

## Benefits of Thinking Tools Ask an Expert



### Designer Matthew Brown Discusses the Value of Online Learning Tools

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A decade ago, Matthew Brown was teaching history to middle school and high school students. He left teaching to earn a Ph.D. from Northwestern University's Learning Sciences program, and now works as a lead designer at Inquirium\*, an educational technology firm. He is part of the team of experts contracted to develop new software for Intel® Education's suite of online learning tools. Recently, Brown took time to describe how new learning tools like the *Showing Evidence Tool*, grounded in cognitive science, are changing the classroom experience.

#### **When you were in the classroom, did you have access to the kinds of resources you're developing today?**

There was absolutely nothing like this available. Like many teachers, I was at a school that was attempting to bring in technology. A lot of effort went into buying equipment, but very little conversation was happening about what we intended to do with this technology from a curriculum standpoint. That's why I left the classroom, to do what I'm doing today. You have to begin with the learning goals in mind.

#### **What do you mean when you talk about 'learning tools'?**

Think of a microscope. It can sit there and do nothing, or it can do some pretty amazing things if you know what to do with it. The kinds of technologies that we design as a company--and that Intel is investing in as Web tools--are like that, too. Learning tools available on the Intel Education Web site, like the *Seeing Reason Tool* and the *Visual Ranking Tool*, are elegantly open-ended. Each supports a particular type of thinking and learning, but teachers use them in a bunch of different ways.

#### **Do new tools mean new strategies for teachers?**

New technologies involve some changes in practice. You always have to engage teachers where they are and build on their existing practices. The most effective situations happen when teachers latch onto something they're already doing. They take a problem they're trying to solve and see how a technology can help them address that. They integrate the technology within an existing practice, but to do new things.

#### **What gives teachers the confidence to try new approaches with their students?**

The most important thing to remember is that the teaching process is a learning process for the teacher. If you can provide an environment where teachers feel comfortable doing some exploring, they're going to feel more willing to experiment. The kinds of tools we're developing with Intel will accommodate teachers who are less comfortable with technology, as well as those who are ready to improvise, trying to push the envelope.

#### **What else helps promote successful learning experiences with a new tool?**

There are many different levels of newness in the classroom when you are trying out a new technology. There's the newness of the technology itself—the clicks and buttons. There's the newness of the classroom dynamics. To use the technology, maybe students are now working in small groups or in a computer lab. And there may be newness of ideas and concepts you're dealing with, because the technology is helping you push on new aspects of learning. We try to help teachers limit the number of uncertain variables.

#### **How does that work in practice?**

A great way to overcome the newness of the actual tool might be to create structured worksheets that students can use as a stepping stone. Worksheets can eliminate uncertainty about how the technology works. You can be working with one group of students, and the

others will still know what to do. Providing a model for how to use the technology allows you to focus on the other aspects of teaching—the new concepts, maybe even the new instructional dynamics that are going on. Later, once students are more comfortable with the software, it's then possible to eliminate some of that structure. Then students are ready to do more of the open-ended inquiry with the technology that we want to aspire to. You can apply this same analogy to other aspects of newness. You could start with a concept or idea that the students are already comfortable with, then jump into the technology that way. They're not focusing on a new idea and a new technology at the same time. The biggest issue is finding balance between what's accustomed in the classroom and what's new.

**This sounds like a great model for learning in general.**

We use the term *scaffolding*, or *cognitive apprenticeship*. It's about recognizing that there's a progression in learners' development and understanding of new ideas and new concepts. It's possible to support that development through decreasing levels of structure over time. You start by supporting it significantly with a lot of scaffolding. As you get more familiar, you remove some of those supports. Over time, as they develop more competency, students pick up more of the responsibility for their own learning.

**Does this model apply to teachers as well as students?**

Everything I've said about students can also be applied to teachers. For teachers who are new to using a technology, providing them with structured context will help them feel more comfortable exploring it. Over time, they develop their own ideas and begin to innovate and improvise and adapt materials to accommodate their own ideas.

**When teachers are using these learning tools effectively and with confidence, what are the potential benefits for students?**

More than ever before, these new learning tools give students the potential to be actively constructing knowledge, building things, and creating things in a way that no other media have been able to support in the past. Books, by comparison, are a decidedly one-way form of communication. Technology offers the opportunity both to convey ideas and to allow for the construction of ideas. That's a huge opportunity.

**Can you give us a preview of what's in development?**

The tools I'm most excited about support students and teachers in doing the same kinds of inquiry that professionals engage in, in fields like science or history. While it's great to use the activities of professional historians or scientists as a model, you also have to recognize that you're dealing with learners who have developmentally particular needs and abilities. For example, scientists do a lot of data analysis with large data sets. A scientist may be able to look at a spreadsheet, plug data into a graphing program, and do some complex statistical analysis. Students may not yet be able to do that, but technology can support them. Technology can make some of these steps invisible so that students can go ahead and develop the larger skill of developing a hypothesis.

**So the thinking tools provide some of that scaffolding?**

The *Showing Evidence Tool* offers a good example. One of the things that learners have a lot of difficulty with is constructing well-reasoned, well-supported arguments that have clear claims and use evidence to support those claims. *Showing Evidence* came out of discussions with a group of teachers and developers at a Web Tools Forum sponsored by Intel Innovation in Education. Researchers from Inquirium and Intel have worked together to develop a tool to provide support in an area where students typically need help by making the structure of an argument visible. It encourages students to articulate certain things, like: Who is the author of this evidence? What is the reliability? Adults or more experienced practitioners do these things automatically when they make an argument and support a claim. But you can't ask students to be investigating complex problems and engaging in authentic, open-ended inquiry without providing them with support in one of the key elements of that, which is developing an argument.

**So the tool captures what students are thinking?**

This is where the learning meets the teaching. A tool like *Showing Evidence* makes student thinking visible in a manner that is teachable and learnable. A key learning goal is to help students determine the reliability of a piece of evidence. So we've built in the ability for teachers and other students to provide feedback about a claim. It's one thing to capture their thinking, and it's another to provide opportunities to actually work with it.

**Are you eager to see how teachers use this tool?**

I can't wait. By developing these kinds of tools, we are providing the opportunity for teachers to do what they do best. You have to have faith, as a designer, that if you give teachers an opportunity, they're going to do something great with it.

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