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Symposium: Modeling Cognitive Processes in Interactive Learning Situations: Face-to-Face Learning and Learning over a Network

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Abstract

This symposium reports research concerned with developing tools and models for the analysis of cognitive processes in interactive learning situations. Results of several studies of natural, interactive task-oriented learning situations including face-to-face learning situations and learning over a network are compared. The results show how interactive, situated discourse is used to support processes of knowledge construction and problem solving within these learning environments.

Introduction

In many kinds of natural interactive learning situations, students construct knowledge and learn to reason and solve problems collaboratively through their interactions. The study of such "situated learning" involves an analysis of how discourse interaction supports knowledge construction and problem-solving processes within collaborative task-oriented learning environments, and requires both cognitive and interactive sociolinguistic perspectives. This symposium compares results across several types of interactive situations using similar analysis tools and models (Frederiksen, 1998). The results show how interactive, situated discourse functions to support processes of knowledge construction and problem solving within these diverse learning environments.

Tutors' Use of Discourse to Model and Explain Problem-Solving Procedures (Carl Frederiksen) We have been studying networked tutoring situations in which an experienced tutor interacts with university students using video-conferencing while they share in the use of software to solve statistical problems. Results will be presented that compare the coaching, guidance and explanations provided by the tutor by means of video conferencing to those which occur in face-to-face tutoring situations. By using models of tutoring knowledge based on these analyses to add coaching functions to our tele-learning environments, we can study how students learn by interacting with a computer coach that embodies the same kinds of explanations and knowledge as the human tutor. The results show how

tutors are able to model and explain problem-solving procedures and how students use such explanations to aid their learning.

Promoting Argumentation in Face-to-Face and Distributed Computer-Based Learning Situations (Susanne Lajoie) Bio-World (Lajoie, 1993) is a computer-based learning environment designed to enable high school biology students to learn to reason about data they collect to verify hypotheses about what disease a patient is experiencing. BioWorld is designed to provide multiple situations for learning: it can be used as a stand alone one-on-one learning environment, or as a small group learning situation, or it can be used as a tele-learning environment in which groups of students at remote locations communicate through video-conferencing while sharing the BioWorld environment. The nature of the discourse patterns pertaining to argumentation in face-to-face small group contexts and in distributed tele-learning contexts will be examined. Preliminary findings indicate how patterns of argumentation within these computer-based learning environments facilitate the acquisition of skill in scientific reasoning.

Cognitive Implications of Teacher-Student Discourse in Science Classrooms (Janet Donin) This research investigated how teachers display knowledge differently and use social context differently even within a well-defined instructional unit. In this project, we studied the nature and functions of discourse in four tenth grade Physical Science classrooms. The question addressed was how differences in teacher-initiated discourse affect the explicit and implicit cognitive requirements for students to function effectively in these situations. Analyses of the content of the teachers' discourse revealed that different models of the domain knowledge were presented to the students. This knowledge was displayed using different methods which in turn affected the task requirements for the students.