraduate, there is an underlying assumption that the more mature student will possess the necessary skills to synthesise concepts and practically apply ideas. Involvement with the production of a significant project was seen to be a vital component of the course design. The project would provide a focus for students and an opportunity to apply the theories and research outcomes studied.

4. Delivery constraints

IBM PC computers are currently the departmental standard. Students continuing on from the bachelor's degree will have ready access to a compatible computer. Production of CBI materials does occur widely on Macintosh computers. To maximise the market of the subjects, however, it was felt necessary to deliver common software on IBM PCs or compatibles.

Video Cassette Recorders (VCRs) are widely available in Australia. The course design and delivery assume all students will have access to a VCR.

5. Subject aims and content

CALT A and B together aim to familiarise the student with the principles and techniques of using computers to assist the learning process.

The first of the subjects, CALT A, introduces the students to aspects of basic educational psychology, andragogy, instructional design models, screen design and design aids such as storyboards, and presents the main CBI methodologies of tutorial, drill and practice, simulation, educational games and software tools. It essentially provides topics for the “design” phase of the construction of CBI courseware.

CALT B concentrates on the development and implementation aspects of CBI. Topics include project management and planning and development testing of courseware. Computer-Managed Learning is introduced as well as a taste of the future directions of CBI.

6. Assessment

The major assessment activity for the two subjects is the design and development of a significant piece of educational software. This reflects the aim to move from a purely theoretical treatment of topics.

The CALT A assessment is based on:

- an evaluation of several seminars (lectures, demonstrations, etc.) to demonstrate critical appraisal skills and a knowledge of adult education practices (20%),
- preparation and presentation of the design for a CBI project to demonstrate project planning and design skills (50%), and
- a case study of a current CBI implementation or CBI evaluation project (written case and oral presentation 30%).

There are four assessment items in CALT B:

- four topic overviews (technology, process or resource reviews) to demonstrate knowledge of the current CBI literature (20%),
- the completion of the project begun in CALT A and presentation of user testing results (initial testing report 10%, oral presentation 10%, implementation report 40%) demonstrates the ability to implement a CBI project, and
- a case of a current CBI implementation expands knowledge of current practice (written case and oral report 20%).

7. Presentation

Both CALT A and CALT B are designed around two main foci. First, the technical content is presented by a number of practitioners whose different philosophical approaches to CBI development demonstrate the wide potential for courseware development, and whose experiences bring practical relevance to what could be an esoteric design exercise. Second, the two subjects are problem-based. Students must develop the design for a significant CBI project in CALT A and implement at least one portion of that design in CALT B. Students are encouraged to develop projects for real clients rather than undertaking a self-generated exercise.

In addition, the students are encouraged to evaluate the lectures and other presentations that occur during the subjects to improve their adult education skills, and are encouraged to broaden their knowledge through wide reading in classical and current CBI literature.

In the initial offering, the subjects were the joint responsibility of the authors, all of whom are involved in a variety of CBI projects.

8. Process for developing and gathering resources

The subject development model used by the department is that new subjects are first offered in on-campus mode only. By doing this, materials to support the distance offering can be developed and tested with on-campus students to ensure they do meet the designers' expectations.

The provision of resources for distance subjects with large technological components requires creatively overcoming problems of access and cost. The teaching and learning resources that distance students have access to are

- a library of videotapes of demonstrations and seminars by CBI practitioners,
- a collection of papers and readings,
- the textbook: "Computer-Based Instruction" by S. Alessi and S. Trollip (1991),
- software products and examples which demonstrate the different CBI methodologies,
- the cT authoring software and manuals, and
- a study guide providing guidance on how to use the resources, topic discussion, activities and samples of student design and development reports and case studies.

On-campus CBI practitioners agreed to deliver seminars and demonstrations to students in a studio environment so that the presentation and subsequent discussion could be videoed. Videos of off-campus practitioners either were purchased or the authors recorded them in an "interview" situation. Many presenters provided associated handouts and readings for seminar participants. These are incorporated with the edited video presentation for the distance student. The videos are available on a loan return basis. (Seminar topics are listed in Appendix A.)

A resource bank of readings and research papers was identified as a necessary component of the course materials. The bound collection of papers and readings aims to provide a more in-depth or different perspective to the topics presented in the text. The collection was established from journal articles and conference proceedings (in particular ASCILITE), the authors' research, and student project work. One reading on instructional design, for example, was written as part of a recent PhD study by one of the authors, and the reading on "New and Future Directions" was a paper and annotated bibliography compiled, under supervision, by a special topic student in the Computing degree.

Examples of demonstration software and products showing different CBI methodologies are provided on disk. These comprise

- product demonstrations and tutorials from authoring systems vendors, for example, TenCORE and cT,
- simulations, and CBI courseware for which UCQ holds copyright, and
- CBI courseware from other sources that the authors have been able to negotiate to copy on a loan and return basis for student viewing.

Considerable effort went into the investigation of suitable authoring tools that could reasonably be accessed by students at remote sites. A factor that restricted the choice of authoring systems was the departmental standard of IBM PC computers. Students use their own authoring tools, or are supplied with cT on a loan return basis for the CBI courseware development project. The cT authoring system was selected as it allowed for cross platform development as well as being available in a "distance student" site licence form.

Examples of case study reports and design (including sample storyboards) and development reports are presented in the study guide for distance students to peruse.

9. Concluding comments

The model where resources for distance students are developed in conjunction with the first on-campus offering has, in this instance, proved to be efficient. The on-campus offering has been like a "development test" providing some measure of their effectiveness.

The experience of teaching these subjects on-campus provided feedback on the following aspects of the design and development.

- Initially the assessment of the case studies was weighted too heavily in comparison to the design and development projects.
- Apart from research on the topical overviews (mainly using computing magazines such as Byte, and PC Magazine), students did no additional reading to the textbook and the supplied papers and readings. They considered the supplied written resources provided adequate coverage of the subjects' topics. They also indicated a lack of time to do further library research.

- The students' oral presentations of case studies and design and development reports were filmed in a UCQ studio. Whilst students found this intimidating, they all agreed it was a valuable learning experience. This assessment option has been modified for the distance offering by requiring students to provide an audio tape and associated written handouts of these presentations.
- The assessment of project work requires the student and marker to be aware of the criteria used. Whilst the authors set down clear marking criteria for project work, they were disappointed by their own lack of consistency in assessment of the same piece of work. It was a learning experience for them as well.

An advantage of a problem-based subject is that students have an opportunity to follow a project from initial development, through the design and initial testing stages, to implementation and user testing. A disadvantage is that the projects are often too small for the students to appreciate the realities of managing a major project. This has been partly alleviated by exposing the students to a variety of working professionals; however, it is likely that the students are still more attuned to a pilot study or an individual author prototype development rather than a major commercial-level activity.

The technology is changing so quickly that it is almost impossible to properly prepare students for the work place. As recently as 1988, the IBM/MS-DOS based computer was clearly inferior to the Apple Macintosh® in terms of its potential for preparing and delivering non-text-based learning courseware. By 1993 the IBM/MS-DOS platform has caught up to the Macintosh platform in terms of the presentation of CBI and multimedia materials.

While projects incorporating the best design and presentation technologies are increasingly too expensive for training institutions, we must continue to demonstrate and develop approaches that permit our students to make the transfer from training situation to workplace reality.

10. References

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Address

Debbie Clayton Email: d.clayton@ucq.edu.au
 Phillip Farrands Email: p.farrands@ucq.edu.au
 Lynn Zelmer Email: l.zelmer@ucq.edu.au
 Department of Mathematics and Computing
 University of Central Queensland
 ROCKHAMPTON QLD 4702.

APPENDIX A
Seminar and Demonstration Topics Provided on Video

Learning Styles and Instructional Strategies

Screen Design and CAL

How the Interface was Won - CHI

Team Building Exercises

Instructional Design and CAL

CAL Design Aids – Storyboards

Development Testing

How to Develop Successful Computer-based Educational Software

Health Science CAL Case Studies

Evaluating A Learning System

Implementation Planning

Commercial Realities of CBI/Multimedia