Are We Going to Get Smarter?

Is intelligence an absolute? Does mankind get smarter as time goes by? It depends on what you mean by intelligence, of course. Certainly we are getting more knowledgeable. Or at least it seems that way. While the average child has access to a wealth of information, considerably more than was available to children fifty years ago, there are people who claim that our children are not as well educated as they were fifty years ago and that our schools have failed us.

Today, questions about what it means to be intelligent and what it means to be educated are not at the center of our scientific inquiry, nor are they at the center of our popular discourse. Still we live our lives according to implicitly understood ideas about intelligence and about education. Those ideas will be seriously challenged in the next fifty years.

About ten years ago, I was asked to join the board of editors of *Encyclopaedia Britannica*. The other members were mostly octogenarians and mostly humanists. Because I was both a scientist and much younger than everyone else, most of what I said was met with odd stares. When I asked the board if they would be happy to put out an encyclopedia ten times the size of the current one if the costs involved remained the same, they replied that, no, the current encyclopedia had just the right amount of information. I responded that they would be out of business in ten years if that was their belief. They had no idea what I meant—although I tried to explain the coming of what is now called the World Wide Web. At a later meeting, after having heard me make similar assertions about the future, Clifton Fadiman, a literary hero of the 1940s, responded, “I guess we will all have to accept the fact that minds less well educated than our own will soon be in charge of institutions like the Encyclopaedia.”

The chairman of the board of the *Encyclopaedia Britannica* at that time was the late Mortimer Adler. He was also responsible for a series called The Great Books of the Western World, which was (and is) sold as a set. These books represent all the great written works of the world’s wisdom—according to Adler and his colleagues, anyhow—and the series consisted mostly of books written prior to the twentieth century. I asked Adler whether he thought there might be some new books that could be included, and he replied that most of the important thoughts had already been written down.

This idea, that all the great thoughts that have already been thought, has been prevalent in the American idea of education and intelligence for a long time. Here are the admission requirements for Harvard College in 1745:

When any Schollar is able to read Tully or such like classical Latine Authour *ex tempore* and make and speake true Latin verse and prose *Suo (ut aitunt) Marte*, and decline perfectly the paradigms of *Nounes* and *verbes*
ine the Greeke tongue, then may he be admitted into the Colledge, nor shall any claim admission before such qualification.

What the Great Books series and Harvard of 1745 have in common is an underlying assumption that the study of man and his institutions had been sufficiently mastered in ancient times and therefore education required you to be well read and well versed in the thoughts of those who had preceded you. An educated person in this view is one who is able to discuss with erudition a variety of historical, philosophical, and literary topics. Being educated and therefore being intelligent—has, for the last century and many centuries before that, been about the accumulation of facts, the ability to quote the ideas of others, and a familiarity with certain ideas. Education has meant accumulating information, and intelligence has often meant little more in the popular imagination than the ability to show off what one has accumulated.

But what happens when the facts are in the walls?
Fifty years from now, knowledge will be so easy to acquire that one will be able simply to say aloud whatever one wants to know and hear an instantaneous response from the walls—enhanced by a great deal of technology inside those walls, of course. Knowing offhand what Freud had to say about the superego won’t mean much when you can turn to the nearest appliance and ask what Freud had to say and and hear Freud (or someone who looks and sounds a lot like him) saying it and finding five opposing thought leaders from throughout time ready to propose alternative ideas if you want to hear them and discuss them together.

But is intelligence simply the ability to be informed of answers to your questions, or is it the ability to know what questions to ask? As answers become devalued, questions become more valued. We have lived for a very long time in an answer-based society. Signs of it are everywhere: in the television shows that people watch, such as Jeopardy and Who Wants to Be a Millionaire?, in the games that people play, such as Trivial Pursuit; and most of all in school, where answers are king. Increasingly, the chief concern of our schools is testing. School has become a regimen for learning answers rather than learning to inquire.

New technologies will change all this. When the pocket calculator was introduced, people asked whether calculators might as well be used in math tests, since from now on such devices would always be available. As a result, math tests began to focus on more substantive issues than long division. The introduction of artificial intelligence into everyday devices will have the same effect. As machines become omnipresent and able to answer questions about whatever concerns us, the values we place on each individual’s being a repository of factual knowledge will diminish. The old idea of school, based on the notion that the most knowledgeable person in town had information to impart and the rest of us were forced to sit and memorize that information, will give way to new ideas of knowledge acquisition. Knowledge will no longer be seen as a commodity to be acquired. Anything obtained easily is devalued in society, and it will be the same with knowledge.

What will be valued will be good questions. Computers can only take you so far, we will hear people say.

Imagine the following: You are sitting in your living room, talking with your spouse, and an issue comes up between
thought. His idea of education did not include, for example, being able to program in JAVA, or understanding the basics of neuroscience. In fifty years, there will still be Harvard, but the value of its imprimatur will have been altered tremendously.

Education in its deepest sense has always been about doing, rather than about knowing. Many scholars throughout the years have pointed this out, from Aristotle ("For the things we have to learn before we can do them, we learn by doing them") to Galileo ("You cannot teach a man anything; you can only help him discover it within himself") to A. S. Neill ("I hear and I forget; I see and I remember; I do and I understand") to Einstein ("The only source of knowledge is experience"). Nevertheless, schools have ignored this wisdom and chosen—in the words of John Dewey—to "teach by pouring in."

The virtual schools that will arise to take the place of current institutions will attract students less because of the credentials they bestow than because of the experiences they offer. Since these experiences will be there for the taking when a learner decides to learn, most students will start college long before the age of eighteen. Success in various virtual experiences will encourage us to encounter new ones, much as video games do today. Certifying agencies will worry more about what you can do—what virtual merit badges you have achieved—than what courses you have taken.

Fields of endeavor will create experiences in those fields. Instead of Harvard or Columbia offering courses in physics, physicists from around the world will work with virtual-educational-world designers who will build software to create physics experiences. Those experiences will be available to everyone. The old idea that the smartest people
were those who received the best grades from schools that tested them to see how well they had learned the lessons will morph into a notion that the smartest students are the ones who pose questions for the software that have to be sent to humans in order to be answered. Intelligence will mean the ability to reach the limits of an educational experience.

Will we collectively be smarter as a society because of all these innovations? In terms of raw capacity for thought, people are as smart now as they ever were or ever will be. But a brilliant cave dweller, who had available to him limited knowledge of the world and limited wisdom from the ages, could work only within the parameters of the tools he knew. He may have understood the nature of humans and their institutions as well as the Greeks who followed him. He may have been as intelligent as the Greeks who followed him. But in any absolute sense he wasn't too smart, because there was so much that he hadn't experienced.

The same is true of our view of the Greeks, of course. Aristotle seems brilliant because he tackled issues we still tackle today and had great insights into those issues. Yet Aristotle can also be almost funny in his naivete when he approaches subjects with which he had little experience and with which we have had so much more. Each generation improves on the experiences it opens up to the next. But a leap of tremendous proportions is coming in the next generation. The fact that we still have teachers and classrooms and textbooks will be almost laughable in fifty years. People will look back at us and ask why it took so long for us to change our notions of education, why we thought SAT scores mattered, or why we thought memorizing answers was a mark of intelligence in any way. The notion that education is about indoctrination by the state—an idea boldly stated in the 1700s and little acknowledged today—will seem scary. The governmental control of information—still popular in some countries, and still possible in those countries without computer access—will become an anachronism. Too much experience will be available too readily and too cheaply to prevent anyone from experiencing anything. Governments will have to give up even imagining that they are in the education business, an area they dominate today, and will be unable to control the broad distribution of virtual experiences in much the way that they are failing to control television and computer access in country after country today.

We will begin to understand in the next fifty years that experience and one's ability to extend its range is the ultimate measure of intelligence and the ultimate expression of freedom. The creation of virtual experience will become a major industry; our homes will be dominated by virtual experiences; our schools will have been replaced by them. What we see today in video games and science fiction movies will become our reality. Today, games like Everquest attract hundreds of thousands of players, who inhabit virtual worlds in an effort to gain status, form relationships, and acquire various virtual objects. These games are so real to the participants that the virtual objects they employ are for sale (for hefty prices) on e-Bay. Many players of these games have a social life entirely based upon them. In the future, these worlds will become much more sophisticated and even more intertwined with the real world.

We really will be able to go wherever we want to go on any given day, and all anyone will ask of us is where we have been and what experiences we have had there. We will seek out those who are more experienced than us in the virtual worlds they have entered. We will understand
that it is the questions that remain unanswered and those who can think critically about them that are the factors in any true measure of intelligence. Of course, this last idea is well understood in universities today, but it is not really appreciated in business or government. Politicians want simplistic points of view, teachers want correct answers, businesses want solutions, venture capitalists want profits, the media want national soap operas, certifying agencies want scores. Those who are considered smart in a society like that are those who have succeeded in supplying it with what it wants. In such a supply-and-demand view of knowledge and intelligence, even Clifton Fadiman would have felt left out. Still, he and those of his generation could hold themselves above all this and talk about Great Books.

I was once asked to review some technical colleges to see how they were teaching. In a class for future chefs, each student had his own cooking facilities and they were busy making food. All I could say was that I had nothing of interest to add. The school was teaching doing by having students do. While this is not a radical idea in technical colleges, it seems to be radical in our other institutions of higher learning. As more tools for doing become available, it is doing that will matter. At Carnegie Mellon, where I work, new students must put together their own computer as soon as they arrive on campus and use that computer for the next four years. You can be sure that they understand how computers work once they have built one themselves.

It is what we can do, not what we know, that will matter in an educational system based on realistic performance environments. The important intellectual issues will revolve around questions arising from the nature of students’ interactions in the virtual educational world.

When educational environments demand questions, ask how questions were obtained, and demand to know the experiences that brought on those questions, then the profound change that computers offer will have been realized. We will all be smarter—a great deal smarter—in the sense that we will not be afraid of new experiences. We will know how to find those experiences and we will grow from them. Our minds will be differently educated and our intellectual world will be dominated neither by humanists nor by scientists but by experimentalists, those who have been there and have become curious as a result.

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