AN INSTITUTIONAL SYSTEM FOR DEVELOPING FLEXIBLE ONLINE LEARNING AND TEACHING ENVIRONMENTS

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Abstract

The paper reports on the state of development of a database/ server architecture for online learning and teaching environments, and progress towards wider adoption in the University. The strength of the Online Courseware Component Architecture (OCCA) comes from its grounded development in real curriculum projects, out of which a common denominator of online learning transactions has been derived. Students might use OCCA-based Web pages created by teachers that support open-ended questions, immediate feedback, learning histories, peer interactions or reflection on previous work. Other pages can be used as an optimised environment for teachers to review, assess and respond to student work. The different Web page structures provide many opportunities for creating templates and pedagogical exemplars that can be shared and re-used. The development has progressed from initial prototyping implementation, to be adopted as the project development environment for the Teaching, Learning and Research Support Department. It is now entering a third phase in which sites are being developed within local teaching departments. This paper summaries the state of development of OCCA and examines the fundamental shifts in the nature of the project and staff involvement accompanying these major phase changes.

Keywords

innovation, flexible learning, online delivery, learning objects, adoption

Background

Software reuse and sharing of online educational models is a major concern of higher education institutions. Significant funding placed into technology-based initiatives over the past five years has, however, resulted in low levels of dissemination beyond the originating department or institution (Alexander, 1999). Attempts to recycle existing computer-facilitated learning (CFL) developments by way of a national inventory found that there are insufficient data about CFL resources available (McNaught, Phillips, Rossiter & Winn, 2000). Previous national databases of CFL materials also did not appear to have significantly increased the take-up of CFL materials and strategies. It is likely that efficiencies will be achieved through increasing institutional adoption of courseware systems such as WebCT. While providing obvious benefits of standardisation, a recent survey of University of Melbourne teachers indicated that any single system would be educationally too restrictive and that some form of central support for supplementary approaches was essential (Fritze et al., 2001a).

Under a strategy to boost innovation, the University of Melbourne has run a major funding program for innovative technology-based curriculum projects over the last four years. While these explorations are natural for the early stages of technology evolution, ultimately more general-purpose platforms for staff use must emerge (Taylor, 1998). The development of Online Courseware Component Architecture (OCCA) is one such response that has been generated within

the Teaching, Learning and Research Support Department (TeLaRS). OCCA has evolved directly from collaborations between teaching and TeLaRS staff, within a number of funded curriculum projects (Fritze, Welch & Ji, 2000). It has been possible for TeLaRS, given its position as the central educational technology support unit, to gather from a wide range of projects across the faculties, a common denominator of pedagogical requirements to underpin a generic learning architecture.

What is OCCA?

OCCA can be most simply described as a Web server, with additional functions for managing and storing teaching and learning 'transactions' (Figure 1). It comes with none of the pre-defined high-level pedagogical functions that typify standard courseware systems; rather activities are constructed using standard Web forms. A database stores 'work' done by students, groups or teachers. This might be a student's answer, a teacher's comment to a student, or even the state of an interactive simulation. Such information is represented within the database in standard 'State Description Protocol' (Fritze *et al.,* 2000) so that the format of the record is arbitrary. Such stored information is only useful if it can be recalled, so before any OCCA Web page is delivered, it is checked for special 'tags', which are replaced with appropriate data from the database records. In this way, text, checkbox/ menu values or other data saved from earlier pages can be embedded onto any other page. OCCA supports standard forms-based posting, as well as customised interactive programs written in Director, Shockwave or Flash, representing, for example, equipment simulations or discipline-specific tools. Using these low level operations, it is possible to create unique discursive environments for both students and teachers, not possible using current courseware systems (Fritze, 2001).

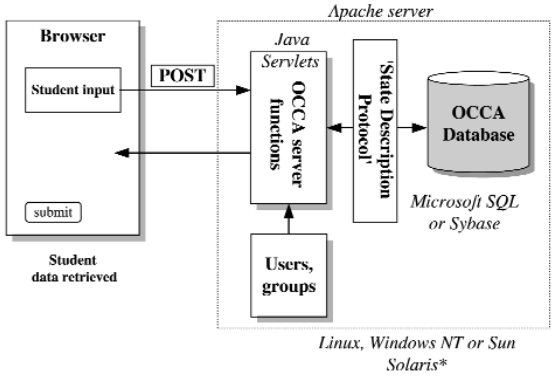

Figure 1: Structure of the OCCA server/database

A Student's View of OCCA

A student might experience OCCA-based online resources through a variety of Web page designs. Typical educational functions visible to the student are (Fritze, Kavnoudias, Kemm & Williams, 2001):

- activities – in which the student can submit work as individual or group, review work of peers, re-draft prior work and reflect on their learning;
- summaries of work done – the student may be provided with pages that represent learning portfolios, timetables of progress, histories of submissions or display responses of whole class or group;
- feedback – comments/ assessment/ annotations by teachers, peer reviews or conditional responses embedded within a question page; and
- interactive programs – e.g. equipment simulations or discipline interfaces such as a flow chart tool.

A Teacher's Perspective

OCCA presents no predefined teaching tools, so in addition to designing activities for students, other pages for teachers to monitor student progress and provide assessment & feedback need to be considered. There are many opportunities for reusing departmental page templates or copying techniques used in other subjects. Additional teaching activities are to administer users/ groups, adapt lectures/ tutorials in response to feedback from students and to train/ coordinate tutors where necessary.

A Central Unit's Perspective

While the view of OCCA as an instrument to facilitate learning and teaching remains clear, less obvious is the manner in which TeLaRS involvement has altered (Table 1). TeLaRS is a department of the Information Division, providing support to all faculties in course development, educational design, programming, media production, learning resources, Web development, educational technology research and evaluation. In progressing from a phase of innovative prototyping, to adoption within TeLaRS and now the institution, the extent and nature of staff involvement has changed significantly, as have funding models and project policy. Moreover, these phases are tending to co-exist. For example there is a continuing role for innovative prototyping in parallel with centralised production and institutional adoption. Such parallel activities reflect fundamentally different involvement, funding models and stakeholder concerns that must be reconciled.

Phase	Description	Involvement	Funding	Concerns
Innovative prototyping	1997 - present Innovation through progressive prototypes, major shifts in technical, educational approach. Formative evaluation.	Only 1 or 2 unit staff, close collaboration with academic innovators in faculties.	Curriculum project grants, opportunistic and through research involvement.	High risk & personal time involvement, dependence on individuals, early attempts become obsolete.
Centralised production	2000 - present Adoption within TeLaRS as project production environment, software consolidated & extended. Project evaluation.	~12 TeLaRS designers, programmers, project managers working for academic 'clients'.	Independent funded curriculum projects.	Focus on individual projects more than common framework, system documentation, management of software versions
Institutional adoption	2001 - present Depts start to adopt for own use. TeLaRS manages centralised system & supports department IT units. Meta evaluation studies.	~10 Unit staff in systems development & admin, training & consultancy. More Faculty staff. Steering committee.	Corporate system funded centrally. Curriculum applications funded by faculties.	Mass usage. Reliability and performance, hotline and backup strategies. Increasing dependence on system. Authoring by widest range of users.

Table 1: Phases in the development of OCCA from the perspective of TeLaRS

Current Applications Within the University

OCCA is currently used in over thirty-five projects across the University. Most are one-off customised interactive online course environments created by TeLaRS for Departments, while others deliver simple questions or facilitate student essay submissions with customised marking templates for teachers. There are four collaborative projects involving other institutions in Arts, Law and Education. Eight projects now represent the start of institutional adoption in which Web development is undertaken within departments, with centralised system and staff support from TeLaRS. The Physiology Collaborative Learning Environment has been of particular importance in establishing the pedagogical potential of OCCA (Kemm et al., 2000). Evaluation reports from this project have indicated high levels of ease of use while involving students in pedagogically significant activities, such as re-drafting, self-assessment, providing feedback to peers, developing key concepts and reflecting on the learning process (Fritze et al., 2001).

Reflection on Adopting OCCA as a Generic Online Tool

OCCA as a development environment for creating customised courseware might be considered successful, based on its uptake in TeLaRS and evaluation of key curriculum implementations but for it to succeed as a generic institutional product, a major philosophical re-alignment is required. Table 1 reveals a number of areas of difficulty, not usually considered in the evaluation of single

projects. Each phase through which the OCCA development has passed signifies a distinct change of 'control' or 'ownership'. Thus it becomes no longer practical for the 'innovators' to exert control over development directions as in the prototyping phase. Innovation threatens the stability required of software that must be applied in multiple projects by staff taking on a production role. On the other hand, a focus only on production of individual curriculum projects does not account for the requirements of a generic institutional system.

Sensitive management of these transitions is critical and must account for institutional and departmental politics and changes in individual involvement. Not only is the number of people involved with OCCA increasing but also new roles are being generated. The central unit must now coordinate new services such as corporate level system support, it must re-engineer systems and hardware, develop templates and resources for use in faculties and offer consultancy and development programs for faculty. A sustainable funding base must be established. There is no more important role than that of a central steering committee representing the interests of stakeholder communities and making pragmatic recommendations on development priorities and strategies. For a generic system such as this to succeed, policy should be informed by meta-evaluation and ongoing close collaboration with teachers at the coalface of its implementation.

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