Anchored Instruction

This slide show was prepared from the following resources:

Cognition and Technology Group at Vanderbilt (1990). Anchored instruction and its relationship to situated cognition. *Educational Researcher, 19* (5), 2-10.

Cognition and Technology Group at Vanderbilt (1992). Anchored instruction in science and mathematics: Theoretical basis, developmental projects, and initial research findings. In R. A. Duschl & R. J. Hamilton (Eds.), *Philosophy of Science, cognitive psychology, and edcuational theory and practice* (pp. 244-273). Albany, NY: State University of New York Press.

Cognition & Technology Group at Vanderbilt (1992). The Jasper experiment: An exploration of issues in learning and instructional design. *Educational Technology Research and Development, 40* (1), 65-80.

The Cognition and Technology Group at Vanderbilt, under the direction of John Bransford, is credited with the development of the anchored instruction model of learning.

Although most frequently affiliated with science and math learning, the authors suggest their model is also relevant to reading, writing, and history subject areas as well

Anchored Instruction Relatives

- a form of “situated” learning
- stories or macro-contexts are used to situate the application of knowledge
- also related to problem-based learning, but more suitable for K-12 settings
- uses open-ended problems, but includes “seeds” or embedded data to scaffold solving the problem

Anchored instruction arose from the problem cited in education literature as long ago as 1929, suggesting students’ knowledge often remains “inert” and cannot be used in response to many different changing situations or problems.

The innovation was to situate learning in realistic problems, allowing students to experience the same professional dilemmas facing experts in a given field. Problems are structured to be factually authentic with real data as well as performance authentic with realistic tasks that might be faced by a novice if apprenticed to an expert historian, physician, business person, etc.

Anchored instruction is similar to case-based learning, although the stories presented are meant to be “explored and discussed rather than simply read or watched” (CGTV, 1992, p. 249). It is also similar to problem-based learning, but not as open-ended. In PBL, students would be expected to do more first-hand research into resources external to the learning environments. Anchored modules typically embed all of the information needed to solve the problem, making it easier to manage in environments with limited time or limited resources.

Designing Anchored Instruction

- generative stories, story line ends, students must generate problems to be solved
- embedded data, story must contain all of the necessary data to solve problem
- problem complexity, Jasper problems contain at least 14 steps

Anchored stories use embedded data. To design an anchored story, identify the steps required to solve a problem, then set about including them in a story line. CGTV developed the Jasper Woodbury problem solving series for middle school mathematics learning. In the "wounded eagle" scenario, students must determine the best way to move and save a wounded eagle, computing the amount of gasoline an ultralight plane will require, weight of cargo, and other data. The problems should not be easily solved, but somewhat complex, requiring students to discuss and debate various options. The Jasper problems were all complex, requiring at least 14 steps in a correct solution path. Problems with more than one solution path are fine, and may actually be preferable as the entire class comes together to describe the solutions of various groups.

Anchored Example

- internet commerce class
- anchor the subject matter by teaching it in a realistic situation
- provide students with a story about a problem-riddled internet company, leaving clues that suggest inappropriate practices
- students generate alternative strategies

In the example noted on this slide, students would need to replay the anchored scenario to identify specific problems associated with the fledgling internet commerce business. Formulating a problem statement would be key (e.g., these are the major issues or major problems that seem to be causing the problem), followed by an extraction and organization of data related to the problem. Students should go beyond problem identification and framing to hypothesize potential solutions warranted by the data provided (trying to avoid faulty leaps in judgment).

Anchored Instruction Steps

- multimedia, web-media, or other interactive technology used to tell stories
- teachers encourage student groups to extract key issues, facts, data
- students encouraged to “play back” or “re-explore” story to retrieve necessary data for solving problems

CGTV recommends the use of video to make the anchored stories as realistic as possible. CD-Rom or videodisc is preferable to straight videotape, as students can replay and revisit sections of a story as they discuss steps required to solve it.

Anchored Instruction Steps

- students develop solutions, present ideas to class
- pros and cons of each idea discussed
- analogous problems using new data help students to engage in “what if” thinking about the original scenario
- extension problems also used to reflect on meaning beyond initial scenario

Students should work on the problems in small groups, eventually reporting their solutions plans to the entire class. At presentation time, pros and cons of various ideas can be discussed.

Analogous problems (e.g., what if you did not have this option) can help students understand problems more deeply by exploring the relationship among pertinent variables.

Extension problems requiring similar skills or strategies used in the initial scenarios can also facilitate transfer of those skills to a variety of tasks.

Some Outcomes

- problem formulation skills take time
- problems with generic “foundation” data may facilitate transfer

In studies with 5th and 6th grade groups, the CGTV found students scored “above average on standard mathematics achievement tests,” but were not immediately successful at problem identification or formulation (CGTV, 1992, p. 252). Students unfamiliar with finding a problem embedded in a story might initially struggle with such tasks. Over time (four to five group problems), students will show improvements in problem formulation.

To the extent a series of related anchored problems can be created to include generic steps or skills of a subject matter domain, they will be more likely to facilitate transfer of those skills to other problems. The CGTV (1992, p. 252) notes: “…an explicit emphasis on analyzing similarities and differences among problem situations, and on bridging to new areas of application, facilitates the degree to which spontaneous transfer occurs.”

Advantages, Disadvantages

- more difficult to cover extensive subject matter or a pre-set “curriculum,” but…
- students more likely to become independent thinkers, apply knowledge
- tricky teacher scaffolding - must allow students to struggle, but support problem processing when necessary

Ironically, one of the biggest detriments to higher-order thinking is a standardized curriculum. Teachers feel like they must cover an unreasonable amount of content, and thus dispensing or lecturing on this content becomes the only viable model of “covering” all of it. Stuffing or cramming facts will not go far to help students apply that information to difficult problems. Fortunately for most higher education, we are not so rigidly defined or locked into a set curriculum as many public schools. Unfortunately, we inherit these students who are likely ill-prepared to handle increased responsibilities because they were exposed to such directed teaching. This ultimately leads to the issue of scaffolding, and how instructors must differentially help student groups process anchored-like problems. Most groups will struggle initially, and a few may struggle continually. Like the students facing their difficult problems, the instructor too must learn through experience when to provide hints and strategic support for problem processing.