Chapter 9: Theory and Practice of Case-Based Learning Aids

Key Points:

- Case-based Reasoning (CBR) is approached from two viewpoints: 1) a model for artificial intelligence; and 2) a theory of cognition.
- In CBR, think in terms of cases: interpret experiences and apply them to new situations; emphasis is on manipulation of stories.
- Commonalities with constructivism and constructionism: knowledge built from experience, learner is active, act of creating leads to learning.
- Experiences are recorded and interpreted so they can be applied to future situations.
- Three components of cognition: cases, case indexes, case processor.
  - Cases, and their subcomponents, are interpretations of experiences that allow one to learn from a situation. Reading and writing cases enhance learning.
  - Case indexing is the organization of those cases in our memory that, if effective, allow one to retrieve and transfer lessons learned to new situations.
  - The work of the case processor is complex in that it will structure the case, choose how to index it, then later retrieve and re-interpret it for application to new situations.
- Implications for learning:
  - Activities must be concrete, authentic, and provide timely feedback. Makes hands-on learning more effective.
  - Reflection helps learners to describe experiences that, in turn, allow for better indexing of experiences. Learners extract meaning, construct solutions, and use lessons learned in new situations. Cautions:
    - Reflection is not particularly rewarding for students.
    - Computer-based feedback is not effective and they quality of human feedback can vary.
    - True reflection is valuable but is easy to fake.
    - Carefully choose when reflection will be productive – don't interfere with reasoning or overdo.
  - Building case libraries can be as valuable as using them, and are most effective when part of constructivist activities. Case libraries are collaborative and may include: 1) Stories – successes, failures, experts, peers, explanations of process and strategies are valuable; 2) Concepts/Skills – experience then share; example in text is very wiki-like; 3) Organizer/Scaffold – online index provides support which can be pulled back as needed.
Examples:

- *The Reflective Learner* – Writing prompts scaffold reflective writing.
- *Archie* – Case library for architects; comprised of stories to aid in the development of plans.
- *Goal-based scenarios* – Learners achieve a goal via learning of curricular content; clear right/wrong answers for each task with computer feedback.
- *STABLE* – Collection of cases to support skill learning; apprentice accesses information structured by the master.
- *Learning by Design* – Curriculum units for middle school science. Software and cases support learning and help students reflect. Other examples in the text (pp. 235-238, DDA, CAT, StoryBoard Author) are also associated with Kolodner.

Seminal Research:

The author of this chapter, Janet Kolodner, is the leader in the field having pioneered CBR and developed the computer models (CYRUS, MEDIATOR, CHEF, JULIA, and ALEX) cited in the text. In the last ten years, Kolodner has focused on implications of CBR for education and development of *Learning by Design*™ – an inquiry-based project-based middle school science program. A comprehensive listing of publications by Janet Kolodner may be found on her website: [http://home.cc.gatech.edu/jlk/4](http://home.cc.gatech.edu/jlk/4).

Kolodner’s co-author, Mark Guzdial, leads the Conceptualized Support for Learning (CSL) lab in applying CBR to the development of “collaborative Dynabooks.”