

Hawaii International Conference on Education – Poster Presentation

Title: The ChemSense Knowledge Building Environment (KBE)

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ABSTRACT

ChemSense is an NSF-funded research and development project designed to examine the impact of representations, chemical investigations, and discourse on chemistry learning. The ChemSense knowledge building environment is a computer-based learning environment that allows students and instructors to collaborate in the investigation of chemical phenomena, collect data, build representations of these phenomena, and participate in scaffolded discourse to explain these phenomena in terms of underlying chemical mechanisms. Research indicates that ChemSense is effective in supporting student representational use and chemical understanding.

The ChemSense Knowledge Building Environment

ChemSense is a research and development project funded by the National Science Foundation (REC-9814653) to examine the impact of representations, chemical investigations, and discourse on chemistry learning (Schank et al., 2000). Our work intersects several theoretical approaches to learning, which include collaborative project-based investigations (Krajcik et al., 1998), representational competence (Kozma & Russell, 1997), the design of chemistry curriculum (Coppola, personal communication), and knowledge building (Scardamalia & Bereiter, 1996). ChemSense includes a set of tools (software and probeware) and curriculum activities that draw on this theory to scaffold students' learning of chemistry. Research on the use of ChemSense indicates it is effective in supporting student representational use and chemical understanding.

Researchers have developed and investigated digitally-based visualization environments for chemistry learning (e.g., Barnea & Dori, 1999; Garnett, Hackling & Oliver, 1997; Kozma, 2000) in light of preliminary evidence that appropriately scaffolded visualizations can help students overcome their difficulties in understanding chemical concepts. The shared premise underlying these efforts is that these representational environments provide students access to a rich visual imagery that can fill a material gap in their ability to experience or imagine the world of molecular entities and reactions. The ChemSense KBE offers distinct functionalities from other chemistry software tools in that it provides students with the capability to generate, animate, and share their own representations of chemical phenomenon (Schank & Kozma, in press).

The ChemSense KBE allows students to create drawings, animations, text, and graphs, and to link these representations with one another (Figure 1). Specialized tools within the environment make it easy to create images of nanoscopic (molecular-level) entities and processes to help students move from simply depicting surface features of chemical phenomena to representing underlying phenomena that align with surface features. The environment also provides students the means to coordinate nanoscopic representations with observable phenomena using probeware. The probeware allows students to directly import graphical or tabular data into their representations that may be collected during laboratory investigations and other inquiry-based activities. The “knowledge-building” function of the ChemSense KBE allows students to add textual annotations to visual representations and provides a ready means for threaded discussions and commentary by students on one another’s work, thereby further supporting the possibility for students to collectively arrive at new understandings of scientific concepts (cf. Bell & Linn, 2000; Brown & Campione, 1996).

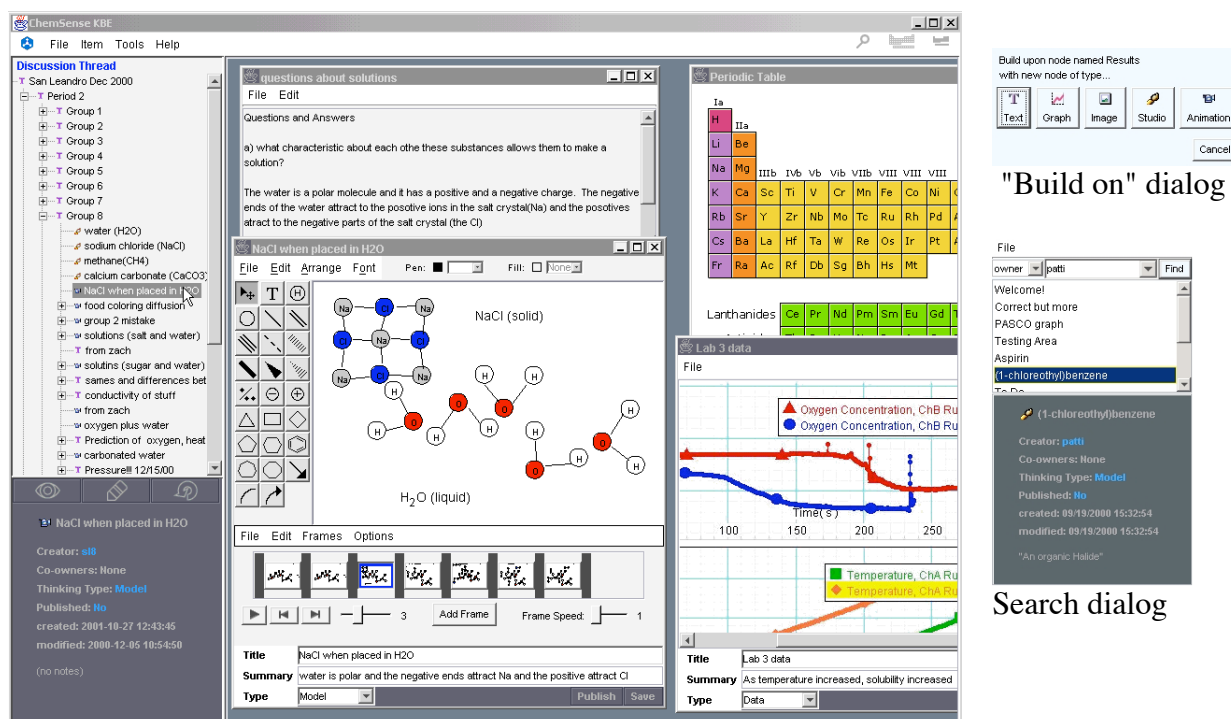


Figure 1. The ChemSense Knowledge Building Environment (KBE) with item browsing area (upper left), preview pane (lower left), and workspace.

This poster session will highlight the ChemSense KBE – the molecule building tools as well as the shared discussion area. This poster session will provide conference attendees with the opportunity to try the tools and ask specific questions about the environment.

References

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