SEEING REASON: A TOOL FOR INVESTIGATING CAUSE AND EFFECT

PORTLAND, Oregon—It's 8:30 on a Saturday morning and cold and grey outside. Yet here, in the computer lab at St. Mary's Cathedral School, a dozen teachers are alert and chipper as they settle behind computer terminals and log onto the Intel Innovation in Education Web site.

The teachers, from various Oregon schools, are here to learn from an Intel trainer how to use a free, Web-based mapping tool called Seeing Reason (www.intel.com/education/seeingreason/). The tool helps students investigate cause-and-effect relationships. Prompted by a guiding question from their teacher, students—typically in pairs—map causal relationships between factors involved in a complex system.

For example, a guiding question might be: What happens when human and bear habitats overlap? Factors involved may include human intolerance, natural food source, drought, and so forth.

Students can revise their maps as they develop an understanding of such multiple influences. Each version of their map is saved for the teacher's benefit, who, following the "paper trail" of their reasoning, can identify any misconceptions and gauge students' depth of understanding.

MAKING THINKING AUDIBLE

Seeing Reason was developed by Eric Baumgartner of the Center for Innovative Learning Technologies (CILT) in Berkeley, California. While cognitive mapping is usually described as making thinking visible, Baumgartner developed Seeing Reason to make thinking *audible.* "The tool was designed to raise the level of discourse about causal relationships," he said, according to Intel's Web site.

It is certainly stimulating discussion among the teachers in St. Mary's computer lab this morning. During the course of the day, they will each develop a lesson plan for a Seeing Reason project. Some of the ideas being tossed around for topics to investigate are the Christian crusades, water quality, school climate, and the structure of fairy tales. Clearly, these teachers see many ways to use the tool across the curriculum.

Intel senior trainer Jeanne Butcher reminds the teachers to choose an open-ended guiding question that will elicit factors that are definable, quantifiable, and measurable. Seeing Reason was developed so that relationships are measured only by whether one factor "increases" or "decreases" another factor.

Jim Pollard develops online teaching tools for Intel. When Intel made Seeing Reason available in 2002 on its Innovation in Education Web site, Pollard provided online examples of how teachers and students had found innovative ways to use the tool in projects. Teachers can learn how to use Seeing Reason by studying the examples, says Pollard, but it's best to tap into the free training sessions offered by Intel.

"The face-to-face training is on how to do project-based learning using Seeing Reason," he says. The sessions not only help teachers learn to use the tool, but to craft well-made unit plans that align with academic standards.

So far, 1,400 teachers around the world are registered to use Seeing Reason. Teachers create "work spaces" on Intel's server for their students' Seeing Reason projects, and, because it's Web-based, students and teachers can access their work anyplace, anytime.

SKILLS FOR THE AGE

A former special education teacher with a doctorate in curriculum and instruction, Pollard explains how Seeing Reason differs from other mapping tools, such as Inspiration by Inspiration Software, Inc. of Beaverton, Oregon.

"One big difference between Seeing Reason and Inspiration is that it constrains your mapping to cause-and-effect relationships. So, in one way, it's not as versatile as Inspiration, but that's one of its strengths: It constrains you to just thinking about *this* factor increasing or decreasing *that* factor. Inspiration's primary use is to say that one element is associated with another; that is concept mapping."

The "increase/decrease" parameter develops mathematical reasoning, says Pollard, a focus of Intel's education efforts.

"We think increasing math skills is important to any student who's going to grow up in the knowledge economy, and we know that, because it's important to people [like those] who work at Intel," says Pollard. When he and others develop teaching tools, they incorporate math processes that the National Council of Teachers of Mathematics has said are essential for mathematical literacy: problem solving, reasoning, communication, connection, and representation.

So-called "21st-century skills" derive from these mathematical processes, Pollard says.

A TEACHING TOOL

Stefni Stephens is a teacher at Mountain View Elementary School in Corvallis. She drove 80 miles to attend this morning's Seeing Reason training session.

"I do think that kids are 'wired' differently [today], and we are slow to pick up on the difference," says Stephens. "Kids now are even more visual than my generation, and we need to update our teaching techniques to include that aspect of their learning."

As good teachers do, she's constantly looking for new and better ways to teach. "The bad part of this is that it is very time intensive," she says, so she often uses technology to facilitate her search. "Computers and the Internet do a lot to help me, because ideas are available at all times of the day."

She's eager to get started with this new tool.

"I was very excited about Seeing Reason, because it is free and available to anyone. There is nothing worse than getting excited about something and then finding out there is no way you can afford it," she says. "I can't wait to try it with kids. I especially like that they have a way to explain their reasoning."