CONCLUSION: A COMMUNITY OF EDUCATORS

Section 1:
Tomorrow's baloney

Betty was impatient. It was 2:15 p.m., the end of a long day of classes before another long day, and she didn't have time for another committee meeting, especially one that asked her to rethink school. "More pie-in-the-sky," she whispered to a colleague. She had rethought school countless times before, imagining all sorts of improvements based on some new revolutionary theory, and had watched the ideas vanish in a fog of excuses—lack of funding, not enough teachers, no follow-through, and resistance from parents or the college office. Even when some new approach was actually implemented, it seemed to last only long enough to collide with "new findings" a few years later, and this rhythm had become depressingly regular over the past two decades of brain research. "Today's new theory about some aspect of brain function is tomorrow's baloney."

The frustration and cynicism that characterize the conversations of many veteran teachers reflect years of dashed hopes that some new theory will transform their students into eager learners. In a system built on answers, teachers want answers, too. So, it's easy to understand how some research can be popularized, morph into a panacea, and raise expectations that can't be met. Each new panacea fails. After a while, you feel as though you are in a pinball machine with ideas whizzing about like steel balls—new math, open classrooms, phonics, whole language, interdisciplinary studies, multiple intelligences, and lateral thinking. Lights flashing, bells ringing, and scores clunking up and down, until finally, you just come to dread the rattle of another idea hitting the chute. Yet this disappointment in research's failure to provide "The Answer," a method of teaching that will work for all, reveals the different perspectives from which teachers and researchers approach learning. Teachers want answers to questions about how to teach. Researchers want answers to questions about how to learn. One aim of this course is to explore how these two groups might help each other tackle these questions.
CONCLUSION: A COMMUNITY OF EDUCATORS

Section 2:
Mind, brain, and education (MBE)

Fortunately, starting in the 1990s, researchers like Kurt Fischer at Harvard, Bruno dalla Chiesa in Paris, and Hideaki Koizuma in Tokyo almost simultaneously began a movement to bring together cognitive scientists, neuroscientists, educators, and students in the service of improving both research and education. Prior to this movement, researchers tended to explore in their labs questions that interested them, but their insights were rarely influenced by student behavior or teacher experiences in the classroom or even by questions raised by teachers. And, it was equally rare for theories developed by researchers to find their way into the classroom, either to be tested against or to influence reality. Those that did find their way into schools, such as, most notably, the theory of multiple intelligences, typically left the researchers at the door.

The inspiration for MBE was, and remains, the research development and practice model of the teaching hospital, where researchers work closely with doctors, patients, and interns to improve medical outcomes. Theory and practice, and models and reality, would finally inform each other in schools, as partnerships developed among researchers, graduate programs, and K–12 schools. At first, a few graduate schools of education offered interested students courses that integrated biology, cognitive science, and education, and researchers lectured educators at various conferences and workshops on learning and the brain. Unfortunately, too few teachers, aspiring or veteran, participated in those MBE programs. The interactions between researchers and teachers at conferences tended to be one-way affairs, leaving teachers excited but puzzled by the theories and with no idea how to implement them in the classroom. Predictably, commercial "brain-based" programs sprang up to fill the void.

Since those early days, the MBE movement has grown more robust, and real collaborations among teachers, students, and researchers are appearing here and there. For example, a group of college and K–12 educators led by researcher Donna Coch started a partnership in the Upper Valley region of Vermont and New Hampshire. Part of the program included opportunities for veteran teachers to enroll in graduate courses in MBE and invitations to teachers to develop experiments that they could conduct in their classrooms. To prepare themselves to become researchers, these teachers visited the labs at Dartmouth College, interacted with neuroscientists, and learned how to conduct
make in reading and math. The conversations also helped the researchers to develop new projects and to gain better insight into student differences, insight that further affected their research. For example, based on conversations with teachers, one researcher studied bullying in middle-school girls, and together the teachers and researchers developed and implemented a program to address bullying.

Another collaboration developed in Massachusetts when researcher Todd Rose approached teachers at the Landmark School with the goal of figuring out some of the processes behind the dyslexia that characterizes most of the students there. (Landmark specializes in students who experience "language-based learning problems.") Todd met with a number of the Landmark teachers to discuss their ideas about the reasons students struggle with reading and writing. He had particularly long and energetic conversations with Chris Murphy, a veteran teacher who had worked for several years with many dyslexic students. Todd talked a lot about "working memory," the number of items that people can hold in mind when they are reading or writing text. He proposed that working memory was the fundamental problem for students with dyslexia. They had trouble keeping enough items in their working memory to be able to understand text that they were reading.

Chris was not satisfied with Todd's explanation. He kept raising objections, asking questions based on his extensive experience with many dyslexic students. He doubted that working memory was so simple: It did not seem to him that all dyslexic students experienced the same kinds of problems with holding items in memory when they were reading or writing.

Back and forth the discussions went, with Todd pushing the argument that the fundamental limitation in dyslexia was working memory, and Chris arguing that many students with working memory limitations turned out to be skilled with reading. Based on all their debate, Chris and Todd realized eventually that they needed to separate working memory limitations from vocabulary limitations. Perhaps a student could have some problems holding items in mind but have a strong vocabulary so that in reading and writing the working memory limit was not a factor.

The result was a research hypothesis: Working memory limitations could lead to difficulties in reading and writing; but if a student had an extensive vocabulary, maybe the working memory limit was no longer an issue or at least less of an issue. This hypothesis formed the core for the research project that Todd designed for his dissertation.

Todd collected data from high school students attending Landmark, putting together scores from a number of standardized tests of working memory and vocabulary. He examined how these skills related to fluent performance in reading "connected text" (such as reading this paragraph). The findings strongly supported the complex hypothesis that Todd and Chris had built together.

This modest partnership between a teacher (Chris) and a researcher (Todd) illustrates how researchers can benefit from discussing their hypotheses with teachers. The direction of Todd's working hypothesis changed as a result of his debates with Chris, whose classroom experiences with students struggling to read challenged Todd's original theory and led to a more complex and nuanced understanding of these important issues that affect how children learn... there needs to be a..." – Dr. Paul Yellin
struggles. The result was new insights into the relationships among working memory, vocabulary, and reading fluency in students with dyslexia. The beneficiaries of these sorts of partnerships are the students.

(Opened ScienceTalk sidebar)

**Practical Research for Sesame Street**

Dr. Kurt Fischer is the director for the Mind, Brain, and Education program at the Harvard University Graduate School of Education. He studies cognitive and emotional development and learning from birth through adulthood, combining analysis of the commonalities across people with the diversity of pathways of learning and development.

In many industries and fields, such as cosmetics, chemistry, engineering, medicine, traffic safety, and meteorology, practice informs research, and research informs practice. Researchers and practitioners work together to do practical research that provides the basis for decisions about how to make and do things—build bridges, create face creams, design cars and highways, test medicines, and predict weather. Education needs this kind of practical research to determine what works in learning and how it works.

One of the best examples of this process in education is *Sesame Street*, which has used practical research from the beginning to make basic decisions about what works well in children's programs, what children actually learn from a program, how different kinds of teaching function better or worse with different children, and many other practical questions (Lesser, 1973).

One story about the early history of *Sesame Street* shows how important research has been for making decisions. At the beginning, the creators of the program believed that young children would be easily confused if Muppets such as Big Bird interacted with the human characters on the show. Based on this assumption, they designed the early versions of the program so that Muppets and human characters never interacted.

But research quickly showed that they had it wrong. Not only were children not confused, but they lost interest in the human segments unless the Muppets were there. The result was the invention of key Muppet characters, such as Big Bird and Oscar the Grouch, who regularly interact with the human characters, as well as with other Muppets.

Most of the research for the show was the work of Children's Television Workshop (CTW), which was specifically created for this purpose. CTW invented two effective tools, one called "the distractor" to measure children's attention to the show's content and another called "the engagement measure" to determine the depth of their actual engagement—laughter, moving to the music, and talking to characters. One segment, *The Man from Alphabet*, never aired because it failed to survive these tests. CTW also measured the effectiveness of the specific lessons by testing retention levels of children...
Currently, these partnerships continue to form as researchers and teachers talk to each other. Some develop as a series of simple workshops and discussions. Others aspire to and may eventually become full-blown laboratory collaborations like those envisioned at the end of the 19th century by John Dewey. For example, Harvard Graduate School of Education has teamed with both Landmark School in Massachusetts and Ross School in New York to create research schools. Harvard researchers are also examining specific research questions with the Boston, Brockton, and Belmont public schools. A process called Instructional Rounds has been created in a number of schools to promote discussion among educators by focusing on individual student cases, in a manner similar to the way that doctors and researchers in teaching hospitals focus on individual medical cases. See book, *Instructional rounds in education: A network approach to improving teaching and learning*. Public schools in Boston and Texas are working with DiscoTest, an initiative to explore new approaches to standardized testing based on how students develop conceptual understanding. See article, "Redesigning Testing: operationalizing the new science of learning."

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CONCLUSION: A COMMUNITY OF EDUCATORS

Section 3: Gaining some perspective

All this insight into learning and the momentum toward filling Dewey's vision of real lab schools makes this an exciting time to be in education. However, we must not let the fanfare and the cheering diminish the voices of the many teachers who, long before the fMRI supported their discoveries, challenged the same traditional assumptions and practices.

If you are of a certain age, you can go to your bookshelves and find the old Dell paperback (95 cents) of John Holt's 1964 book, *How Children Fail*. Holt was a teacher. Like many teachers, he drew his inferences and conclusions not from brain images but from the behavior of the students with whom he worked. The similarities between his insights and the implications of today's research are striking:

- The connection between emotion and learning, the importance of emotional relevance: "[What I was teaching] did not meet any felt intellectual need. ... The only answer that really sticks in a child's mind is the answer to a question that he asked or might ask of himself."
- The effect of fear on thinking and learning: "What I now see for the first time is the mechanism by which fear destroys intelligence, the way it affects a child's whole way of looking at, thinking about, and dealing with life. So we have two problems, not one: to stop children from being afraid and then to break them of the bad thinking habits into which their fears have driven them. ... What is most surprising of all is how much fear there is in school."
- The importance of attention and developing students' metacognitive skills: "Most of us have very imperfect control over our attention. ... Part of being a good

Dr. Todd Rose

"We've got to do a better job of recognizing just the natural variability that kids bring to the table and designing school environments that deal with..."  — Dr. Todd Rose

View larger image
student is learning to be aware of that state of one's own mind and the degree of one's own understanding."

- The relation of context (scaffolding) to performance: "Would [my students] have discovered [the answer] if I had not paved the way with leading questions? Hard to tell."
- How grades (scores) come to replace learning: "We wanted them to figure out how to balance the beam, and introduced scoring as a matter of motivation. But they outsmarted us, and figured out ways to get a good score that had nothing to do with whether the beam balanced or not."
- The importance of regression (still confused with failure) in learning: "... perhaps we should see that failure is honorable and constructive rather than humiliating." "A baby does not react to failure as an adult does, or even a five-year-old, because she has not yet been made to feel that failure is shame."
- The need to link new learning to the real-world understandings brought to the classroom by different learners: "Between what he was studying for chemistry and the real world, the world of his senses and common sense, there was no connection."
- Issues of homework and rigor: "I have noticed many times that when the workload of the class is light, kids are willing to do some thinking, to take the time to figure things out; when the workload is heavy the 'I-don't-get-it' begins to sound, the thinking stops, they expect us to show them everything. Thus one ironical consequence of the drive for the so-called higher standards in schools is that the children are too busy to think."
- The danger of emphasizing coverage and testing as opposed to constructing conceptual understanding: "We do not consider that a child may be unable to learn because he does not grasp the fundamental nature of the symbols he is working with. ... [These children] would not be in the spot they were in if, all along the line, their teachers had been concerned to build slowly and solidly, instead of trying to make it look as if the children knew all the material that was supposed to be covered."
- The need to understand the knowledge and skills the learner brings to the classroom: "The reason this poor child has learned hardly anything in six years of school is that no one ever began where she was."
- And the great hoax of schools embedded in the emphasis on rote learning: "Even [young children] learn that what most teachers want and reward are not knowledge and understanding but the appearance of them."
CONCLUSION: A COMMUNITY OF EDUCATORS

Section 4:
Partners for change

Holt’s book reminds us that good teachers know or have intuited many of the things that researchers are now “discovering.” Too often, when teachers and researchers have come together, teachers have tended to sit mutely absorbing the lectures of the neuroscientists as though the teachers had nothing to contribute. Many of the neuroscientists have projected this attitude, as well. However, there are thousands of teachers like John Holt whose insights into how young people learn have guided their teaching, though their colleagues and administrators often dismissed them as cranks. One of the most important benefits of today’s research is that so much of it supports the wisdom of the trenches. The John Holts have found allies in the lab.

As partnerships and discussions replace one-way lectures, teachers and scientists are learning from each other as they search for places where neural imaging resonates with student behavior, and where science supports intuition. After all, finding these places is one of the contributions teachers can make to researchers. Teachers know when behavior does or does not support theory, and researchers need to know when their predictions pan out in the very unlababoratory-like conditions of real classrooms filled with all those messy individual differences embodied in actual students trying to function in uncontrolled (even out-of-control) conditions.

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Teachers can also help scientists identify meaningful questions to guide research. For example, in two of the districts in the Upper Valley partnership, teachers identified an important issue that they were struggling to resolve: which of two approaches to teaching math and reading was the more effective. The researchers brought to the discussion neuroscientific data and their laboratory perspective; the teachers brought their experiences with students and the classroom realities that formed the basis of their current beliefs. Together, they found a way to discuss the issues without the usual level of tension and eventually resolved the issue. The conflict over whether to teach math using a curriculum based on procedures or a curriculum based on concepts, for example, disappeared as they developed a common language and realized that both
approaches could be useful depending on the circumstances. Teachers constantly struggle with questions that would benefit from data gathered from research. For example, when is a learning disability a learning disability? If learning means building new, increasingly complex neural networks—a process dependent on establishing conceptual connections between bits of knowledge (like the relationship between addition and multiplication)—why couldn't what seems to be a learning disability instead be a failure to make the critical connection on which the more complex skill or knowledge depends? What about rote learning? Is there a developmental period when memorization without real understanding might actually lay a foundation for superior future learning? What about discipline policies—crime and punishment? If the ability to make good choices (by simulating cause and effect) develops late in adolescence, what are the implications for how we punish young people for their misbehavior? How realistic are our expectations for their behavior? Has any research been conducted on whether experience or guided simulations can speed up brain development and, hence, the ability to make good choices? Why do so many young people make perfectly good choices and avoid the trouble that seems to dog some of their peers?
CONCLUSION: A COMMUNITY OF EDUCATORS

Section 5:
What we have here...

What's the difference between Humpty Dumpty and Ludovic Lazarus Zamenhof? Their approaches to language. In a most unsatisfactory conversation with Alice in *Through the Looking Glass*, Humpty Dumpty declares, "When I use a word, it means just what I choose it to mean—neither more nor less." For Humpty Dumpty the goal is control, and language is the key to determining who will be master. Zamenhof, in 1887, began his crusade as Doktoro Esperanto (Dr. Hope) when he published his first book of what he hoped would become a universal second language, Esperanto. As a boy in Poland, he noticed "the misery caused by language division and [saw] at every step that the diversity of languages is the first, or at least the most influential, basis for the separation of the human family into groups of enemies." His idea was to create an international language to promote peace and the sort of understanding that enables people to work together to create a better world.

As educators and researchers come together to imagine and create better schools, we would be wise to resist the perhaps innate egotism of Humpty Dumpty and make our muse Dr. Esperanto—not his quixotic desire for one universal language but his desire to promote greater understanding.

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The first task is to figure out how to communicate, which requires more than simply developing a common vocabulary —though it certainly includes that. Anyone who has been involved in change knows the difficulties of communicating and understanding. Not only do groups develop arcane jargon and have different understandings of the same word, but their perceptions of issues, problems, and situations are shaped by shared experiences and the emotional goals that guide their beliefs and behavior.
Meaning tends to be rooted in these experiences and goals. (In fact, these issues sound just like those facing teachers and students in a classroom.) For example, a proposal to study the correlation between student course loads and learning will receive very different responses in a school facing budget cuts than in one with a history of interdisciplinary studies. Perceived threats are particular factors in communication:

- This person wants me to change. I don't want to change.
- Who is she to tell me what to do? What does she know about my world?
- If I need to change, then what I've been doing all these years must be wrong.
- I am an expert in my field, not a learner.
- I'm not going to just give what I know to someone else.
- I don't have the time or energy to change.
- What if I can't change?
- Will this change eliminate my job or change my status?
- What I'm doing works fine.
- I've already tried that, and it didn't work.
- I already do that.

Finding strategies to address these very real emotional responses to change is as essential as finding a common language.
CONCLUSION: A COMMUNITY OF EDUCATORS

Section 6:
The readiness is all

June can be a giddy time of hope and despair in schools across the land, especially in faculty rooms as teachers don their robes and await their cue to participate in another graduation ceremony. They shake their heads, amazed that Joe or Sally is actually getting a diploma, and weep with laughter as they trade memories of the seniors who seemed most impervious to learning. "Joe had modern European history, and he had US history. So in my English class I felt safe in asking if anyone could tell me why so many Irish flocked to America. Joe raised his hand. 'A malaria epidemic,' he suggested." Big explosion of laughter from that corner of the faculty room. But filter out the laughter, and what remains is the frustration over the poor skills and knowledge of too many high school graduates. The senior class is a mirror into which teachers are uneasy gazing.

Better than anyone, they know that nothing is really amusing about education. From the rising tide of mediocrity to No Child Left Behind (NCLB) to the Race to the Top Fund to high drop-out rates, educators are reminded incessantly of the need for something better.

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Anyone interested in education—teacher, administrator, parent, student, researcher—knows that what we have isn't working as well as we want it or need it to work. We are in it together, and we will either solve our problems together or 100 years from now, people will continue repeating the same conversation that began in the 19th century. That's our common ground, our desire to make our schools better. Today we have the opportunity to look at education from all these perspectives, allowing us to unite experience and science, theory and practice, intuition and
insight—provided we bring to the endeavor certain traits:

- A desire to work with others, a belief in the power of many perspectives, and a belief that we can help each other
- An openness to accepting new ideas and to examining old assumptions
- A willingness to feel the points of view of others and open channels of communication
- The effort to understand and align our goals

The overriding purpose of this course is to stimulate conversation within this wide community of educators. Share your ideas and insights, and engage the ideas of others, by participating in online discussions (Note: On this Annenberg site, you will find a Teacher Talk list-serve. We hope you will use it to discuss with others your ideas and experiments.); joining the International Mind, Brain, and Education Society; attending and presenting at conferences and workshops; visiting one another's classrooms, schools, and research labs; challenging the practices and policies that seem ineffective or counterproductive; inventing new approaches; and writing, sharing, and publishing your ideas.

Despite the struggle, perhaps we can come together as a people who speak one language and build the schools that embody our hopes.

Glossary

**No Child Left Behind (NCLB)**
United States Law passed in 2001 with the goal of closing the achievement gap through accountability for student achievement, reliance on educational tools that are scientifically supported, and availability of choices.

**Race to the Top Fund**
A competitive U.S. grant program introduced during the Obama presidency awarding funds to states that propose to advance education by improving practices and increasing student achievement with innovation and reform.
CONCLUSION: A COMMUNITY OF EDUCATORS

Section 7:
Resources


