Can Technology Exploit Our Many Ways of Knowing?

By Howard Gardner

As human beings, we are the kinds of creatures who can learn in many ways: through exploration with our hands, the use of our several senses, the silent observations of other persons, conversation and argument, and the development of many different kinds of symbols—ranging from paintings or graphs to semaphore or dance notation. These alternative ways of knowing can often be observed at home, on the street, and, increasingly, in children's museums and other "hands-on" learning environments.

Regrettably, however, formal schooling often neglects these multiple ways of knowing. For the most part, youngsters sit in their seats all day, reading books or attending to lectures. When asked to show what they have learned, students typically take a written test—all too often, multiple choice—or are asked to recite back what they have read or heard.

It might seem that such "uniform schooling" is fair—since everyone is being treated in the same way. I believe, however, that it is fundamentally unfair. School has long privileged one or two forms of human intelligence—those involving language and logic—while ignoring the other powerful ways in which we can come to know the world.

According to Multiple Intelligences (MI) theory, all human beings possess at least eight forms of intelligence, which I call linguistic, logical-mathematical (the two favored in school), musical, spatial, bodily-kinesthetic, naturalist, interpersonal, and intrapersonal. All of us have these intelligences—they are what make us human, cognitively speaking. But because of genetic variation and the accidents of experience, no two of us have exactly the same blend or combination of intelligences. I call on educators to take advantage of this multiplicity of intelligences. Teachers should fashion teaching and learning so that *all* students have the chance to learn and to demonstrate what they have learned—not just those students who happen to be gifted with words and numbers.

The theory of multiple intelligences emerged during the same era as the "new technologies": CD-ROMs, videodisks, the Internet, the World Wide Web, and such promising approaches as lego-logo (where one can build elaborate physical structures by issuing commands at the keyboard) or hypermedia (where one can shift at will among written, graphic, and auditory contents and also rearrange those contents as one likes). It has seemed evident to many people—teachers, parents, youngsters, entrepreneurs, technologists—that these technologies ought to be mobilized for better instruction. Indeed, the process of using technology to mobilize the multiple intelligences of students has already begun. Technologies and technologically based exhibitions in museums invite students to use several intelligences; moreover, even when one is simply typing on one's keyboard, one can "think" in spatial, musical, linguistic, or bodily intelligences.

But before declaring victory, it's important to record a few cautionary notes. First of all, even in my lifetime, many technologies—from slide projectors to television—have been touted as "the solution" to American education. Yet these technologies have had remarkably little impact on mainstream education. When plugged in, they are all too often simply used to "deliver" the same old "drill-and-kill" content.

Second, once a multiple intelligences perspective has been introduced, there is a reflexive impulse to test youngsters to see which intelligences they have or lack. This could be done with old-fashioned materials (e.g., musical instruments, abacuses) or online: in fact, hardly a week goes by without some new start-up suggesting that it is developing ways of measuring or nurturing the intelligences. While this impulse is not malevolent, it need not yield positive educational outcomes. We are hardly better off if we have eight labels (good in language, poor in spatial thinking, etc.) for children rather than two (smart or not). Nor does it mean much educationally simply to develop one or more intelligences for their own sake.

What Are Our Goals?

Technology is neither good nor bad in itself, nor can it dictate educational goals. A pencil can be used to write Shakespearean sonnets or to copy someone else's homework. The Internet can be used to engender

enlightenment or hatred. Before embracing any new technology, we need to declare our educational goals and demonstrate how a particular technology can help us to achieve them. And of course we must provide adequate technical assistance if the technology is to be deployed effectively.

I favor two broad classes of educational goals. First, we should help students to become certain kinds of adults. If, for example, we want students to be civil to one another, we need to develop their interpersonal skills. This could be done by recording tense interactions on video and having students choose the best human(e) means of reducing the tension; by involving students in chat-rooms or discussion forums that include opportunities for helpfulness or deceit; or by creating cartoon simulations or virtual reality scenarios of human dilemmas where the student has options to interact in various ways. Or, if we want students to be sensitive to the arts, we should let them examine different works of art and encourage them to create in words, musical sequences, or line, color, and form. While such opportunities have always existed, technology brings them literally to our fingertips: for example, one can compose (or at least "assemble") music at a computer even if one can neither read music nor play an instrument.

Second, we should help students to understand the major ways of thinking that have developed in the disciplines. Here is where the new technologies can really come into their own. In science, students need to understand how one develops theories, evaluates data, tests hypotheses, and makes predictions. Suppose, for example, one is learning to predict weather, or identify the strata of rocks in a region. With new software and the World Wide Web, it is possible to receive and to manipulate all kinds of (hopefully accurate) data, captured in a wide range of symbol systems, and evaluate respective claims and counterclaims.

Turning to the case of history, students need to understand how one makes sense of original documents, conflicting testimony, the oral, written, and graphic records in order to reconstruct events from the past. Again, suppose one is studying the causes of the First World War or the strategic battles of the Civil War. Using videodisks or CD-ROMs, one can easily access the relevant documents, including photographs or film records, create one's own models, evaluate them in the light of contemporary and retrospective accounts, and relate them to events in today's newspaper.

Don't get me wrong. Such scientific and historical studies could have been carried on in an earlier era, without benefit of multimedia or cybercommunication. But the new technologies make the materials vivid, easy to access, and fun to play with—and they readily address the multiple ways of knowing that humans possess. Moreover, for the first time ever, it is possible for teachers and other experts to examine the work efficiently, at long distances, and to provide quick and relevant feedback in forms that are useful to students.

Clearly, a marriage of education and technology could be consummated. But it will only be a happy marriage if those charged with education remain clear on what they want to achieve for our children and vigilant that the technology serves these ends. Otherwise, like other technologies, the new ones could end up spawning apathy, alienation, or yet another phalanx of consumers.