Reaction

Questioning the Language that We Use: A Reaction to Pannabecker's Critique of the Technological Impact Metaphor

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In Volume 3, #1 of the *Journal of Technology Education*, Pannabecker (1991) identified shortcomings in the language that has shaped perspectives within technology education, and raised an issue for dialogue. This essay is intended to extend Pannabecker's critique to include the metaphors of autonomous and advancing technology, and their supporting ideology of technological progress. Reasons for extended critique and a summary of contemporary debates on these issues in the history of technology are provided.

According to Pannabecker, the metaphor of "technological impacts," often used by technology educators to describe the relationship between technology and society, has shaped a "simplistic and inflexible" view of that relationship (p. 43). This metaphor has reinforced a mechanistic and deterministic view of technology; indeed, a view suggesting that technology determines social and cultural direction. Society and individuals merely roll with, and adapt to technological change.

Whether those embracing the "impact" metaphor would logically follow it toward this conclusion is not the issue. However, it is important that we become conscious of the assumptions that may be hidden within our language, and of the constraints that they place on our imagination and discourse, questions we ask, or problems that command our efforts. Dr. Pannabecker should be commended for his critique of the language often used in technology education and his suggestion that the impact metaphor be abandoned for its lack of complexity.

I would add that this metaphor and others be abandoned for additional reasons. While self-criticism of the way we talk about technology is certainly within the range of our obligations as educators, might it also be a key ingredient for engaging in dialogue with others who have similar interests? All

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things considered, our perspectives on technology, framed by metaphors that we use, can appear anachronistic and ahistorical. Assumptions within our language may in fact be contradictory to messages we wish to convey to students and may limit possibilities for meaningful dialogue with historians, philosophers, and others who are involved in the study of technology.

Closely related to, but excluded in Pannabecker's critique, are the issues of autonomous and advancing technology, technological progress, and their sometimes uncritical acceptance and use in technology education. Autonomous technology suggests that technology is self-determining and has a life of its own. This notion was prevalent in Ellul's (1962) critique of Western cultural values. Ellul argued that technology has become autonomous in that it is governed by itself rather than by any definition of cultural values. Ellul proposed a philosophical theory to explain his notions of technological autonomy and determinism. In this theory, the relationship of technology to culture is, as Pannabecker explained, understood in terms of a one-way causal impact. Technology, self-governing, is advancing forward. If autonomous, then the question of shaping the form, substance, and direction of technology through democratic participation is irrelevant. If advancing, one can merely hope to get out of its way or catch up with it. These notions tend to augment political passivity, as there is no point in attempting to direct an entity with a forward autonomous momentum. Technology is therefore considered to be beyond human control. Certainly in technology education, the consequences of this logic are considerable when one accepts the development of a technologically astute citizenry with democratic initiative as fundamental to the cause and movement.

Notions that technology autonomously advances and, in effect, impacts either positively or negatively on society are reflections of an ideology in which new technology is assumed to be socially progressive. Within frames of reference constituted through the ideology of technological progress, technology is "modern, Western, and science-based, [and] related to culture as an independent driving force demanding adaptive change from all other cultural institutions" (Staudenmaier, 1985, p. 144). Science and technology autonomously progress in a forward motion and, given these forces, people and cultures are expected to conform. Those who choose to question this progress are questioned themselves and labelled modern Luddites. Endorsement of this ideology is an endorsement for social inaction toward technological issues, as expertise is viewed as a requisite for action. Norms that are technical, such as efficiency and speed, are generally the only measures of technological progress. Hence, cross-cultural comparisons are at-base, generalizations related to superiority or inferiority. From a cultural relativist perspective, one can see how this ideology inspires something less than an affirmation of unique cultural values (Adas, 1989; Lasch, 1989). Human dignity, integrity and the value of life are blurred by the imperatives of technological progress (Glendinning, 1990; Mumford, 1964; Winner, 1986). As positioned in this ideology, the appeal of the impact

and autonomously, advancing technology metaphors is also apparent (Marx, 1987; Staudenmaier, 1985, 1989).

These metaphors and their supporting ideology are salient in literature and popular rationales supporting technology education (e.g., Waetjen, 1987; Wolf, 1990; authors in: Dyrenfurth & Kozak, 1991; Wright 1991). These notions are deep rooted and have been socially constructed; consequently, we all share in their origins and use. The history of industrial education is characterized by a continuum of arguments for the educational legitimacy of both the content and the process of technology. These arguments have been understandably emotional and often predicated on their sensational appeal to the public and body politic. Also, considering the remarkable persistence of technological progress, transcending this ideology has been, and remains a struggle. This helps to explain the irony in the fact that as a profession, we have historically succumbed to this persistence while proclaiming that critical insight into personal and social interaction with technology is imperative in a democratic society. Similarly, credulity must also be seen as part of the explanation for the metaphors that we've employed. As Frey (1990) wrote, few of us have neither been prepared nor prepared ourselves for sufficiently addressing the nature of technology, and as a result, we risk being advocates of a "superficial curriculum" (p. 69). Our cause has remained deserving and our arguments wanting.

It seems then, that our educational mission has historical consistency and a form of contemporary consensus. However, our rationales have been inconsistent with our mission and have often succumbed to the ideology of progress. The logic of a rationale that is driven by economic rhetoric (e.g., international competitiveness demands technology education) and academic rhetoric (e.g., technology is a discipline) is problematic. The competitiveness rationale clouds a unique identity for technology education as vocational educators expand their curricula to reflect workforce and workplace needs. The notion of international competitiveness can also be interpreted as a popular metaphor for technological progress embraced during the past decade (Hill, 1989). At the same time, the logic of drawing on the idiom of the academic disciplines is flawed. Characteristically, disciplines are bound to methods of inquiry through which knowledge is generated, tested, and ultimately organized (Luetkemeyer, 1968; Thompson, 1978). Historians of technology, in their interpretations of human interaction with technology, have yet to discern anything that is indicative of "the technological method"! Likewise, engineering is not dependent on a single intersubjective method, and employs methods ranging from rule-of-thumb to scientific. "The technological method" defined by educators (e.g., Barnes, 1989, 1990; Todd, 1990; Savage & Sterry, 1990) is bereft of any historical or even contemporary basis. If it is a new phenomenon, it has avoided empirical testing. Having benefited from rhetoric, "the technological method" has organizational momentum and now seems somehow fit for assimilation into the minds of unknowing students. "The technological method" may be related to the epistemological problem of "how we, as a community of educators come

to understand technology" as much as any language problem. Nonetheless, the question of "what language shall we use to talk about technology?" is, as Pannabecker suggested, crucial. This question has been central to historians of technology who, like technology educators, have struggled with traditions and their role in the academic community.

To be sure, critical commentary directed toward technology was present in the first half of the century (e.g. Mumford, 1934), but only lately has a body of scholarship been developed with a critical stance on this issue. Within the Society for the History of Technology (SHOT), there has been a commitment to rescue the history of technology from its mythic "heroic inventor", "success story", and "boundless progress" tradition. Mostly through the influences of SHOT, historians have worked to critically interpret technology in its social and cultural context. This commitment has generated historiographic and philosophical debate along with consensus on some issues (Cutcliffe & Post, 1989).

The "technological impacts", and "advancing technology-lagging society" metaphors, ultimately questions of causation in history, reflect the historical explanations of Ogburn (1923) and Burlingame (1938). Most historians of technology would conclude that it's "futile to attempt to trace social changes to technological innovations" (Daniels, 1970, p. 8). Not surprisingly, these popular conceptions of an earlier era are still adopted by general American historians. Historians of technology would cite a lack of any historical evidence to support notions of either autonomous technology or the related theory of technological determinism. The historical record does *not* suggest that technology "feeds on itself", advances autonomously, or has a life of its own. As for determinism, these historians have argued that "technology, in a word, is used to help people do better what they were already doing for other reasons, and what they are doing for other reasons determines the nature of their future technology" (Daniels, 1970, p. 8). Kranzberg (1986) suggested that the case is not so closed, and the theory of technological determinism would challenge historians for some time. In general, most have no problem with the idea of "reciprocal causation. . . technology and society mutually influence each other" (Layton, 1970, p. 29). Technologies have historically been reflections and manifestations of cultural values. They have been, albeit often faulty and always through the involvement of enfranchised and disenfranchised groups, designed, engineered, and managed by people.

The ideology of technological progress has recently received considerable attention in both the history and philosophy of technology. Critiques have focused on material progress as well as those technologies that help us to achieve less tangibles such as security, freedom, control, longevity, and justice (Adas, 1989; Goldman, 1989; Glendinning, 1990; Hill, 1989; Mumford, 1964; Winner, 1986). Because of the various facets to technological progress, comments on any genuine concensus would be suspect. Nonetheless, Staudenmaier (1985, 1989, 1990) and Smith & Reber (1989) can be read as synoptic summarizations on contextual interpretations in the history of technology. Staudenmaier (1989) maintained that

> historians of technology labor to situate each artifact within the limited, historically specific, value domains from which they emerged and in which they operate. They speak of "technologies," and not "Technology," of cultural options rather than inevitable progress. This approach attempts what history traditionally holds dear, the liberation of human beings by demythologizing false absolutes and by paying attention to the human context of change. . . . Responsible technology talk fosters a language of engagement where "Technology" is understood to be a variety of particular technologies, each carrying its own embedded values, each related to its own unique cultural circumstance. It is a language that reweaves the human fabric, reintegrating method and context, and inviting us all, technical practitioners and ordinary citizens alike, to engage in the turbulent and marvelous human endeavor of our times (pp. 285, 287).

Language that reflects the ideology of technological progress, with its suggestion of inevitability, obscures underlying human motives and an assessment of who is served and who is left out. According to Staudenmaier, only by adopting a critical stance toward technology and its concomitant talk of progress can we begin to act responsibly and democratize the technological design and decision making process.

One can get a sense of the alternatives to the language of progress and determinism by attending to the history of technology (e.g., Smith & Reber, 1989; Staudenmaier, 1985, 1989, 1990). It's evident that we've a lot to learn from historians about the "what" and "why" of technology. So do historians have much to learn from technology educators about the troublesome, yet rewarding human experiences of teaching and learning how to use and create technology. The use of the history of technology in technology education, and specifically teacher education programs, should be reconsidered. This issue, raised periodically in the profession, remains unresolved (DeLuca, 1976; Frey, 1990; Miller, 1984). If the history of technology weren't so rich in scholarship and relevance, one might be inclined to agree with Bensen (1984) who exclaimed that "if we. . . teach only the historical aspects of our technology, we are doomed to oblivion" (p. 4). The reasons for our course to oblivion are complex and the road has been at least partially paved with good intentions. It's as much a factor of "how" as it is of "what we teach" that will conjure up similar specters. By locating ourselves within a larger community that includes historians, philosophers, and sociologists, we can stay attuned to contemporary discourse on technology. It might be wise to reflect on Pannabecker's critique of technological impacts and the validity of language or rationales that may contradict our mission or inhibit meaningful dialogue.

References

Adas, M. (1989). *Machines as the measure of men: Science, technology, and ideologies of western dominance*. Ithaca, NY: Cornell University Press.

Barnes, J. L. (1989). Learning to solve tomorrow's problems. *The Technology Teacher*, *48*(6), 25-29.

Barnes, J. L. (1990). A future perspective for defining and organizing the study of technology. *Journal of Epsilon Pi Tau, 16*(1), 26-30.

Bensen, J. (1984). The call for excellence. *The Technology Teacher, 43*(8), 3-5.

Burlingame, R. (1938). *March of the iron men: A social history of union through invention*. New York: Grosset & Dunlap.

Daniels, G. (1970). The big questions in the history of American technology. *Technology and Culture, 11*(1), 1- 21.

Cutcliffe, S. H. & Post, R. C. (Eds.). (1989). *In context: History and the history of technology, essays in honor of Melvin Kranzberg*. Bethlehem, PA: Lehigh University Press.

DeLuca, R. (1976). Should industrial arts teachers study the history of technology? *Man/Society/Technology, 33*(6), 169.

Dyrenfurth, M. J. & Kozak, M. R. (Eds.). (1991). *Technological literacy, 40th yearbook of the Council on Technology Teacher Education*. Peoria, IL: Glencoe.

Ellul, J. (1962). The technological order. *Technology and Culture, 3*(4), 394-421.

Frey, R. E. (1990). Thinking about technology education. *Journal of Industrial Teacher Education, 27*(4), 67-71.

Glendinning, C. (1990). *When technology wounds: The human consequences of progress*. New York: William Morrow and Company.

Goldman, S. L. (Ed.). (1989). *Science, technology, and social progress*. Bethlehem, PA: Lehigh University Press.

Hill, C. T. (1989). Technology and international competitiveness: Metaphor for progress. In S. L. Goldman, (Ed.), *Science, technology, and social progress*, (Pp. 33-47). Bethlehem, PA: Lehigh University Press.

Kranzberg, M. (1986). Technology and history: "Kranzberg's laws." *Technology and Culture, 27*(3), 544-560.

Lasch, C. (1989). The idea of progress in our time. In S. L. Goldman, (Ed.), *Science, technology, and social progress* (pp. 229-239). Bethlehem, PA: Lehigh University Press.

Layton, E. (1970). Comment: The interaction of technology and society. *Technology and Culture, 11*(1), 27-31.

Luetkemeyer, J. F. (1968). Introduction to the yearbook. In J. F. Luetkemeyer, (Ed.), *A historical perspective of industry, 17th yearbook of the American Council on Industrial Arts Teacher Education*, (Pp. 15-30). Bloomington, IL: McKnight & McKnight.

Marx, L. (1987). Does improved technology mean progress? *Technology Review, 90*(1), 33-41, 71.

Miller, L. (1984). What should industrial teacher educators learn from the history of technology?. *Journal of Industrial Teacher Education, 53*(22), 53-54.

Mumford, L. (1934). *Technics and civilization*. New York: Harcourt, Brace & World.

Mumford, L. (1964/1970). *The myth of the machine- The pentagon of power*. New York: Harcourt, Brace, and Jovanovich.

Ogburn, W. F. (1923). *Social change with respect to culture and original nature*. New York: Huebsch.

Pannabecker, J. R. (1991). Technological impacts and determinism in technology education: Alternate metaphors from social reconstructivism. *Journal of Technology Education, 3*(1), 43-54.

Savage, E. & Sterry, L. (1990). A conceptual framework for technology education. *The Technology Teacher*, *50*(1), 6-11.

Smith, M. R. & Reber, S. C. (1989). Contextual contrasts: Recent trends in the history of technology. In S. H. Cutcliffe & R. C. Post, (Eds.), *In context: History and the history of technology, essays in honor of Melvin Kranzberg* (pp. 133-149). Bethlehem, PA: Lehigh University Press.

Staudenmaier, J. M. (1985). *Technology's storytellers: Reweaving the human fabric*. Cambridge: The Society for the History of Technology and The MIT Press.

Staudenmaier, J. M. (1989). Perils of progress talk: Some historical considerations. In S. L. Goldman, (Ed.), *Science, technology, and social progress* (pp. 268-293). Bethlehem, PA: Lehigh University Press.

Staudenmaier, J. M. (1990). Recent trends in the history of technology. *The American Historical Review*, *95*(3), 715-725.

Thompson, J. C. (1978). The disciplines and their structure: A review of the proposal. *School Science and Mathematics*, *78*(7), 608-614.

Todd, R. D. (1990). The teaching and learning environment. *The Technology Teacher, 50*(3), 3-7.

Waetjen, W. B. (1987). The autonomy of technology: A challenge to education. *The Technology Teacher*, *46*(6), 7-14.

Winner, L. (1986). *The whale and the reactor: A search for limits in an age of high technology*. Chicago: The University of Chicago Press.

Wright, P. H. (Ed.). (1991). *Technological Impacts: Proceedings of Technology Education Symposium XIII*, October 24-26, 1991 at Indiana State University, Terre Haute, IA.

Wolf, L. J. (1988). Seven understandings with technology. *Technical Education News, 48*(1), 3-6.