

## Chapter 5.14

# An Embedded Collaborative Systems Model for Implementing ICT-Based Multimedia Cartography Teaching and Learning

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### **ABSTRACT**

Information and communication technologies (ICT) have created many new opportunities for teaching, learning and administration. This study elaborates a new embedded collaborative systems (ECS) model to structure and manage the implementation of ICT-based pedagogies in a blended learning environment. Constructivist learning, systems theory, and multimedia concepts are used in the model design and development. The model was applied to a third-year undergraduate multimedia cartography course. The findings show that regardless of student background, implementing

effective ICT-based learning pedagogies can be managed using the ECS model.

### **INTRODUCTION**

Integrating information and communication technologies (ICT)—specifically computers, networks, and the Internet—into higher education has created new opportunities for teaching, learning, and administration. Indeed, the role of ICT in the administration of the higher education process has been reflected in national initiatives such as the 1997 Dearing Committee of Inquiry

into Higher Education in the United Kingdom (Dearing, 1997). One of the recommendations of the Dearing Committee was the adoption of national and local ICT strategies to improve the effective and efficient use of resources by U.K. education institutions. Canadian higher education has echoed these strategies and has also increasingly used ICT in the improvement of the quality of distance-education models (Farrell, 1999). The diffusion of information and communication technology into higher education can be attributed to its potential to leverage education processes toward richer and more rewarding learning and management environments (Mitchell, 2002).

In teaching and learning, ICT is a platform on which key learning skills can be efficiently integrated into existing curriculum to boost learner motivation, deepen inquiry, accelerate learning, and widen participation among traditionally isolated groups (Hassell, 2000). Moreover, teaching core ICT skills such as computer operation and programming prepares students to function and succeed in an increasingly information-based society. However, some authors have pointed out that excessive optimism about the micro and mega benefits of ICT in education can develop into broken promises (Selwyn, 2002). These broken promises can adversely influence the adoption of ICT in educational contexts. While most educators agree that ICT has transformed the traditional education process and, hence, demands a new way of thinking, some have pointed out that achieving and verifying useful ICT educational benefits will require strong theoretical evidence, embedded analysis, and research to surmount the associated structural and cultural barriers (Kenway, 1996).

The utility of ICT in providing and retrieving information is of immense value to educators. Instructional designers are now better able to include a range of ICT-based pedagogy into curriculum design and delivery. Many accept that the technology itself does not ensure learning but acknowledge that it enhances traditional instruc-

tional systems to deal with modern-day literacy that is a key component of all education goals. Literacy is now generally considered as a multimedia construct (Abbott, 2001). Multimedia improves upon the traditional text and speech formats of interacting with knowledge by integrating other forms of media, such as audio, video, and animations into the learning experience. This has made information more accessible and understandable. But the benefits of multimedia have also come with new challenges. Using multimedia in the classroom is a clear departure from traditional expectations and requires a new mindset and commitment from educators and administrators to ensure effective implementation. Challenges also arise due to the lack of consistent baseline experience to guide the integration of multiple media into the curriculum. Moreover, the wide range of multimedia tools available present a technical challenge to educators who must select instructional technologies to match pedagogical strategies and desired learning outcomes (Abbott, 2001). These challenges demand a flexible and systematic mechanism for managing multimedia tools in traditional learning. Systems theory provides a useful foundation to develop such a management mechanism. In systems theory, the key components of the process are identified and managed separately but as a part of an integrated and functional whole. The resulting systematic structuring ensures that valid models for pedagogy inform the learning process, and that the quality of education is maintained and improved through dynamic interactions between learners and educators.

The utility of ICT in promoting sharing and collaboration among learners is also highly desired. This is reflected in the many content management systems (CMS), such as WebCT (<http://www.webct.com>), that empower educators to implement synchronous and asynchronous collaborative environments in distance-learning models and in online support for face-to-face instruction or blended-learning models. Socially

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