ABSTRACT

This article presents the development and software architecture of a conceptual and operational collaborative distance education model. Promotion of educational expertise, especially through expansion of specialization, is of increasing importance. Within the educational sphere, big universities tend to dominate the market at the expense of smaller ones. For small universities, the key to their survival could also be specialization within disciplines, coupled with collaboration among universities. Intra-discipline specialization would promote development of quality services, and interuniversity collaboration would enable a wide offering of these services. The proposed paradigm would require the development of a suitable model to support it. The model proposed in this article is a federation of independent universities that are loosely coupled to facilitate collaboration and the sharing and exchanging of information. The federated model, supported by agent-based communication over the Internet, can operate across geographical, cultural and organizational boundaries while promoting integration within those boundaries.

Keywords: agent-based communication; collaborative education; federated architecture

BACKGROUND

The growth in demand for tertiary education is a phenomenon experienced by all countries throughout the world. Education, and particularly tertiary education, is valued very highly by all communities, leading to increased demand for universities. This demand puts significant financial pressure on governments to provide sufficient places for public-funded university systems. Increasingly, government is unable in the less-developed world, or unwilling in the developed world, to meet the full cost of this provision. Currently, the responsibility for the costs of running universities is being increasingly transferred to the immediate consumer, the student, and, in latter times, to the universities themselves. This transfer takes many forms. In Australia in recent years, student fees for university courses have increased, while government funding of universities has significantly decreased. On the other hand, countries in
Asia and Africa have encouraged universities from the developed world to provide a variety of pathways to enable their nationals to gain access to university qualifications.

The increasing cost of the provision of university education raises both economic and social dilemmas. In countries such as Australia, although students and taxpayers seek and approve university education, they seem reluctant to meet its increasing cost. This presents the government with the problem of either reducing the number of universities or providing alternative means for making university education more cost effective. One approach encouraged by the Australian government is for universities to find supplementary sources of funds by, for instance, increasing their intake of full fee-paying students, both local and overseas. However, many of the current solutions may not be sustainable in the long term, while the costs of education can only be expected to rise.

**RATIONALE**

Universities are faced with the challenge to be multidisciplinary. This challenge particularly impacts small and newer universities, as they cannot afford the resources to develop specialties across all disciplines. Alternative models of education that can provide quality education cost-effectively need to be explored. Educational technology offers great potential in this area, but the cost of producing quality educational software is very high and only becomes financially viable for large classes of students. However, large classes are not feasible in any but a few institutions.

Traditionally, universities have appropriated their own courses and the subjects within those courses. Thus, it is possible that several hundred students throughout a country may be studying a particular subject in a given year. Yet the number of students in any one institution is insufficient to justify the costs of new technologies, which would reduce the costs of delivery and offer alternative learning experiences while at the same time provide outcomes similar to those obtained within the traditional classroom (Jung, Jacques, de Andrade & Vicari, 2002; Redfern & Naughton, 2002).

Perhaps a solution lies in the development of an alternative model of education that liberates it from a conception of university as a totally self-contained individual entity and, instead, promotes the notion of a university not as a locale but as a collection of scholars pursuing knowledge. The particular location or affiliation of these scholars is immaterial. What matters is the collaboration between them to offer and to share their particular expertise. The development and sharing of expertise is becoming increasingly important as existing areas of knowledge expand and new areas continuously emerge.

The massive growth of knowledge, roughly estimated to double every five years (Freeman & Capper, 1999), has placed even the larger institutions under pressure. Fortunately, the exponential growth of both knowledge and complexity of issues requiring multi-disciplinary expertise has been accompanied by the advent of the information technology age. The emergence of convenient technology has minimized reliance on a community of proximate scholars. Scholarly interaction now tends to take place with similarly interested, but distant, specialists — that is, in the professional rather than the physical realm (Dirchinck-Holmfeld & Lorentsen, 2003).

In this environment, the smaller universities have a special interest, because of their small number of academic staff in
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