From the Editor

An (Articulated K-12) Curriculum to Reflect Technology

Precisely fifty years since Warner (1947) presented "A Curriculum to Reflect Technology," and with phase two of the Technology for All Americans Project now underway, we enter the most critical phase in the history of our profession. Our work over the next decade will either thrust us into the mainstream of the technology in education movement—or, it won't. The struggle for recognition of technology as legitimate subject matter in our schools is now behind us. Even the staunchest luddites recognize that "technology" isn't some passing fad. Technology educators are no longer alone in the call for technology in the curriculum. Every parent wants his and her child reap the benefits of technology in education. The only questions remaining have to do with the what, who, and how "technology" will be infused across the curriculum.

I wish we could assume credit for this awakening. After all, we've been championing the cause for half a century. Others, most notably those in the Science, Technology, and Society movement, have shared our passion for technology as content. But the message, for the most part, never rang loudly beyond our profession, and is only now beginning to be heard by "outsiders." Though we would like to take credit for this "paradigm shift" and have it guided by our vision, that is not the way it seems to be unfolding. The current frenzy regarding technology in education is a phenomenon of much broader proportions than our profession. This cause is now celebrated by all who have—at one time or another—experienced the power and wonder of the digital revolution.

We can be self-righteous in our understanding that "technology" is more than *just* computers. But the fact remains that computers *are* technology to virtually everyone outside our field. For them, the equation reads: *Computers = Technology*. We can evangelize all we want that technology is more than just computers... but precisely where that argument will lead us in the next decade is a matter of conjecture. Do we really believe educational decision-makers will put their resources in "production systems" or even "physical systems" before funding "digital systems?" Because of vocational funding, we have been able to dodge this issue in the past. How long can we continue to do so while chanting "technology for all Americans?"

The fact is, most of the processes we have taught in our field now originate with computer input devices—at least such is the case in the "real world." *Communication Systems* are all about bits these days. Most *Production Systems* begin with digital CAD systems, which generate code that drives

machining equipment. *Power / Energy / Transportation Systems* are now routinely simulated with digital technologies. The concepts and processes of technology can and will be taught via digital systems.

Thus, anyone capable of operating a desktop computer is able to deliver something that most people believe is "technology education." Modular lab vendors have made it so, and they are exploiting this perception at an alarming rate. Witness the latest manifestation—the modular lab for the elementary school. Applied Technologies is now marketing "KidTracs™ Techno-Plaza and Theme Park" for the under-12 crowd. With modular labs for the elementary, middle, and high schools, Applied Technologies now offers some form of "technology education" from grades K through 12. School districts that purchase all three modular labs would have instant K-12 technology education; an inevitability that should give us cause to ponder. Is *this* the "technology education" we believe is best for the future? School districts and administrators will find these turnkey K-12 solutions irresistible as they go for the 21st century gusto.

At Virginia Tech, we now have a small but growing stream of graduate students entering our Technology Education Program who, despite having *no* background in our field, have been thrust into a modular lab (on the assumption that anyone can teach in such a facility). They are coming to us for the obligatory certification coursework. Sadly, the broad understandings and synthesis of ideas generally thought to be the stuff of graduate programs is of relatively little use to them in their modular labs. This phenomenon poses new challenges for our profession as we prepare technology teachers for the next century.

If the digital revolution and modular labs weren't enough to challenge our sensibilities, the Internet certainly ought to! The astonishing growth of the Internet/World Wide Web is taking education by storm. Every sector of the school is being impacted by networked information systems, beginning with the library and administration and extending outward from there. If those networks don't stretch to the technology education labs, we will be "road-kill on the information highway," as the cliché now reads.

Any one of these three "revolutions"—digital, modular labs, and networked information systems— would be astonishing by itself. All three assembled together in any given school system will provide convincing evidence of "technology education" in action. The problem is, they require little or none of our involvement. At a time when all of America, from the Clinton administration to the local PTA, is clamoring for "technology" in our schools, we will see a staggering increase in modular labs, computer workstations, and Internet connections at all levels and in all precincts of education. Computer labs will give way to networked "distributed computing" throughout the schools, as teachers increasingly demand computers in their classrooms. Soon, teachers in all disciplines will be involved in "technology education."

Technology *is* making its way into the schools and into the curriculum, and it is happening in spite of the field we call "technology education," not because of us. Computers, modular labs, and networked information are rapidly

changing the ways schools do business. The brand of technology education being put in place isn't the sort we might have envisioned, but it certainly is "technology education" in everyone else's eyes.

It seems to me we have several opportunities/responsibilities amidst this changing landscape. First, we must continue to demand (by way of our purchasing decisions) more flexible modules from vendors whose primary motivation is sales rather than education. "Modular" instruction needn't be inherently bad, just as "technology" isn't inherently bad. Modules are what we make of them. We need modules that offer open-ended problem solving opportunities, not modules consisting only of lockstep procedures masquerading as "education."

Second, we must do everything within our power to make certain the school network makes its way to the technology education laboratory. Any technology education program excluded from the school network might just as well be located on a different planet, since "intra-school" communication would thus be easier from a networked program on the other side of the globe than it would be from the non-networked technology education lab in the school.

Finally, and most importantly, we *must* develop an articulated K-12 curriculum for technology education. As fundamental as this task may seem, no one seems to have taken it on. What concepts/processes/principles of technology do we think *should* be taught to a kindergarten student? What concepts/processes/principles of technology should follow this formative kindergarten experience in first grade? We must ask this question of each grade level from kindergarten through high school. We have never addressed this fundamental issue because technology education has never been a required subject from kindergarten through the 12th grade. The sooner we have this "vision" in place, the sooner we can move it to the public agenda.

The standards to be developed by the Technology For All Americans Project may be the key to the K-12 curriculum that we so desperately need. But, as important as they will be, I'm not sure we can afford to wait for "The Standards." We desperately need an *Articulated K-12 Curriculum to Reflect Technology* that we can forward to the public *right now*. Computers, modular labs, and the Internet are forcing our hand in this. We have worked on pieces of this curriculum for the past fifty years; yet ironically, we've never taken the "systems approach" to the development of a K-12 curriculum. We have yet to conceptualize a comprehensive, articulated K-12 technology education model. I think we can assume the modular lab vendors will get around to this task sooner or later—and when they do, it will be that much more difficult for us (or anyone) to forward a less commercial, more pedagogically sound model. It's time for an *Articulated K-12 Curriculum to Reflect Technology* to take shape!

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Warner, W. E. (1947, April). *A curriculum to reflect technology.* Paper presented at the annual conference of the American Industrial Arts Association, Columbus, OH.