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mapping ideas

SEEING REASON, *A CAUSAL MAPPING TOOL AVAILABLE ON THE WEB, PROMOTES DEEPER THINKING*

SUZIE BOSS, WRITER, NORTHWEST REGIONAL EDUCATIONAL LABORATORIES

Teachers are always on the lookout for new ways to reveal student thinking. Effective instruction builds on what students already know, making the critical connection between prior knowledge and new concepts.

Causal mapping is a strategy researchers have devised to make thinking more visible. A Web-based causal mapping tool called Seeing Reason prompts students to capture their ideas about cause-and-effect relationships in a series of boxes and arrows. The maps are revised and refined as students test hypotheses through observation. The process allows students and teachers to "see" ideas in development, providing a springboard for lively discussions that can take understanding deeper.

Seeing Reason is one of the newest classroom tools available to teachers on the Intel® Innovation in Education Web site. Teachers can visit the site to learn how to use the tool, read about the theory behind causal mapping, and gain strategies to use in the classroom. Step-by-step instructions explain how to help students make and store their causal maps right on the Web site.

Elegant Simplicity

The simplicity of this powerful learning tool can be deceptive. The first time Idaho middle school teacher Theresa Maves explored Seeing Reason on her classroom computer, she was not exactly dazzled. It only took her a few minutes to understand how to use the prompts to create boxes and arrows to graphically organize her ideas. "But I was not so impressed. The simplicity can throw you at first," she says.

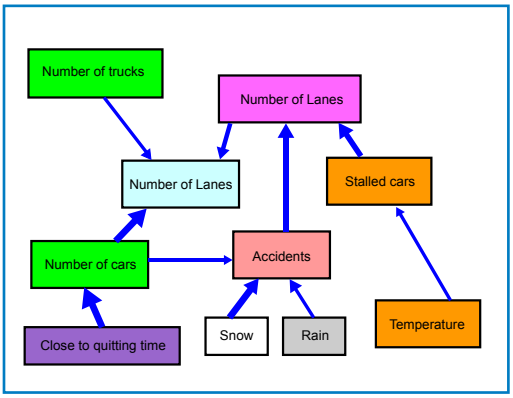
The more she thought about it, however, the more she appreciated the value of the causal mapping tool. She decided to give it a try in a forensics science unit in which students would play the role of detectives. In order to "crack" the make-believe case, they would have to pose good interview questions, evaluate laboratory test results for scientific evidence, and evaluate suspects' alibis. Seeing Reason provided just the tool to help them gather data and weigh complicated evidence in an open-ended problem-solving task.

"You're able to see students' thinking over time," Maves explains. "You can see what questions they have asked and where those questions are leading them." With the click of a mouse, she could open a map and add her own notes or questions to redirect a team of students, or reassure them that they were on the right track.

Ways of Knowing

Ever since Howard Gardner introduced the concept of multiple intelligences, teachers have been paying closer attention to students' individual learning styles. Many teachers design classroom activities that will tap into diverse learning modes — visual, auditory, logical, kinesthetic, and so forth. By addressing the needs of diverse learners, teachers help all students find a route to understanding that fits with the way they learn best. Some teachers call this "setting many hooks" for learning.

Seeing Reason taps into several learning modes. Visual learners benefit from the flowcharts — boxes and arrows — that capture their ideas in a graphic way. Thinking becomes not only visual but also auditory when students discuss their maps with partners or with their



teacher. Logical reasoning is engaged as students are prompted to provide supporting evidence for the ideas they represent on their maps. Even interpersonal intelligence comes into play as students negotiate through conflicting theories with their partners. Verbal skills are tapped during the reflection process when students write journal entries.

During the four weeks of her successful project, Maves saw all learning styles engaged. "For the students who tend to be more analytical, this was like an interesting puzzle. They mapped out their data so it all made sense. The more verbal ones worked on coming up with good questions to ask. The artistic ones found creative ways to color-code their information."

Valuable Assessment

Teachers report that causal maps open a window onto students' understanding that goes far beyond a right-or-wrong assessment. Ariel Owen, a middle school teacher in Walnut Creek, California, describes the value of the mapping tool in a recent article in Learning & Leading with Technology (April 2002):

"As the map becomes more complex, it is fascinating to ask students to explain their factor relationships. Instead of trying to hint and guide students to the 'right' answer, I have learned to ask probing questions that help them think about the relationships. Often I will learn a great deal about how my students are thinking and learning."

Teachers who have used Seeing Reason in the classroom report that students intuitively understand how to use the tool. The crime unit was the most open-ended activity Maves has ever tried with middle-schoolers. "It caused students to think about questions. To reflect. To evaluate evidence and come to conclusions in their own way. Kids don't get to do that very often," she says, "but this is the highest kind of thinking we can ask them to do."

We would like to hear how you are using this tool in your classroom. Please send your ideas to seeing.reason@intel.com

The Idea Behind Causal Mapping

Seeing Reason provides students with an elegantly simple tool to organize their thoughts, but it's grounded in complex research into cognitive science. Dr. Eric Baumgartner developed causal mapping at the Center for Innovative Learning Technologies (CILT) in Berkeley, California, to support student learning through the use of visualization and modeling tools.

Causal mapping, Baumgartner explains, not only makes student thinking visible, but raises "the level of discourse about causal relationships." It provides a springboard for lively classroom conversations as students pursue questions that engage them in the inquiry process.

CILT and Intel® Innovation in Education have formed an alliance to bring causal mapping to a wider audience through the Seeing Reason Web site.

For more information about Seeing Reason, see the Innovation in Education Web site at www.intel.com/education/seeingreason

global adventures in learning

AN INNOVATION ODYSSEY SHOWCASES TECHNOLOGY-ENHANCED CLASSROOM PROJECTS

SUZIE BOSS, WRITER, NORTHWEST REGIONAL EDUCATIONAL LABORATORIES

An Innovation Odyssey showcases technology-enhanced classroom projects
Suzie Boss, writer, Northwest Regional Educational Laboratory

Teachers around the world are inventing innovative ways to incorporate technology into their classrooms, building environments that encourage students to be active, engaged, and in command of new tools. For instance:

- In Castlebar, Ireland, ten-year-olds use digital cameras to record their field trip to a nearby archaeological site where history comes to life.
- In rural Tennessee, teenagers build robotic "cybugs" that mimic insect behavior, then race them through a maze.
- In Haifa, Israel, young children stretch their language skills to invent lovable toys for an interactive Web site.

A new Web site, launched in January 2002, provides a place where educators can learn from each other's experiences. The Innovation Odyssey Web site showcases a different classroom every school day, featuring technology-enriched projects from all over the globe appropriate for a wide range of ages, subject areas, and learning styles. The Odyssey site tells stories of technology innovation using teachers' own words and features photographs taken in their classrooms.

Educators browsing for fresh ideas can click through the easy-to-navigate links to seek out ideas they might want to adapt for their own classrooms.

> "The title "Odyssey" comes from the words One Digital School Year (ODSY). An odyssey is a journey, and it works well here, too. We want to offer a visit to classrooms around the world — a journey through classroom innovation."
> –Amy Pearl, Manager Web Resources, Intel® Innovation in Education

The international collection of teachers showcased on Odyssey come from small towns and big cities, from schools loaded with the latest digital equipment and schools making do with ancient computers. Some are brand-new to using high-tech equipment in the classroom. Others are old pros who lead their communities in advocating technology use in education. What they share is a commitment to providing students with an optimum learning environment.
The teachers' stories bring to life what researchers have identified as key ways that technology can be harnessed to support learning. According to the National Research Council, these important supports include:

- Providing scaffolding and tools to enhance learning and help children solve problems
- Providing more opportunities for feedback, reflection, and revision
- Building global and local communities

Many Odyssey teachers report that technology is providing a spark to make their classrooms more exciting and help their students feel more connected with the world beyond the school.

Jennifer Kirch — Day 62 in the Odyssey lineup — is a teacher in Egg Harbor, New Jersey, who uses technology and an exotic classroom pet — an African pygmy hedgehog, to integrate the subjects of literature, writing, math, science, health, social studies, and workplace readiness. The project allows her to weave together sound classroom practices, including "strategies of cooperative learning, multiple intelligence, and brain-compatible learning," she says. Her fifth-grade students, on the cusp of adolescence, become more motivated to learn. "Because the hedgehog is real, their learning has meaning," she says. It's not the kind of project teachers might think of as technology-infused. But Internet research, digital cameras, publishing software, and other tools play an important role in classroom work.

Across the country in Las Cruces, New Mexico, a teacher named Sue Ann Dobbyn brings together technology and her high school students' natural interest in sports to teach powerful lessons about physics. Her story—Day 63 on the Odyssey site—tells how students make digital videos of one another throwing a football, then use mathematical analysis software to examine the action for velocity, acceleration, force, and momentum.
"Technology allows students to actively participate in class experiments — to be the stars," the teacher explains. "It also facilitates the use of sophisticated analysis tools to manipulate the data and show relationships between factors." The result? A jump in students' understanding of physics — and a boost in their self-confidence as learners.

Beyond presenting good ideas for teachers, the Odyssey stories provide parents, school board members, and voters a window into effective technology-enhanced learning. For anyone wondering about the benefits of technology in the classroom, Odyssey offers a convincing journey.

Read more on the Innovation Odyssey Web site at: www.intel.com/education/odyssey.

How To Submit a Project to Odyssey

Have a classroom technology project that's too good to keep to yourself? An online submission process makes it quick and easy to share your story with a worldwide audience. Innovation Odyssey is looking for stories that involve student learning in K-12 settings and in which technology use clearly enhances the learning. Teachers aren't expected to write their own stories. Instead, you complete and submit a project description using an online form that's used for story development by the Intel team. Your story is illustrated using digital photos you submit via e-mail. As a thank-you for your time, you receive your choice of a digital camera or a handheld microscope.

IMPLEMENTING POWERFUL SOLUTIONS

TIM LAUER, TEACHER ON SPECIAL ASSIGNMENT, AUTHOR, PORTLAND PUBLIC

An old joke tells the story of how it took twenty years to get the overhead projector out of the bowling alley and into the classroom. The pace of change has quickened and today many of the tools that are common outside of the school are finding their way into classrooms.

This article will explore two of these technologies that help teachers provide powerful learning tools for their students.

Linux Terminal Server Lab:

Sid Leader is a former television news producer turned teacher working at Whitaker Middle School in Portland, OR. In his first year at Whitaker, Sid inherited a computer lab with a mishmash of old and broken equipment. He found himself spending too much time troubleshooting machines and too little time working with students. His dilemma caught the attention of his school district information technology department and a solution was proposed. The solution involved the installation of a 30-station Linux terminal server lab.

Using low-cost workstations and a beefed-up server, the terminal server lab provides thirty students with access to the Internet and to productivity tools. The workstations Mr. Leader's students use are low-cost, recycled PCs that are connected to a server running Linux. The work stations require so little "computing power" that even older-generation PCs will work on this network.

The server logs each student on the network and provides selected applications and files to the individual workstations. The software includes Open Source applications including Web browsers and needed support for multimedia plug-ins. While saving the district thousands of dollars in software licensing costs, this type of lab allows Mr. Leader's students to save their work to a file server. Student work is backed up nightly and students can access their work from any computer on the school network.

Mr. Leader's lab is based on the K-12 Linux Terminal Server Project (K12LTSP, see http://www.k12ltsp.org), distribution which includes RedHat, Linux, and the LTSP terminal server packages. It is distributed under the GNU General Public License which means that it is free and is based on Open Source software. The software can be downloaded from the Linux Terminal Server Project site, or an installation CD can be purchased.
For more information see: http://www.k12ltsp.org.

Push-button Web Publishing:

With the growth of Internet access, more and more parents and teachers are seeing the benefits of using the Web to publish classroom information and assignments. While the power can be seen by just about everyone, most teachers do not have the time or technical skills necessary to publish online. Resourceful district teacher leaders have started taking advantage of low-cost (or free) Web browser-based tools that make Web publishing a much simpler process.

Pages and entries are added easily. While dedicated content management systems can be quite expensive, two low-cost (and in the case of Blogger, no-cost) solutions that are finding wide use are Radio and Blogger.

> Both of these tools allow a teacher to set up a Web site in a matter of minutes. The key is that the content creation is up to the author while all of the tedium and mystery of getting that content onto the Web is handled by filling in a template in a Web page.

Rose Palmer is an elementary math teacher who works as an instructional specialist for Portland Public Schools (PPS). In addition to conducting professional development workshops, mentoring teachers, and helping produce a parent newsletter, Ms. Palmer is charged with posting information to the PPS Elementary Math Web site. She uses Radio
to post information about upcoming workshops and family math curriculum nights. With every Portland classroom connected to the Internet, the math curriculum team sees the use of Radio

as a powerful tool for dissemination of curricular information and materials.
"This tool has allowed us to easily share information with over one thousand teachers. Without this type of tool, I would not have the time or technical skill to provide this resource. The power of Radio is that it allows me to very easily create and post the information that I need to share with my teachers and their families."

Information about Radio, Blogger and the Portland Elementary Math Web site can be found at the following sites:
http://radio.userland.com
http://www.blogger.com
http://teachers.pps.k12.or.us/elementarymath/.

interview

AMY PEARL,
MANAGER INTEL® INNOVATION IN EDUCATION,
WEB RESOURCES

Intel's Innovation in Education Web site is being built with the ideas and involvement of experienced educators. Amy Pearl, a former classroom teacher and technology-in-education innovator, plays a key role as the driving force behind Intel's Education Web site. She brings a solid understanding of the challenges facing teachers, coupled with a sense of adventure about harnessing new technologies to engage young minds.

What got you interested in joining this team?

At first, I was leery about their intent — would I be put in a compromised position where I would be selling products to my colleagues? I've always been an educator — first in arts education, later in technology use and professional development. As I learned more about Intel's goals to improve education, I realized my opportunity to help one of the world's biggest corporations make a difference in education.

Is there a philosophy driving this work?

The late Robert Noyce, a founder of Intel, summed it up when he said, "Optimism is an essential ingredient for innovation. How else can the individual welcome change over security, adventure over staying in safe places?" That describes my philosophy, too. I think it rings true for most teachers. The job can be so challenging that optimism really is essential for success.

What are the strategies for developing the Intel® Innovation in Education Web site?

Educational impact is our goal. We want to build resources and tools that encourage teachers to try new ideas to improve practice. So, collaboration with individual experts and research organizations is critical. We draw on a large extended team of education experts to guide content development and create new tools and resources that we believe will provide new capabilities in classrooms.

What are some of the areas Intel® is focused on?

Intel's education focus has four objectives: to increase the effective use of technology in K-12 classrooms; improve math and science teaching and learning; improve access to technology; and increase the number of under-represented women and minorities pursuing technical careers.