From the Editor

Merging, Converging, and Some Reflections on a Lava Lamp

Standard Oil Company was forced to break itself up into 34 separate entities in 1909 as a result of a lawsuit based upon the Sherman Anti-Trust Act of 1890. These entities did business rather independently from that milestone ruling until recently, when Exxon and Mobil oil companies merged. Mobil Oil was originally Standard Oil Company of New York (Socony) and Exxon was Standard Oil of New Jersey (Esso, sounds like "S. O.," for Standard Oil). Exxon, by the way, has struggled with monikers just as our field has, using Esso as well as Enco (Energy Company). Carter and Humble were also mixed in with the names due to further acquisitions (Henderson and Benjamin, 1996).

As dependency on Mideastern oil continues and oil supplies world-wide dwindle, it is quite possible that more mergers will occur. In fact, a likely scenario is that all of the oil companies will have to reinvent themselves as oil supplies become totally depleted and our transportation infrastructure uses alternative energy sources.

In similar action much later, the American Telephone and Telegraph Company (AT&T – "The Bell System") was forced to divest, creating a number of "Baby Bells." The year was 1984. These orphaned siblings started by supplying local telephone service while the mother company focused on long distance service. That, too, changed when the federal government allowed the siblings to supply long distance service as well. Not only that, but the new laws allowed telephone companies to supply television signals and the cable companies to supply telephone service. Then, suddenly, wireless telephone technology reached the hands of the consumers, with service at the beginning provided almost totally independent of the original Bell System. A few Baby Bells like Verizon jumped into the wireless market early and became leaders, while the mother company, AT&T, got into the wireless market and then rather abruptly bailed out when it sold the wireless end of its business to Cingular only a few months ago.

Beyond all this, who would have thought that IBM would get completely out of the personal computer manufacturing business as they did a few months ago? Who would have thought that Apple would become an online supplier of music, first for its iPod personal music player, and then for the rest of the world? And who would have thought that Apple would switch to a microprocessor from Intel, of the same family as most of the rest of the personal

computer world? Who would have thought that Black and Decker Corporation, the power tool namesake, would have gotten into the small appliance business by purchasing that product line from General Electric? Who would have thought that the tobacco giant, R. J. Reynolds, would get into the food business? Who would have thought that Chrysler and Daimler would merge?

The number of mergers in the business world has increased dramatically over the past several years. The rationale for these mergers is based upon business principles and includes such factors as reducing competition by joining together, economy of scale, building strength and power, and survival. Often mergers grow out of questions of "What business are we really in?" and "What business do we want/need to be in?" Questions like these are important ones for us to ask ourselves as well.

Aside from business mergers, but nonetheless often an influence, are convergences of technology. Associate Editor Mark Sanders often reminded me of the prediction that Nicholas Negroponte, Director of MIT's think tank Media Lab, made about the convergence of three technologies, represented by three industry sectors: the Broadcast and Motion Picture Industry, the Print and Publishing Industry, and the Computer Industry (see Brand, 1987, p. 10). His prediction has proven itself to have some validity, though the convergence is behind his prediction and is still occurring.

Technological convergence is also occurring between personal digital assistants (PDA's) and cellular telephones. Cell phones initially were just telephones. Then they began to adapt features of the PDA's, such as phone books, which became contact databases. Then came digital cameras built into the cell phones with the capability to send images to another cell phone or to the whole world via the Internet. Likewise, PDA's began to have cell phone capability, with the PalmOne Treo series being one example. Call these devices what you wish, but the technologies have converged into one.

The capabilities of faxing, printing, copying, and scanning have converged into a single machine that has been available for some time now. It surely makes sense, too, since the technology of all these functions rely together on digitizing an image. I am surprised that these all-in-one machines have not caught on more than the have, but I suspect that literate consumers realize how quickly the technology changes and when significant advances are made in one of the capabilities, it would require the replacement of the entire machine to realize the advantage. I am also surprised how my colleagues and I continue to print documents on the printers in our offices and then walk down to the centralized copier in the main office to make multiple copies. Networked copiers have been available for some time now and the cost will no doubt decrease as competition to include networking increases.

When I first started teaching, I was concerned about the diversity of courses that were offered in our field. It seemed to be a boundless mix of everything from automotive repair and woodworking to crafts and leatherwork. I felt elated when the field finally converged on the organizers of communication, construction, manufacturing, and transportation. Some theorists reduced these

organizers to three by converging construction and manufacturing into "production." Though this made theoretical sense, it was difficult to put it into teachable practice. A few textbooks tried to homogenize the two areas, but eventually it seemed that the first part of the book was manufacturing and the last part was construction, or vice-versa. It was a failed merger.

Similarly, there have been challenges in teaching transportation without making the fundamentals of power and energy a predominant part of the instruction. In thinking about this, I have always wondered why nearly every curriculum structure that we have developed has had only one level of organization (e.g., communication, construction, manufacturing, and transportation) when it seems that there should be at least two or three levels. Unlike the convergence that has occurred in some other school subjects, our curriculum has been diverged with the Standards (ITEA, 2000). It will be interesting to see if the medicine and agricultural areas from these Standards are converged in the future, either together with each other or into "production."

Over the years, I have observed the connections made with other constituencies and organizations. In the 1970s I learned about some efforts to connect with Junior Achievement (www.ja.org; also see May, 1954). It seemed like such a natural fit to our field, with their emphasis on entrepreneurship and our emphasis on the technical and managerial aspects of manufacturing. I recall the close relationships that we had with the Associated General Contractors and the Society of Manufacturing Engineers, and the assistance they gave to our curriculum development efforts in the 1970s, especially the *World of Construction* (Lux, D. G. and Ray, W. E., 1970) and *World of Manufacturing* (Lux, D. G. and Ray, W. E., 1971), respectively. I think about the Science, Technology, and Society (STS) movement that started in the late 1960s and how important our involvement in that effort seemed to many at the time (see, as a resource, http://www.chass.ncsu.edu/ids/sts/). In fact, Melvin Kranzberg (now deceased), a premier historian of technology, spoke at a conference of the American Industrial Arts Association (now the International Technology Education Association) and the Association published a significant work that he authored (Kranzberg, 1964).

The decade of the 1990s might be termed the Technology, Science, and Mathematics era where a number of efforts, often funded by the National Science Foundation (NSF), were underway. The emphasis was on integrating these three subject areas in a way that made sense to students and would motivate them to learn. I vividly remember when the principal of the junior high school in which I was teaching said that the only way to get "ordinary kids" (i.e., the vast majority) interested in science is through industrial arts (now technology education). The year was 1966, my first year of teaching. That belief led to a major project, with my colleague Mark Sanders, to integrate technology, science, and mathematics, nearly 30 years later (LaPorte & Sanders, 1995). Today, nearly 40 years later, I still believe in that notion but I still do not know how to do it in a highly effective manner.

The present decade, just past the half way point, seems to be characterized by alliances with engineering and educational technology, two disparate counterparts, indeed. A number of engineering projects have been funded by NSF and are currently in development. Two articles by Theodore Lewis, Professor at the University of Minnesota, have addressed engineering between the covers of the JTE; one appeared in the last issue and one is in this issue. Also in this issue is an article by Yaron Doppelt from Israel that has clear connections to engineering.

No one knows where our budding relationship with engineering will take us. In reflecting, though, about what I have read regarding this notion over the past couple of years, there is some confusion in my mind for it seems that some would have us in the business of preparing engineers at the secondary level rather than developing the technological literacy of the masses, albeit a vocational purpose instead of a general education purpose.

Clearly we draw from the same discipline base as engineering. Clearly engineering is starting to value hands-on problem solving like we have practiced from the beginning of our history. Clearly engineering has realized the importance of their presence in K-12 education. Clearly, engineering is the application of mathematical and scientific theory to the solution of practical problems. Rushing forward from the back of my mind, though, are the images of a relatively large number of students with whom I have worked over the years, at three land-grant universities, who transferred into technology education from engineering. They transferred precisely because they developed a grave disdain for the application of mathematical and scientific theory, at least the way in which it was taught to them in engineering courses. Engineering, though, is beginning to change the way in which they teach their future engineers and it is beginning to converge with the way in which we teach our future teachers of technology. The new master's degree/teaching licensure programs at institutions like Colorado State and Virginia Tech, that rely on students with undergraduate degrees in engineering, will provide us with an interesting test bed for research.

Stephen Petrina at the University of British Columbia has been promoting the merger of technology education and educational technology for several years. His initial arguments were presented in the JTE (Petrina, 2003) and he continues to develop them on the listserv for the Council for Technology Teacher Education. The commonality of purpose between these two areas has increased in recent years, with educational technology becoming more content based and literacy focused, and technology education becoming more reliant upon educational technology to deliver content, especially modular-type programs, and to engage students in the design process. Many technology teachers find themselves teaching computer use and even serving as educational technology experts in the school. Clearly there is a convergence in process.

In scanning newspapers and journals on mergers, a lot of factors are posited for their success. The one that seems most recurrent is the compatibility of cultures between the two entities being merged. In reviewing in my mind the linkages that might have taken place and did not, I can explain them away with

cultural differences, with varying strengths of argument. Perhaps, though, these potential mergers and convergences that failed to happen are just as they should be in our dynamic society, consistent with Toffler's (1970) notions of adhocracies—connections that come and go as political and sociological needs and interests change.

I have been driven by logic throughout my professional life. That is, if an idea did not make logical sense to me, then I could not support it and did not understand the intentions of those who did. They were the opportunists. They chased the money and the political power bases, regardless of what direction they might lead or how inconsistent they might be with the direction in which our field had decided to go. I abhorred them for not being orthodox. Now, in the autumn of my career, I realize that the opportunists are essential to our field, for they open new doors and new eyes to our work and its importance to society. There are tradeoffs to the relationships that the opportunists make, but there are equivalent tradeoffs to the actions of the orthodoxists, like myself.

I am mesmerized by "lava lamps." I watch the globules of "lava" split apart and then rejoin other globules in an endless cycle of merging and converging. No patterns are ever the same and the paths of motion are perpetually changing. It seems so much more complex to me now, though, than it did in the past.

A "Lava Lamp"

JEL

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