

References

- America's Network. (1997, October). *The ABC's of LNP: Everything you ever wanted to know about number portability, but were afraid to ask*. Cleveland, Ohio: Author. Retrieved July 23, 1999 from the World Wide Web: http://www.americasnetwork.com/issues/97supplements/100197lnp/100197lnp_inpabc.html
- Cole, M. (2000). *Introduction to telecommunications: Voice, data, and the Internet*. Upper Saddle River, NJ: Prentice Hall.
- Federal Communication Commission. (1996, July 2). *In the matter of telephone number portability*. (CC Docket No. 95-116). Washington, DC: Author. Retrieved July 22, 1999 from the World Wide Web: http://www.fcc.gov/Bureaus/Common_Carrier/Orders/1996/fcc96286.txt
- Federal Communication Commission, Common Carrier Bureau, Competitive Pricing Division. (1999, January). *Local telephone number portability*. Washington, DC: Author. Retrieved July 23, 1999 from the World Wide Web: http://www.fcc.gov/Bureaus/Common_Carrier/Factsheets/portable.html
- Federal Communication Commission, Common Carrier Bureau. (1999, May 27). *FCC considers strategies to address United States telephone numbering exhaust* (CC Docket No. 99-200). Washington, DC: Author. Retrieved July 16, 1999 from the World Wide Web: http://www.fcc.gov/Bureaus/Common_Carrier/News_Releases/1999/nrcc9032.txt
- Gable, R. A. (1999). *Telecommunications department management*. Norwood, MA: Artech House.
- Kennard, W. E. (1999, July 20). *The unregulation of the Internet: Laying a competitive course for the future*. Washington, DC: Federal Communication Commission. Retrieved July 28, 1999 from the World Wide Web: <http://www.fcc.gov/Speeches/Kennard/spwek924.html>
- Knauer, L. T., Tollin, L. A., Zachem, K. A., & Pastor, M. V. (1998). *Beyond the telecommunications act: A domestic and international perspective for business*. Rockville, MD: Government Institutes.
- Kuruppillai, R., Dontamsetti, M., & Cosentino, F. J. (1997). *Wireless PCS: Personal communication services*. New York: McGraw-Hill.
- Lynch, T. M. (1996). Telephony. In L. T. Knauer, R. K. Machtley, & T. M. Lynch (Eds.), *Telecommunications act handbook: A complete reference for business* (pp. 9-53). Rockville, MD: Government Institutes.
- Midwest Region Number Portability Administration Center. (n.d.). *Midwest region primer for local number portability*. Retrieved July 23, 1999 from the World Wide Web: <http://www.ported.com/midlnp.htm>
- Newton, H. (1998). *Newton's telecom dictionary* (14th ed.). New York: Flatiron.
- Peck, J. R. (Ed.). (1988). *A history of the telecommunications regulatory environment* (Industry Brief: MT10-620-101). Delran, NJ: Datapro Research.
- Rowe, S. H. (1999). *Telecommunications for managers* (4th ed.). Upper Saddle River, NJ: Prentice Hall.
- Shaw, J. (1998). *Telecommunications deregulation*. Norwood, MA: Artech House.
- Todd, K. P., Jr. (1999). A capsule history of the Bell System. In D. Massey (Ed.), *Tribute to the Bell System*. Atlanta, GA: Author. Retrieved July 28, 1999 from the World Wide Web: http://www.bellsystem.com/tribute/capsule_history_of_the_bell_system.html
- Wenders, J. T. (1987). *The economics of telecommunications: Theory & policy*. New York: HarperInformation.



Focus on Communication and Collaboration: Suggestions for Implementing Change in the 21st Century

Charles Linnell

If curriculum and teaching standards for technology subjects are to become a vital addition to the public school curriculum in the 21st century, then two important challenges must be resolved. The first is to communicate clearly, with solidarity, what technology education is and what technology educators do. The second challenge is

to prepare technology education teachers to collaborate in different school settings with teachers from different disciplines. Communication and collaboration efforts will teach public school students, educational policy makers, teachers, and others of technology education's cross-curricular value. School subjects such as language

arts, math, science, and social studies provide opportunities to develop the technology curriculum into the public school curriculum.

Communication

There has been considerable debate within the technology education community about its purpose and

mission (Volk, 1997; Wicklein, 1997; Zuga, 1993). Where is the profession going? Some of the central questions asked include the following:

1. Should the technology curriculum emphasize skills, technological systems and concepts, or a combination?
2. Where does it fit in the public school hierarchy? Can, and should, technology content be assimilated into the K–12 public school curriculum? If so, how?
3. Should technology teachers be the only ones to teach technological skills and concepts, exclusively? Or should preservice teachers, primarily elementary, have technological concepts, skills, and teaching strategies designed into their university curricula?

These questions, and others, need to be addressed in a succinct and proactive manner by technology administrators and practitioners.

The technology education profession is, and has been, immersed in an on-going change process for almost 20 years with varying degrees of success. Research has shown that changing established educational goals and curricula requires innovative change agents, facilitators, and coordinated strategies to assure success (Guskey, 1990). When teachers are involved in the educational change process, trained change agents can alleviate their personal concerns and anxieties. Two important factors in educational change theory are quality facilitation and trained, subject-specific facilitators who can be proactive and communicate well (Fuller, 1969). Bensen (1990), who studied curriculum change in technology, asserted, “To improve, one must change, and making change in any human endeavor involves some element of risk” (p. 3). After studying the concerns of technology teachers involved in the change from industrial arts to technology, the one concern that kept recurring most often was the anxiety that teachers felt when they were “mandated” to implement the new technology curriculum (Linnell, 1991).

The teachers were unsure of their abilities to master the requirements of the new “high tech” curriculum. The study found that after organized inservice activities and exposure to *proactive* change facilitation, the majority of the teachers were more confident and better prepared to work with the new curriculum. However, a substantial number were not. Openness to change has not always been one of our discipline’s strengths (or any educational content area).

The hesitancy and concerns that teachers have when they are involved in a curriculum change effort are usually concerns about their own ability to understand and work successfully with the anticipated curriculum requirements (Hall & Hord, 1984). These are serious personal concerns. In different locations specific technology teachers’ questions and concerns have been identified; in some places specific inservice and preservice strategies designed to assist teachers exist. Yet, the majority of teachers do not participate in state association activities, let alone alter the way they teach. Approximately one half of the teachers of technology subjects in South Carolina are members of the state’s technology education association. Only about one fourth of those are members of the International Technology Education Association (ITEA) and regularly attend the state association’s scheduled meetings. I contend that only with support from state government, proactive local education associations, qualified, enthusiastic, change facilitators, and an organized, well-funded public relations campaign will teachers be able to accept and take a personal interest in the technology curriculum. I also believe that this situation is not unique to South Carolina technology educators. However, there are some bright spots. Our neighbors, Georgia and Florida, have made funding technology subjects a priority. Their state teacher organizations and Technology Student Associations (TSA) are thriving and effective.

Technology professionals, from classroom teachers to the administrators

of the ITEA, are, historically, a fairly cloistered group. Their individual dedication, teaching, and research efforts are genuine and admirable. However, this hard work and fervor is going unnoticed by the public, specifically, public school teachers and administrators. This may stem from the fact that we do most of our communicating within our own profession, that is, *Tech Directions*, *TIES*, *The Technology Teacher*, *The Journal of Industrial Teacher Education*, *The Journal of Technology Studies*, *The Journal of Technology Education*, and others. In fact, how many other discipline’s research journals and mass-market publications, such as *Teaching K-8*, *USA Today*, and *Time*, have articles describing the processes, strategies, and positive student outcomes gained from the technology classroom and lab? Not many. The ITEA staff has been developing, and implementing, good public relations strategies. However, public relations campaigns are very expensive and, as Saunders (1999) suggested, “we” must get “political.” Saunders stated further:

If technology education is to realize its potential in the 21st century, we simply *must* become aggressively and outwardly political. Very little of real significance will happen in our field until we re-direct our energies and resources toward this task. (p. 26)

Collaboration and Flexibility

The lack of a clear curricular focus and the determination of some technology professionals to resist change does not bode well for our discipline. If the *Technology for All Americans* effort is embraced by the public schools in the United States, and K–12 students will be required to take courses that investigate technology, then technology as a field of study becomes important, a required part of all students’ education. However, if the *Technology for All Americans* movement is *not* accepted by the public, then we will need to do what we should have been doing since the change from industrial arts to technology: Collaborate with teachers from different subjects.

Understanding the objectives of a course of study is important for students and the public. Some basic questions make this point clear. What are the objectives of math and science education? What is the purpose of studying different cultures? Why should students be familiar with great works of literature? What is the purpose of vocational education? Ask yourself these questions, and the odds are that for each one you will have your own neat, compartmentalized understanding. However, when you ask someone, "What is technology education?" the answer could be anything. The answers are usually "computers" and/or "information or educational technology." This misunderstanding is slowly, and in some locations rapidly, blurring the quality goals and objectives of the technology curriculum, and renaming, reassigning, and even closing many technology classes and departments (Volk, 1997). Technology professionals have traditionally been "masters of their domain" with their own unique pedagogy, skills, and resources. However, if they want to represent a legitimate subject in schools yet still have a unique, collaborative reputation, then they must be prepared to accept change and communicate a willingness to be flexible.

Some of the public's (and even the profession's) difficulty in understanding who we are stems from the lack of a clear curriculum definition, course and

subject titles, and focus. Some of the different technological subject area titles are Industrial Arts, Industrial Arts Education, Industrial Technology, Industrial Technology Education, and Technology Studies, among others. If professionals in the technology field do not have a clear understanding of our mission, then how can we expect the general public to buy into the profession's efforts to standardize the curriculum?

It used to be that our mastery of techniques set us apart from other school subjects. Not any more. Technological innovations and changes are happening almost every day in business, industry, and technology. In order to keep up, *everyone* will have to retrain and reeducate themselves if they want to keep abreast of technological innovations. We have moved beyond the competitive mind-set of "America First." Now we realize that for the world's economies and social structures to succeed, we will *all* need to collaborate. It is the same with technology education. The goal of our profession is still to produce students who are conversant with different aspects of technology. Hopefully, by collaborating with teachers from other subjects and at all grade levels, the practical value of our discipline will become an integral part of the public school curriculum. The technology education profession must not hesitate to inform the public and the

education community that we are here and that we have unique skills, strategies, and content that will benefit the education of every student.

Recommendations

Hopefully, these following recommendations should assist the implementation of technology education and increase the awareness of technology educators:

1. Increase and improve communication and collaboration efforts with K–12 public schools via publications, inservice workshops, demonstrations, and by assisting future teachers in the implementation of technology concepts and activities.
2. Use the same positive communication and change facilitation strategies within the technology education profession, that is, to promote the value of cross-curricular collaboration, to improve solidarity and professional pride in professional technology education organizations, and to prepare future technology education teachers to confidently accept and implement change.

Dr. Charles Linnell is an associate professor at Clemson University in the Department of Technology and Human Resource Development. He is a member of Alpha Chapter of Epsilon Pi Tau.

References

- Bensen, J. M. (1990). Quality and service: Twin forces for developing excellence. *Technology Teacher*, 49(5), 3–4.
- Fuller, F. F. (1969). Concerns about teachers: A developmental conceptualization. *American Educational Research Journal*, 6(2), 207–226.
- Guskey, T. R. (1990). Integrating innovations. *Educational Leadership*, 47(5), 11–15.
- Hall, G. E., & Hord, S. M. (1984). *Change in schools: Facilitating the process*. Albany: State University of New York Press.
- Linnell, C. C. (1991). *Evaluating the stages of concern of North Carolina technology education teachers with the curriculum change from industrial arts to technology education*. Unpublished doctoral dissertation, North Carolina State University, Raleigh, NC.
- Saunders, M. (1999). Politics as usual. In M. R. Karnes, Technology education in prospect: Perceptions, change, and the survival of the profession. *The Journal of Technology Studies*, 25(1), 11–35.
- Volk, K. (1997). Going, going, gone? Recent trends in technology teacher education programs. *Journal of Technology Education*, 8(2), 67–71.
- Wicklein, R. C. (1997). Curriculum focus for technology education. *Journal of Technology Education*, 8(2), 72–79.
- Zuga, K. (1993). A role for alternative curriculum theories in technology education. *Journal of Industrial Teacher Education*, 30(4), 49–67.