To Change Perceptions of Technology Programs

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Educational Program Quality

The classic definition of quality is "the ability of a product or service to consistently meet or exceed a customer's expectations." An important element of the definition, customer's expectations, requires further defining since customers value certain aspects of a product or service and they therefore associate those aspects with its quality.

Product or service quality has many facets. Quality might include the following elements:

- Performance or the main characteristic of the product or service.
- Aesthetics, which include the "look and feel" of the product or service.
- Special features of the product or service.
- Conformance or how well the product or service aligns with the customer's expectations.
- Safety, which includes the element of risk of injury or harm.
- Reliability or the ability to consistently deliver the intended results.
- Durability or the useful life of the product or service.
- Reputation of the product or service.

Different customers will have different expectations of a product or service based on the relative value they place on these components at a given moment in time. To make a determination of the quality of an educational program, one must identify the customers and their expectations of the program as they relate to the facets they deem most important. This is particularly true when a program, such as technology education, purports a significant change in it focus, content, and importance. In essence, the perceived quality of the new program will be influenced by the reputation of the program it has replaced, its academic home, and the faculty associated with the program.

Perceptions: The Startling Truth (Expressed on a University Campus)

- "I wish you guys would just keep teaching shop" (engineering technology faculty).
- "High schools must have a place to put low performing students" (trade and industry teacher educator).
- "A vital and important part of the university for giving students who don't succeed in business, engineering, and computer science a second chance" (director of university academic services).
- "Vocational education" (engineering department chair).
- "Occupational training program" (engineering faculty).
- "You don't have qualified faculty who can teach the newer technologies" (dean of the business college).
- "You are a blue collar college in a white collar university" (university's alumni organization).
- "The College of Technology is where you go if you don't know what you want to do" (nontechnology student tour guide).
- "Technology teacher preparation programs don't care and are nonproductive" (state administrator).
- "Not doing enough to recruit new teachers" (high school technology teacher).
- "Irrelevant" (dean of the college of education).
- "Teacher training programs are becoming increasingly irrelevant" (school district administrator).
- "Without serious scholarship, the unit does not contribute to the mission of the university, except in student credit hour production" (senior administrator of the university).

As I reflected on the comments, I realized that they all had different expectations of what technology programs should do and that these expectations were based on distorted mental images of technology education. I surmised that if I tried to improve the image of my program based on their responses, I would never win them over. In fact, if these indeed were the perceptions of our programs, we had already lost. In his summary of the events that led to the closing of an important technology teacher preparation program, Erekson (1993) said:

> Trying to speak objectively, it is not difficult to understand why the department was eliminated. The department had several open lines, the curriculum was outdated, and only a few faculty were involved in scholarly activities that were expected of faculty at the "flagship" campus in the state system. This is a chronology of what happened at Maryland and will continue to happen at other places where faculty do not update curriculum, are not involved in scholarship, and are not unified in their direction. (p. 16)

But, what about the facets of a program they do not know about? Aren't questions of quality related to past product perceptions and not to what ought to be? Expectations and statements of quality based on outdated models tend to perpetuate the perceptions and not reality. Is it possible to instill a new image of what technology education is or ought to be?

Mental Models

Mental models, as described by Senge (1990) in *The Fifth Discipline*, facilitate the organization and integration of complex dynamic events and discrete information into streamlined frameworks. We use mental models to summarize the myriad data and experiences we encounter for retention and rapid access. Limited amounts of information trigger the recognition of a pattern or similarity to other experiences (mental models). Rather than processing and analyzing all of the details of a new event, we make a leap of abstraction that this new event is similar to. We then draw conclusions based on our mental models, and our subsequent actions are based on those conclusions. Mental models are valuable when the assumptions and beliefs they are based on are appropriate and true and detrimental when they are based on false assumptions or the leap of abstraction is incorrect.

The legitimate use of mental models for decision making requires the ability to reflect on our strengths and weaknesses and to know how our experiences have shaped our mental models. This self-understanding is important because our perceptions and eventual actions are based on the mental models we hold. As technology educators, we must always intentionally challenge our mental models and those of our colleagues. Critical reflection and dialogue allow us to expose and correct the assumptions and constraints that our mental models may have assimilated. Critiquing our mental models can lead to decisions that will transform the way we teach, what we teach, and why we teach.

A Vision of Technology Education As It Ought to Be

A vision is an image of life as it ought to be or how we would like it to be. Reality is how life is. The discrepancy between our vision and reality can be reduced in one of three ways. First, we can compromise the vision: "That's just a dream, be realistic." Second, we can distort reality: "It's not that bad; they just don't know. We are the university's best kept secret." Third, we can progress towards the vision. The first two alternatives are unacceptable. To move from reality to the vision requires a clear understanding of the current situation and a clear description of the vision. We must be brutally honest about the present and eternally optimistic about the future.

The International Technology Education Association's (ITEA, 2000) definition of technological literacy is "the ability to use, manage, assess, and understand technology" (p. 9). In an exploration of my mental model of technological literacy (Hansen, 2001), I identified three statements that facilitated the process of defining the personal importance of technological literacy and technology teacher preparation:

- Technology can be a powerful tool for helping individuals achieve personal and shared goals.
- Technology ought to alleviate human suffering and promote social justice: to help people "make a difference" in their worlds.
- People must have the knowledge and skills to evaluate and decide on appropriate courses of action when confronted with problems.

A synthesis of these ideas produces the statement that technological literacy is an individual's ability to adopt, adapt, invent, and evaluate technological solutions to positively affect his or her life, community, and environment.

Technological literacy empowers people to live life well and to positively influence their environment. It enables them to not only do what they might not otherwise be able to do but also to become what they might not otherwise be able to become. It is the concept of empowerment that should guide the development and implementation of technological literacy programs. It is individual empowerment that unites the concepts and focuses my passion. Empowered individuals, as it relates to technological literacy, would exhibit several characteristics that clarify the concept.

I believe people who are technologically literate would:

1. *Perceive themselves as capable* of learning about technology to achieve specific objectives and extend their influence in the world, even when confronted with unknown and ambiguous situations.
2. *Exhibit a willingness* to (a) take control of their decisions, (b) invest time and energy in achieving solutions, and (c) take necessary risks to explore divergent options. In short, they would not, nor would they want to, leave these kinds of decisions to others.
3. *Have an adequate knowledge and skill base* to seek, evaluate, and implement technological solutions. They would be able to determine the discrepancy between what they know and what they need to know to achieve appropriate solutions.
4. *Rely on their abilities and knowledge to use technology* to meet personal and shared goals and to make a positive difference in the world.
5. *Reflect* on (a) how and why they use technology as they do, (b) how they and technology interrelate with their surroundings, and (c) the technological strategies they use to achieve their objectives.

Technological literacy fosters (a) self-efficacy, (b) rational decision making, (c) focused knowledge and skills acquisition, (d) critical application, and (e) reflective

practice. This is the model of technological literacy that captures its profound importance. Literacy in technology is much more than the ability to use this or that tool, machine, process, or system. It is the development of human potential and influence through technology. These are the identical characteristics we expect from reading, writing, mathematics, science, and social studies literacy: characteristics that empower success.

So What?

As technology educators, we must consider the legitimate outcomes of our technological programs. We should be concerned with the results of the future technological decisions of our students and their students. Few of us realize the ubiquitous nature of the technology in our lives. We tend to treat technological progress as if it is a natural law that can be neither managed nor influenced. Yet, as we verbalize this thought, we sense that something is wrong. We intuitively understand that technology can improve human life, and we also know that our technologies can distort and destroy human life. It is our place to ask: What does it mean to live, as humans, in a technologically prolific world and how should this affect the implementation of technology education programs? Naisbitt (1999) elegantly stated:

> To love technological progress means that we should cherish it, see its faults and triumphs, heed warning signals, admit mistakes, be open and compassionate, watch, listen, face problems squarely, get philosophical, set standards, question standards, review standards, be informed, and welcome opinions from all professions and denominations. If we love technology we will be careful with it. We won't be reckless. We can enter aware and receptive into a dialogue about technology. We will begin to *nurture* the power of technology instead of rejecting it (as do so-called technophobes) or blindly embracing it (as do technophiles). (p. 4)

The study of how technology is developed and applied to meet human needs and wants and to drive economic prosperity must *not* be constrained to the techniques of designing, using, and producing artifacts and systems but must include the promotion of the rights of all humans: life, liberty, and the pursuit of happiness. The study of technology must encompass an understanding of technology that goes beyond technical skills and techniques. It ought to be a basic and essential element of a person's general education. In addition to literacy in mathematics, science, reading, and writing, we, as well as our students, must become technologically literate.

Technological Literacy: A Solution of Global Proportions

As the proliferation of technology continues at unprecedented rates, individuals and societies will be confronted with critical issues as a result of their inability to appropriately adopt, adapt, invent, and evaluate technological solutions to personal, community, and global problems. We are in the midst of a new revolution, the *genome revolution*, which will dramatically affect humankind in unforeseen ways. We not only have the power through this new technology to determine who and what will exist in the future but we can now control the characteristics of future generations. We, and our students, are ill equipped and unprepared to make the kinds of decisions we must make as the genome revolution progresses. Who will prepare the youth of today for the decisions of tomorrow?

The decisions to effect solutions using this technology will be increasingly left to the science and technology experts, those who advise the politicians, since the average person, the technologically illiterate, will be unable to understand the technology. The responsibility and authority to influence the direction and mechanisms for individual and societal fulfillment will be wielded by an increasingly smaller group of people. Human freedom and action will, as a result, be constrained. The solution to this problem is not the unilateral limitation of technology but the development of a technologically literate citizenry: a citizenry capable of making informed decisions to use technology as a powerful tool for reaching personal and shared goals and for making a positive difference in the world. The success of humanity in the 21st century is contingent on a technologically literate population making sustainable decisions.

One of the functions of a leader is to see what others do not see. Many times we don't know that we should be looking for something. Other times we know we should be looking but don't see what we think we are looking for. Oftentimes we look and see. Other times we look at something so often that we fail to pay attention to it. I suggest that deep within each technology educator is the underlying belief that technological literacy is essential to human development and the pursuit of our most basic and universal human goals and that this belief is the hidden mental model that motivates us. It is this vision that technology education programs must capture and promote. It is this understanding of the importance of technological literacy that ought to guide us in our curriculum development, research, and teaching.

Technology education focuses on innovation. Innovation, though, is often stifled because one becomes fixated on the traditional solutions to problems. Traditions help us transfer our experiences and wisdom from one generation to the next and also help us to not succumb to fads. But, adherence to tradition often leads to traditionalism, which seeks to perpetuate tradition, oftentimes losing the very meaning of the traditions it seeks to protect. We often react to the need for change not by developing new paradigms but by patching up old ones. As much as one desires to be innovative, the reality is that it is much harder to forget the old ways than it is to create new ways. We must be careful to not let current and past perceptions (mental models) and practices thwart our efforts to develop a technologically literate citizenry.

Now I know why I am in this profession. First, it is because my technology teachers helped me develop some of the characteristics of technological literacy. Second, future civilizations depend on the essential knowledge and skills we take into the future. I now choose to make a difference, in my current world and for the future, by developing these characteristics in others. Whatever I can do to facilitate the development of these characteristics is, indeed, a worthy and noble effort. It is a vocation I can commit to with vision, passion, and focus. It is this vision that will guide the development of my technology teacher program.

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