A NEW METHOD FOR RESEARCH IN COMPUTER-BASED LEARNING ENVIRONMENTS

Stephen R. Campbell
University of California, Irvine

Instructional designers are becoming much more attuned to the importance of user-centred design, the wide variety of experiential modalities associated with human-computer interfacing, and various relations between instructional design and cognition. As a result, computer-based learning environments (CBLEs) for mathematics education now typically involve multiple representations of subject matter content in ways that attempt to accommodate different learning styles. Typically, human-system interaction research has relied on monitoring user activity via computer tabulation of keystrokes and mouse clicks. Advances in digital video and telecommunications technology have now provided the means to develop a new method for dynamically tracking teaching and learning in these environments. Some empirical results demonstrating this method of dynamic tracking are presented.

Dynamic tracking presents teachers, learners, researchers and instructional designers alike with more intuitively accessible opportunities for investigating symbiotic cognitive development in CBLEs. Dynamic tracking allows teachers to conduct action research on the effectiveness of their teaching with CBLEs, and learners with the opportunity to reflect on their own learning. What researchers can discover about various factors that promote or inhibit learning in CBLEs using this method can also serve to inform instructional design. On the other hand, instructional designers, through the CBLEs they have developed, provide researchers with a variety of different constrained conditions in which to investigate factors that promote or inhibit learning with respect to a variety of different learning styles.

This presentation will demonstrate dynamic tracking using familiar protocols (such as “talking aloud”) as well as new ones that were simply not possible using previous methods (such as “keeping your mouse where your mind is”). The method of dynamic tracking will be demonstrated in both teaching and learning situations, as well as in classroom and clinical contexts. Once data have been collected, they can also be analysed using digital video processing software. Thus, various action sequences and meta-cognitive factors can be identified and used for data interpretation. Using this method, CBLEs can be analysed to help identify potential systemic constraints placed on the learner, as well as the kinds and effectiveness of the scaffolds for learning that they offer. Dynamic tracking thus provides a variety of avenues for investigating various modalities of mathematical cognition and how they are interconnected, for ways in which CBLEs can be improved, and for ways in which teaching and learning with them can be more effective.