“SKO as Portable ITS Module to Teach Reading Comprehension for STEM”

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Abstract
Sharable Knowledge Objects (SKO's) are portable Intelligent Tutoring Systems (ITS) modules that help teachers teach and students learn Science, Technology, Engineering, and Mathematics (STEM) topics. We are developing and testing these SKO’s as one of the four STEM Grand Challenge projects funded by the Office of Naval Research. The project develops an enhanced version of AutoTutor that uses animated conversational agents to hold conversations with learners in natural language while they learn the knowledge, procedures, and skills of Algebra I. The goal is to produce efficient and cost-effective ITS modules on STEM topics that are comparable with experienced human tutors. The presentation will cover the following aspects of this project: (1) relevant theory of learning, such as the expectation-misconception tailored dialog in tutoring, (2) signature enabling technologies such as semantic representation analysis, (3) useful implementation details such as assembling mathematics content and implementing cognitive task analysis methods, and (4) empirical efficacy studies to test advanced learning technology in classrooms.

Biographical Note
Dr. Xiangen Hu is Dunavant professor at the University of Memphis (UM) in the Department of Psychology and Institute for Intelligent Systems (IIS) and visiting professor at Central China Normal University (CCNU). Dr. Hu is currently the director of the cognitive psychology area at UM, the Director of Advanced Distributed Learning (ADL) center for Intelligent Tutoring Systems (ITS) Research & Development, and senior researcher in the Chinese Ministry of Education’s Key Laboratory of Adolescent Cyber-psychology and Behavior. Dr. Hu’s primary research areas include mathematical psychology, research design and statistics, and cognitive psychology. More specific research interests include general processing tree models, categorical data analysis, knowledge representation, higher dimensional semantic spaces, cognitive psychometrics, computer tutoring, and advanced distributed learning. In the last 5 years Dr. Hu has been principal investigator on over $6 million in funding from the National Science Foundation (NSF), Institute for Education Sciences (IES), the Army Research Laboratories of the US Department of Defense (DoD), the Army Medical Research Acquisition Activity (USAMRAA), the Office of Naval Research (ONR), and CCNU.