

## **ITR/PE(IIS): Activity Awareness in Computer-Supported Collaboration**

### **Section A: Project Summary**

People working collaboratively must establish and maintain awareness of one another's intentions, actions, and results. Understanding the role of awareness in computer-supported collaborative work (CSCW) and developing effective software tools to support awareness are keys to the future success of CSCW systems. We propose to investigate awareness and awareness support in collaborative problem-solving and learning activity.

We will synthesize prior research, much of which has addressed singular phenomena, issues, and techniques, by assessing and refining a taxonomy of types of collaborative activities, and types of awareness with respect to collaborative activities. This will provide a framework for analyzing existing research, as well as guidance for investigating specific relationships among types of activities and types of awareness, and for developing new tools to support awareness.

We will further develop, and then evaluate, a suite of awareness tools to support coordinated planning, action, and outcome analysis in the Virtual School. Prior development of the Virtual School environment was driven by criteria of educational efficacy. In this project, we will focus more specifically on consequences for collaborative awareness within problem-solving and learning activities.

We will coordinate a field study with a series of laboratory investigations, to benefit from both the scope and ecological validity of a field study and the analytical focus and control of laboratory studies. Our field study capitalizes on a five-year participatory design relationship developed with six public school teachers in a prior NSF project (REC-9554206). The software developed in this prior project, the Virtual School, has now been in regular use for several years to support teaching and learning collaborations spanning school and classroom boundaries.

Education is a particularly good domain to study cognitive issues and tool support for awareness: Teaching involves a lot of planning, plan revision, and coordinated activity; schools as workplaces have traditionally provided poor support for awareness. Contemporary systemic reforms in education emphasize student collaboration, teacher collaboration, and the use of computer and networking technologies — heightening the importance of planning and coordination, but often diminishing awareness. Building upon collaborative software already in regular use will allow us avoid the uncertainties and delays of software adoption, particularly notorious in education.

We will carry out a coordinated series of laboratory studies, adapting task simulation methods, including the use of confederate participants, from the social psychology of communication. Such methods allow complex social situations to be specified and replicated. Experimental controls permit more sensitive analysis than is possible in field studies. One of our objectives is to investigate the broader feasibility, and some of the boundary conditions, of simulation experiments for user interface and application studies.

We will take a multivariate approach to both laboratory and field studies in order to mitigate various risks to validity. We will develop a comprehensive evaluation methodology for assessing and contrasting a variety of tools and mechanisms to support planning and awareness within the Virtual School. This will include contextual observation, session logging, questionnaires and standard scales, a Web-based critical incident forum, and a series of laboratory experiments designed to examine issues and hypotheses raised, but not answerable, in the field studies. Combining a broad range of empirical methods will afford a more comprehensive and valid analysis of planning and awareness, and will provide a basis for codifying a multifaceted evaluation methodology that could be employed by other investigators.

We will investigate and develop the notion of *activity awareness*, the awareness of project work that supports group performance in complex and long-term tasks. Activity awareness builds upon prior research on *social awareness* (of the presence of one's collaborators) and *action awareness* (of what collaborators are doing or what they have recently done). We believe that developing a concept of activity awareness can further integrate awareness research and tool support.

