Achieving Techno-Literacy

By **KEVIN KELLY**   SEPT. 16, 2010

This past year my wife and I home-schooled our eighth-grade son. One school day, he and I decided we would make fire the old way — out of nothing but plant materials and our own hustle. Our son watched a seemingly endless series of instructional survival videos on YouTube as part of his research. He chose the bow method based on our physics class about friction. He then constructed a bow from a branch in the woods, carved a stick for the spindle and added a fiber string. It was mighty tough going. We spent hours refining the apparatus. He was surprised by the enormous amount of bodily energy required to focus onto a very small spot, and how a minuscule, nearly invisible bit of fuel, once sparked, can quickly amplify into a flame and then a fire. Chemistry, physics, history and gym all in one lesson. And, man, when you are 13 years old and Prometheus, it's exhilarating!

One day our student would dissect and diagram the inside organs of flowers; the next he'd write short stories or poems and then revise them; and the next day we'd solve logic problems with algebra, then he'd work on plans for a chicken coop and maybe we'd do a field trip to a car factory. He also went through eighth-grade textbooks in history, grammar, geometry and the like. This type of home-schooling is really nothing special. Our son was merely one of more than a million students home-schooled in the United States last year. Our reasons for home-schooling were not uncommon, either. We wanted to create an ideal learning environment. For the previous seven years, our son

was enrolled in challenging schools. His grades were excellent, but the amount of homework was grinding him down. The intense high school he was planning to attend promised even more work. He asked if he could be home-schooled for his last year before high school, and by a quirk of life, this was a year our schedules would permit our role as home-school teachers.

Now that the year is done, I am struck that the fancy technology supposedly crucial to an up-to-the-minute education was not a major factor in its success. Of course, technology in the broadest sense was everywhere in our classroom. There was an inexpensive microscope on the kitchen table and an old digital camera to record experiments. There was a PC always on for research. Our son was also a big user of online tutorials. Of particular note is Khan Academy, which offers nearly 1,600 short high-quality tutorials on algebra, chemistry, history, economics and other subjects — all created by one guy, and all free. The Internet was also essential for my wife and me as we researched the best textbooks, the best projects, the best approaches.

But the computer was only one tool of many. Technology helped us learn, but it was not the medium of learning. It was summoned when needed. Technology is strange that way. Education, at least in the K-12 range, is more about child rearing than knowledge acquisition. And since child rearing is primarily about forming character, instilling values and cultivating habits, it may be the last area to be directly augmented by technology.

Even so, as technology floods the rest of our lives, one of the chief habits a student needs to acquire is technological literacy — and we made sure it was part of our curriculum. By technological literacy, I mean the latest in a series of proficiencies children should accumulate in school. Students begin with mastering the alphabet and numbers, then transition into critical thinking, logic and absorption of the scientific method. Technological literacy is something different: proficiency with the larger system of our invented world. It is close to an intuitive sense of how you add up, or parse, the manufactured realm. We don't need expertise with every invention; that is not only

impossible, it's not very useful. Rather, we need to be literate in the complexities of technology in general, as if it were a second nature.

Technology will change faster than we can teach it. My son studied the popular programming language C++ in his home-school year; that knowledge could be economically useless soon. The accelerating pace of technology means his eventual adult career does not exist yet. Of course it won't be taught in school. But technological smartness can be. Here is the kind of literacy that we tried to impart:

• Every new technology will bite back. The more powerful its gifts, the more powerfully it can be abused. Look for its costs.

• Technologies improve so fast you should postpone getting anything you need until the last second. Get comfortable with the fact that anything you buy is already obsolete.

• Before you can master a device, program or invention, it will be superseded; you will always be a beginner. Get good at it.

• Be suspicious of any technology that requires walls. If you can fix it, modify it or hack it yourself, that is a good sign.

• The proper response to a stupid technology is to make a better one, just as the proper response to a stupid idea is not to outlaw it but to replace it with a better idea.

• Every technology is biased by its embedded defaults: what does it assume?

• Nobody has any idea of what a new invention will really be good for. The crucial question is, what happens when everyone has one?

• The older the technology, the more likely it will continue to be useful.

• Find the minimum amount of technology that will maximize your options.

I don't think my son mastered all those principles in one year, but he got a start. For the most part, learning at home is more demanding than learning in a classroom because it requires more self-direction. On one particularly long day, with books piled up and papers spread out, my son was slumped in his chair.

"Is everything O.K.?" I asked.

"It's hard," he said. "I not only have to be the student, I also have to be the teacher."

"Yes! So what have you learned about being a teacher?"

"You have to teach the student — that's me — not only to learn stuff but to learn how to learn."

"And have you?"

"I think I am doing better as the student than the teacher. I'm learning how to learn, but I can't wait till next year when I have some real good teachers — better than me."

He had learned the most critical thing: how to keep learning. A month ago he entered high school eager to be taught — not facts, or even skills, but a lifelong process that would keep pace with technology's rapid, ceaseless teaching.

If we listen to technology, and learn to be proficient in its ways, then we'll be able to harness this most powerful force in the world. If not, we'll be stuck at the bottom of the class.

Correction: October 3, 2010

An article on Sept. 19 about technology in the classroom misspelled the name of a Web site that offers online tutorials in various subjects. It is Khan Academy, not Kahn.

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