Bereiter, C. (1999). In Search of High Impact. In L. Harasim (Ed.), *Wisdom & Wizardry: Celebrating the Pioneers of Online Education*. (pp. 8-9). Vancouver, BC: Telelearning, Inc.

In Search of High Impact

Throughout my career in educational research and development I have experienced a tension between working on high-impact innovations that require much investment of time and talent and in the end reach only a few students versus low-impact innovations that reach a larger population. That tension persists in my current work in online learning--perhaps it is even intensified--but technology may also provide means of resolving it.

When I entered doctoral work at Wisconsin in the 1950s there was not much intellectual excitement in educational research and what there was centered on measurement of individual differences, so that was what I concentrated on. But after taking a research job in that area I began to think that such research was never going to produce anything new in education at all, that only experimental research had much promise of doing that. So I moved to the University of Illinois to learn how to do experiments. My first project there was trying to teach a chimpanzee finger spelling and the second was grandiosely titled "Accelerating Intellectual Development in Young Children." I was clearly aiming at high impact.

The chimpanzee study went the way of many another bright idea that looks good on paper but dissolves when it encounters reality. The project with young children, however, ended up exceeding expectations. The disadvantaged children Siegfried Engelmann and I worked with could read and do arithmetic at mid-second grade level by the time they left our kindergarten. We learned in the process that the educational establishment does not really expect anything to make much difference and feels threatened and insulted when something does. Engelmann went on to develop our direct instruction methodology into DISTAR, which, when accompanied by substantial teacher training and supervision, has indeed proved to be a high-impact way of bringing low-achieving kids to above-average levels of performance. I moved to Toronto where, with Valerie Anderson, we tried to work out a way to achieve the Illinois kind of results without the high costs in time and personnel. Working with experimental classes of low-income kindergarteners, we were successful. One teacher, working with a class of average size, could actually teach all the kids to read--which, in the school they came from, was quite remarkable.

We then set about to produce a program that could be distributed and used widely. By the time we had accommodated to all the constraints of a published program however, it was no longer high-impact. In fact, meticulous evaluation by a talented young researcher named Marlene Scardamalia showed that it had virtually no impact at all. Why? Well, for one thing we had to eliminate reading altogether, because teaching this directly had already become contrary to Ministry policy. For another, in the interests of user-friendliness we had to put everything into a lesson-by-lesson format that militated against

any adaptation to what was actually happening to the kids and that encouraged teachers to focus on procedures rather than principles.

This reduction of principles to procedures is, I believe, the main reason why high-impact experiments turn into low- or zero-impact practices. I have seen it happening in all the areas where I have tried to have impact. The principle that mathematics should make sense to students gets turned into exercises with manipulatives. Inquiry learning gets turned into filling in the blanks in laboratory workbooks. Thinking about what you have read gets turned into answering comprehension questions. Problem solving strategies get turned into the "golden steps." Writing as a socio-cognitive process gets turned into "process writing": plan, write, rewrite.

In the 1970s I began to devote a part of my academic life to what is necessarily a low-impact kind of intervention, although it is one that can affect many learners--creating basal reading and mathematics programs for schools. The barriers to innovation in this area are immense; the entire education system is organized to prevent it. And it is in the nature of the genre that principles have to be reduced to procedures, thus making high impact virtually impossible. But if you can find the rare publisher who is willing to put educational values ahead of fashion, you can have some effect on the learning of a large number of students. There is evidence that the Open Court reading and mathematics programs I have helped author do this, and I continue to keep this part of my career as an educational designer alive.

The other part of my academic life from the middle 70s onward has been the collaboration with Marlene Scardamalia that has led from research on the psychology of writing to research on expertise, intentional learning, and knowledge building and eventually into design of a computer-based environment to support collaborative knowledge building. Marlene has sketched this work in her companion piece, so I will only add some comments related to my theme.

Our work in the CSILE/Knowledge Building project was aimed at high impact from the beginning. Of course, practically everyone doing educational technology development would say the same thing. Expressions like "revolution" and "paradigm shift" are common. At the same time, it is generally recognized that merely installing computers and network connections in schools is a very low-impact innovation. We have some evidence that our knowledge-building technology, even when it is unaccompanied by any significant change in teaching practices, has a beneficial effect--probably due to the greater use of written language and to opening up different channels of communication. But really dramatic effects come only when teachers see the possibility of previously unimagined attainments and see the technology as providing ways of working toward them. "Knowledge building" is the conceptual basis for such a vision. Grasping the idea and making it come alive in practice takes a lot of effort, talent, and support, and so knowledge-building pedagogy does not scale up easily. But network technology also offers new possibilities for teacher development and for mutual assistance in the transformation of teaching. We may at last find ways to have it both ways--to have high educational impact and also to reach a large number of learners.

There are formidable obstacles. Reduction of principles to procedures is the norm with online instruction as with offline. It is much easier for teachers to adopt an activity or a set of procedures than to pursue the goal of knowledge building. Ministries of education are moving to regulate educational software the same way they regulate textbooks, thus discouraging high-impact innovation. And modern technology brings with it yet another barrier to education advancement: glitz. It is very easy to convince educators and even parents that something dramatically new is happening when only the packaging has changed.

Yet I remain hopeful. Recently we were presenting Knowledge Forum® to people in a health service organization that is trying to redesign itself as a knowledge building organization. What with equipment problems, the demo was not going well, but they were won over when we showed them a video showing elementary school kids trying to work out relations between the eye and the brain. "That's exactly what we want to happen here!" their director said. Making that connection required grasping knowledge building at a level beyond procedures. Few people see it that readily, but those who do can help others to see it. Knowledge building will become widespread in classrooms when the education profession itself becomes a knowledge society. It is a long way from that now, but technology makes the prospect at least imaginable.