Understanding the Ontological Requirements for Collaborative Web-based Experiential Learning

Dr Elspeth McKay  Prof. Brian Garner  Prof. Toshio Okamoto  
RMIT University, School of Business Information Technology, Australia  
Deakin University, School of Computing and Mathematics, Australia  
The University of Electro-Communications, Graduate School of Information Systems, Tokyo  
elspeth.mckay@rmit.edu.au; brian@deakin.edu.au; okamoto@ai.is.uec.ac.jp

Abstract

The challenge of human-computer interaction forces educationalists to think of new ways to understand the social, historical and contextual nature of learning. Discussion and exchange of ideas enable learners to learn together. However, the granularity of the Web-based learning context is extensive; consequently, e-Courseware design faces new dilemmas. Only through targeted research will it be known with any certainty whether Web-based learning gives rise to a new type of learning dissonance [1]. It has been proposed that converged theoretical paradigms that underpin particular digitised or context-mediated learning systems are forcing learners into new ways of thinking [2]. This paper presents an overview of the plans for an experimental project designed to understand the ontological requirements for experiential instructional environments. This project is a joint research initiative involving three Universities in the Asia/Pacific region. Results will be used to inform educationalists interested in developing instructional strategies for a global community.

Keywords: Web-based ontologies, collaborative experiential instruction, knowledge-mediated learning

1. Introduction

Innovations in online training and skill acquisition processes are being driven by demands on the human workforce to maintain their competency and knowledge in a period of rapid technological change and international competitiveness [3]; [4]. The potential of the Web to offer a medium of collaboration, where conversation, discussion and exchange of ideas that allow learners to work and learn together [5]; [6] has naturally excited considerable interest. Web-based courseware has broadened our instructional opportunities. It is now possible for the facilitation of both synchronous and asynchronous communication. On the one hand, computer laboratory instructors in educational settings manage synchronous interaction easily. While on the other, the delayed interactivity characteristic to asynchronous mode is more difficult.

2. Project Direction

This project aims to provide an understanding of the hierarchical structuring of knowledge (ontological complexity) in HCI for collaborative processes, to implement linkage between learning investments and professional practice [3]. The investigation and analysis of knowledge-mediated, human interaction requirements, and consequential discovery of group knowledge support requirements, is expected in:

- Conceptualisation (ontology) specifications for given knowledge domains [7]
- Categorisation of contextual forms best suited to experiential learning
- Mechanisms for knowledge-mediated learning strategies through experimentation with novel indexing mechanisms for context resolution
- Knowledge fusion requirements when accessing multiple knowledge sources; and
- Cultural factors in the socialisation requirements for specific HCI models

To accelerate the learners’ acquisition of problem solving skills and professional practice effectiveness, the proposed study of complexity issues specifically addresses the collaborative modelling requirements of experiential learners for building new or extended contexts. Appropriate HCI models stored in computerised external memories will allow automated retrieval to extend the learners’ prior cognitive experience. Participants will be able to develop their understanding of new concepts, by accessing the experiences of other members in the study, thereby illustrating to the learner how the concept has been applied over a range of different contextual environments. Recent recognition by the authors of the ontological constraints encountered in contextual referencing (such as how to provide sufficient advice to maintain and motivate a novice-learner [8]) and in crossing problem domains (such as dealing with a learner’s conceptualisation skills [2]), further justifies our integrated research programme.

Imagers (pictorial-thinkers) are believed to experience difficulty with predominantly text-based learning material; just as Verbalisers may have a
similar difficulty with pictorial or graphical material. Visual-thinkers may have to translate text into a graphical form before they can absorb and assimilate the received information. This process may be tiring and even stressful for the learner [2]. Verbal-thinking learners may be similarly stressed, by trying to learn from pictorial-based material. They may miss out on the overall picture of the learning material, whereas their pictorial-thinking counterparts, who take a broader sweep of the same material, may ignore the fine detail involved. In a collaborative learning environment, the visual and verbal learners can share their understanding, thereby enriching the learning experience for both cognitive styles. Promoting and monitoring this interaction is the key to developing successful Web-based ALNs. Research must further investigate the dynamics of this collaborative interaction and the complex nature of experiential learning tasks. Web-based experiential learning also raises questions, not only of the meta-knowledge requirements for improved group interaction, but also, of the ontological requirements (such as how to deal with a diverse range of prior domain knowledge and skill) for modelling context-mediated group interaction in diverse cultures.

5. Summary

The quest to achieve leadership in e-Learning amongst the so called knowledge nations is problematic. This well placed project is clearly aimed at fulfilling that role. This paper briefly discussed an overview of the plans for an experimental project designed to identify and understand the ontological requirements for Web-based collaborative experiential instructional environments. The project is a joint research initiative with collaboration amongst three Universities in the Asian/Pacific region. e-Learning is regarded as a cost-effective solution to the growing disparity in educational/training opportunities in society [3]; and a means of meeting the retraining challenge during this era of massive technological change. This research project rises to the challenge facing the education and industrial sectors whereby the social, historical and contextual nature of learning is in question. Web technology contributes to the ease at which courseware designers perceive they are dealing with an instant collaborative instructional medium. The authors propose to identify the granularity of the Web-based learning context. The diversity of participating cohorts engaged in this research will, no doubt, provide a rich source of learning contexts and comparative analyses of instructional design effectiveness, thereby informing the future design of experiential learning programmes, appropriate to Web-based collaborative models. The project findings will clarify how a for profit education sector can support a knowledge economy, and will lead to commercial exploitation for global workforce empowerment.

6. References