Distributed cognition in computer mediated learning environments

Michael Morgan
University of Wollongong

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Distributed Cognition
In
Computer Mediated Learning Environments.

A thesis submitted in fulfillment of the
requirements for the award of the degree

Doctor of Philosophy
from
Wollongong University

Michael Morgan

BCA, Grad.Dip.Ed, MCA, MEd.

Faculty of Education

2005
Declaration

I, Michael Morgan, certify that the material within this thesis, submitted in fulfilment of the requirements for the award of the degree Doctor of Philosophy, in the Faculty of Education, at the University of Wollongong, is wholly my own original work unless otherwise referenced or acknowledged. This thesis has not been submitted for the award of qualifications at any other institution.

Michael Morgan

1st of October, 2005
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Michael Morgan

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Abstract

This thesis focuses on analysing and redesigning a common mediating artefact in computer mediated learning environments, the ‘Copy and Paste’ function. Text-based resources represent a significant proportion of the content in computer mediated learning environments and are therefore an important factor in learner/content interactions. The ‘Copy and Paste’ function is central to the note taking process and to the learner’s interaction with text-based content. This study uses Distributed Cognition theory to examine and redesign the ‘Copy and Paste’ function as a mediating artefact that regulates the learner’s cognitive processes and the structure of learning activities. The aim of making modifications to the ‘Copy and Paste’ function was to increase the level of processing of the content for understanding by the learner and therefore to aid the encoding of the content to long-term memory. A by-product of this process for the learner was expected to be the internalisation of the interaction strategies embedded in the interface.

The modifications to the ‘Copy and Paste’ function involved embedding a note-taking process, summarisation tools and relevant information resources into the ‘Copy and Paste’ function. The theoretical basis for choosing to embed these particular interaction strategies in the ‘Copy and Paste’ process was Information Processing theory and Schema theory and Distributed Cognition was drawn on to examine and design a new ‘Copy and Paste’ concept. Schema theory in particular gives an insight into effective processes for encoding content to long-term memory in forms that are appropriate for efficient retrieval. These strategies were aimed at encouraging the learner to process content for understanding and therefore to encode content into long-term memory in forms that were semantically efficient, easy to recall and transferable across a wide range of contexts. Modifications to the ‘Copy and Paste’ function also aimed at constraining certain forms of activity, such as plagiarism and indiscriminate copying of text, by designing specific affordances and constraints into the tool. A controlled experiment was conducted in order to determine the effectiveness of the modifications in supporting learner interactions with text-based content.

The experimental study was conducted in 2004 and 2005. The experimental treatment involved a modified version of the ‘Copy and Paste’ function. An evaluation of the efficacy of modifications to the ‘Copy and Paste’ function was carried out using direct observations, pre-experience and post-experience surveys and an analysis of the characteristics of learner notes.

This research offers a new perspective with which to examine the activities of learners in computer mediated learning environments. The locus of the analysis was on a mediating artefact that was available in the learning environment and how successfully the learner was in making use of this mediating artefact in order to process content. The theoretical approach outlined in this thesis directs the instructional design effort to focus on the development of mediating artefacts that allow learners to interact effectively with content in computer mediated learning environments by embedding interaction strategies and resources into the interface. This approach is applicable to a wide range of contexts in computer mediated learning environments.