

From the Editor

Reflections, Fabbers, and Sharing Intellectual Property

About nine years ago I wrote my first *From the Editor*, titled *Nine years back and looking ahead* (LaPorte, 1998). At that time I summarized a bit of the nature of this *Journal* as it had developed over the first nine volumes. It seems appropriate to do that again in this issue as nine more years have gone by.

In reflection, a lot has happened over those nine years. We now have a set of curriculum standards for the first time and the profession has rallied around them in a variety of different, very positive ways. The interest in integrating technology, mathematics, and science has evolved into the current emphasis on engineering. A variety of organizations beyond our profession have become involved in technological literacy, both within the school and in the community. We can now access the Internet wirelessly in most hotels and airports, many coffee shops, nearly every college campus, and an increasing number of “hot spots” across the country. With a satellite Internet connection, people can take their “office” with them and do work virtually anywhere in the world and at any time, whether it is (tongue in cheek) under the Eiffel Tower or in the wilderness of the Montana mountains.

It seems that virtually everyone has a cell phone, including many elementary school children (and many parents depend on this form of communication). There is no respite from the mega-communication network that has evolved as long as we keep the switches turned on – and increasingly others expect us to do this. For good or for bad, the geographic location of any person with an active cell phone can be determined.

On the other hand, over those nine years we experienced 9/11, we became engaged in a war, and for the first time I worked with JTE authors whose lives were in danger as they developed manuscripts. Many advances in medical technology have occurred, but there is still no plan for those who cannot afford health insurance. We have started to come to grips with the reality of global warming and have begun to realize the grave consequences if we do nothing about it. Promising developments in alternative fuels to power our automobiles are occurring, though we glutted ourselves with low mileage vehicles, making everyone pay more for fuel because of the economic principle of supply and demand, including those conscientious about non-renewable resources.

The economy has become even more global than it was nine years ago. Through the curriculum standards and other influences, our profession has become much more global as well. The fact that the international PATT (Pupils' Attitude Toward Technology) Conference is held every other year in conjunction with the ITEA Conference has made it a truly global event as well, spawning international collaboration in a variety of ways – we really have “grown into our name” and have become an international organization.

Nine years back I highlighted how “international” the JTE was, so I decided to compare the first nine volumes to the second nine volumes in this regard. As reported in Table 1, the number of articles authored by one or more international authors has increased dramatically, by more than 50%.

From the time I first started teaching I felt that the general education goals to which we aspired, and in which I still firmly believe, would be reached when there was an equal number of male and female teachers, and male and female students in our programs. Though the number of female teachers has increased more than 10 fold between 1979 and 1999 (Sanders, 2001, p. 41) females are still short of being equally represented in our profession. At the same time, though, the number of female students at the middle school level has nearly reached equality (Sanders, 2001, p. 43). I was curious to see the representation of females among the authors of JTE articles. As reported in Table 1, I found that this percentage increased 30% between the two time spans. Still, less than one in five published articles involved a female author, but the increase over time is quite encouraging.

In addition to authorship, I also took a look at the JTE subscriber base, counting those who had female first names. I did not count names that were gender neutral, so my count is an underestimate. I found 103 females (19.5%) among the 529 individual subscribers at the time the Fall 2006 issue was mailed. This is encouraging as well.

Table 1
Authorship of Articles in the Journal of Technology Education

	Volumes 1-9		Volumes 10-18		Change
	N	%	N	%	
Total number of articles	100		88		
Articles in which the author or one or more co-authors did not reside in the US.	27	27.0	37	42.0	+55.6%
Articles authored or co-authored by one or more female(s)	14	14.0	16	18.2	+30.0%

Through the leadership of then Editor Mark Sanders, the JTE went online in 1992. Soon, all issues were available electronically. The *Journal of Industrial Teacher Education* and then the *Journal of Technological Studies* followed suit

soon thereafter, essentially opening up the scholarship of our profession to the world. I can remember the early days of accessing the JTE online when there was only one other publication so available. I can also remember soothsayers within our profession who believed that making the JTE available online would destroy the paper copy subscription base, and thus the revenue generated. This has not happened and paper copy subscribers are now around 600, an all-time high.

With full access to the JTE at no charge, it clearly can be considered part of the “open source” movement in this country. Wikipedia (wikipedia.org) is another example of an open source entity. Very popular with students, it is an online encyclopedia that is comprised of entries provided by anyone who wishes to contribute (yes, “technology education” is included). As the founders admit, there are inaccuracies, errors, and misinformation, but as time goes on, and because of the dynamic nature of the effort, corrections are made and the information becomes more valid. Though the term is often used in reference to computer programming code, Wikipedia includes a broad definition of “open source” as:

... a set of principles and practices that promote access to the production and design process for various goods, products, resources and technical conclusions or advice.

In simple terms, open source could be considered as the paradigm for the open sharing of intellectual property. Most teachers are exemplars of this sort of sharing. In fact, most of the ideas that I use in my teaching are adaptations of ideas that someone else shared with me. Likewise, for those few ideas that were original to me, I feel tremendous satisfaction in seeing my former students, attendees at my conference presentations, readers of my writings, and friends, apply my ideas to their own teaching, improving the ideas in the process, and sharing those improvements with me and others. Though educators generally open-source themselves fully to others with their “intellectual property,” the whole concept is often quite foreign to those in business and industry, where intellectual property is rightfully held very close to the chest and patent and trade secret protection and industrial espionage are a way of life. Educators operate under a sociological model whereas those in business and industry must typically operate under a competition-based economic model. As an aside, the differences between these two cultures must be reconciled before true cooperation can be productive.

One of the most significant technologies of interest to technology educators these days is rapid prototyping. Starting with a three-dimensional model developed with computer software, parts and products can be made as easily as printing a document from a computer. Rapid prototyping machines designed for educational use have become less and less expensive over time and will no doubt be in the labs of many secondary schools and colleges in the next few years.

Now let me connect open-sourcing with rapid prototyping. An exemplar of the potential of the doing this is Hod Lipson. He is director of Cornell

University's Computational Synthesis Lab. Hod clearly could have been a technology educator – as the article in *Popular Science* magazine stated, he “lost Lego pieces constantly” (p. 42). He has built a “prototype” of a rapid prototyping machine and calls it a “fabricator,” or “fabber” for short. Between the article in *Popular Science* (2007) and his Website (fabathome.org), he provides all the details for replicating the “fabber.” He is committed to the notion that collectively, his idea can be improved for the benefit of all. As he stated:

We want as many people as possible to get their hands on this technology, experiment with it, and develop new applications for it. . . . We've put everything out in a completely free way, no limitations (p. 42; 44).

What a powerful concept! The article cites an example that has particular significance to technology educators. Noy Schaal, a high school student, won a first place in a “science” fair by using a “fabber” to produce a representation of *her* home state of Kentucky. The material used was chocolate!

Certainly intellectual property must be protected for reasons of national defense and to maintain the integrity of our vulnerable economic system. Likewise, creative efforts of individuals must be protected from those who might use them for their own personal or economic gain at the expense of the creator. At the same time, as I take increasing interest in my own health and longevity (as most older people do), I would like to be able to read at no charge all the research articles (not just the “free ones”) published in the *Journal of the American Medical Association*. Doing so could possibly extend my life and reduce the burden of my health care on society. Likewise, I feel that we, as a technology education profession, should have open access to the research and scholarship of those with similar purposes. Nearly every engineering and technology-related organization has some involvement in education, but with many of them you must be a member to access their educational materials. As an example, I refer to the American Society of Engineering Education (ASEE). The ASEE Website (www.asee.org) allows free access to all of the papers presented at their conferences over the past decade or so. This is a valuable resource, especially to those working to integrate engineering concepts into technology education. However, the scholarly journal of ASEE, parallel to the *Journal of Technology Education*, is the *Journal of Engineering Education* and is available online through their Website only to members.

We have welcomed the input of engineers into the development of our curriculum standards and we are sharing these standards with open-access online. The engineering community has given significant support to us in many ways as well. We allow engineers to freely access and publish in the *Journal of Technology Education* without being a member of the sponsoring organizations. I propose that we extend this collaboration and freely and openly share the scholarly resources of our allied organizations that pertain to education for our mutual benefit and that of the students we serve. I cannot come up with any negative tradeoffs to this proposal. There is no evidence that the JTE lost paper subscribers when all issues were put online – those in the field who are

interested in research still want the paper copy, even though they do searching online. I am convinced that because of this open access we have exemplified, international authors became aware of the scholarship in the US and included the resultant findings in their own research, fostering international collaboration in the process. Increasingly, researchers are relying on the Internet for their resources, just as our students are. I would guess that resources available online are cited more often, to the benefit of the authors, the publishing journal, and the sponsoring organization. Let's make it a win-win game for all educators and students in technology, engineering, and design! Let's abandon the outdated paradigm and throw the doors to our scholarship wide open!

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