Technology enhanced inquiry learning in science; Current state and future developments

Ton de Jong

Faculty of Behaviorial Sciences
University of Twente
The Netherlands
Email: a.j.m.dejong@utwente.nl

The idea of inquiry, or scientific discovery, as a learning approach for science is currently regaining extensive attention partly due to the emergence of technology enhanced learning environments. Recent large scale comparative studies show the potential effectiveness of this approach. In order to be successful there is a need to investigate learning processes that underlie inquiry, to identify characteristic difficulties students have in the inquiry process, and to design instructional designs for (technological) learning environments that help prevent or overcome these problems. Our research indicates that problems that students have can be overcome by cognitive scaffolds. These cognitive scaffolds can be integrated with computer inquiry, for example, in simulation-based learning environments or they can be offered as separate entities. In our studies we repeatedly have found a positive influence on learning from cognitive tools that structure the learning process, provide students with predefined hypotheses and background information, support students in their planning behaviour, or give hints for efficient experimentation. In this presentation I will present a number of these instructional designs based on national and international projects (ZAP, SCY, Co-Lab, KM Quest, and SimQuest). Also, recent experimental studies in which these designs have been studied will be presented. Trends for inquiry learning in science such as collaborative science learning with shared interfaces, learning by modelling, and the analysis and visualization of learning patterns with the use of data mining techniques will be discussed.