Designing Case-based Hypermedia Learning Environments for Problem Solving Across Professional Fields

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Abstract: This panel focuses on underlying design principles for creating case-based hypermedia learning environments for building problem solving skills in two professional practice fields—teacher preparation and medical education. The panelists provide an opportunity to actively view and compare a sample of interactive cases that integrate application scenarios, domain knowledge bases, authentic case information, expert modeling, and problem-solving activities. Similarities, differences, and design decisions will be discussed based on a set of design principles for creating practice fields in hypermedia learning formats. The audience will engage in applying these principles, concerns, and opinions to their respective areas of expertise.

Introduction  
Louis Semrau

The nature of training all workers as well as professionals is changing dramatically. The increase in the sheer amount of information in our knowledge bases as well as the shifting of how these knowledge bases are employed make it critical for training to be both effective and efficient. Hypermedia case-based training, especially when electronic performance support systems (Laffey, 1995) and collaborative work activities (Barab & Duffy, 2000) are incorporated, provide such training environments for professional fields.

Hypermedia case-based learning has the potential to provide complete information, expert modeling, and challenges to be solved by the learner in his or her own situation (Fitzgerald, Semrau, & Wilson, 1997). Case-based training systems help educators develop, implement, organize and re-use multimedia cases for problem-based learning (Riedel, Singer, Leven, Geiss, & Toenshoff, 2000). Hypermedia case-based learning environments are active learning environments in which users explore case scenarios through video and audio, gather contextual information, access domain knowledge, draw on expert modeling of solutions, define contextual problems, and revise solutions based on prompts and scaffolds. Hypermedia-based training goes beyond traditional simulation models by allowing learners to take control and responsibility for their own learning through nonlinear access to information, problem identification, access to information on demand, instructional scaffolds, and feedback on problem solutions.
Design of Practice Fields

While a great deal of literature is available concerning the design of effective hypermedia case-based learning environments, until recently this information has been confusing due to subtle distinctions between instructional design models and applications to differing learning contexts. Design concepts continue to evolve to guide developers in conceptualizing and designing learning environments. The following design principles have recently been recommended for creating practice fields based on situated learning that emphasize engaging the learner in authentic tasks that require problem-oriented learning (Barab & Duffy, 2000).

- Doing Domain-Related Practices
- Ownership of the Inquiry
- Coaching and Modeling of Thinking Skills
- Opportunity for Reflection
- Dilemmas are Ill-Structured
- Support the Learner Rather than Simplify the Dilemma
- Work is Collaborative and Social
- The Learning Context is Motivating

While these principles provide a solid basis for the development of hypermedia case-based learning environments, they may not apply universally across programs with widely differing goals, activities, appearance, audience and disciplines. The principles will be discussed relative to the following demonstrations.

Demonstration #1

Instruction and Management in Emotional and Behavioral Disorders: The Case of Martelle
Gail Fitzgerald

Instruction and Management in Behavioral Disorders is the third title in an interactive training series for use in teacher education programs (Fitzgerald, Semrau, & Standifer, 1998). The program is based on case study scenarios in which the user takes the role of a teacher in planning for different youngsters with significant behavioral and emotional problems in classrooms.

The computer program contains computerized background information on a child named Martelle. Content in the program includes policies in his school, a resource information base related to behavioral interventions, a series of problem solving activities based on authentic job responsibilities, scaffolds for the user related to the activities, and 35 template tools for creating intervention plans. Multimedia material on the CD includes videos to observe Martelle in a variety of classroom settings, audio interviews with adults with information about him, mini-presentations on specialized curriculum, and commentary by experts in the field. The resources and template tools are designed as stand-alone applications for users to have following successful completion of the case study activities. Through these tools and information resources, a direct bridge is provided to support the application of knowledge and skills to real-world use through electronic performance support systems.

Figure 1 displays the main menu screen for the case study Martelle. Figure 2 displays the resource site for gathering case, school, curriculum, and tool resources. Figure 3 displays a prompted activity of assessing Martelle’s classroom environment.
Demonstration #2

The CAMPUS Training System in Medicine
Jens Riedel

CAMPUS is a case-based, Web-based training shell system to develop, organise and (re-)use flexible, simulative medical multimedia cases to be used by educators, students and physicians at different levels (Riedel, Singer, Leven, Geiss & Toenshoff, 2000).

To minimize acceptance problems and maximize effectiveness and efficiency of case data input, CAMPUS is designed as a flexible, adaptable system that can be used by different users (medical students and physicians at different levels) in different learning scenarios (e.g. self-study, presentation, learning groups, tutorials, assessment). For medical students and physicians the improvement of the own problem- or case-solving competence is the main goal to achieve. With CAMPUS this competence can be trained by using the most realistic form of possible presentation forms. This form is simulative, meaning that the user can do about everything he wants to do (like in reality, e.g. anamnesis, physical and technical exam, lab tests) until he reaches a decision/feedback point, where he has to make diagnoses. Having made diagnoses the user gets feedback about the things he has done so far by giving a comparison between the things done by him with the things the author of the case thinks to be the right ones. At these decision/feedback points the user has to reflect his steps done so far. With the possibility to get knowledge on demand (expert comments, extern knowledge via extern digital libraries) the learner can be trained to become a knowledge manager, a competence becoming important in the medical field more and more.

CAMPUS is a system developed completely in Java using a detailed case-database. It can be used over the Web and locally (see http://www.medicase.de).

References


