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Editorial

The Human Tendency to Be Technical

Ronald Hansen

Our social and technical history, albeit contested, is our culture as human beings. Yet, it (the technical component) goes unclarified and untold in many ways. To find clarification and "understanding," this research revisits the history of technical learning in and out of schools. (Bennett, 1926, 1937). Case study information from a technical-minded school headmaster is also analyzed in order to clarify a human tendency that is central to understanding how technical education is or is not embraced in the schools.

The concept "technical thinking and learning" is used as way to define the aptitude, ingenuity, and penchant for solving practical problems that technical educators employ in their work (Autio and Hansen, 2002). How do technical people feel about their learning, as individual human beings and as teachers? What do they know? The literature, especially the education literature, does not reflect the passion much less the clarification of what it means to "be technical."

One concern of technical or practical educators is captured in the following question. What is technical learning and in what form does it belong in the schools? The literature (Hansen, 2000; Layton, 1993; Pannabecker, 2004) does confirm that the question is not a new one. It was raised and debated vigorously 200 years ago, just as it is today. Yet questions of nature and form persist, making policy analysis almost impossible. The purpose of this analysis is to probe the roots of technical learning and thinking (TLT) and, in the process, pose questions about learning generally. Why is academic learning so dominant in schools and technical learning not? The personal writing of a subject or subjects about critical incidents (Cole, 1991 ; Tripp, 1993) in their lives provides one method of collecting evidence. An historical analysis is another (Kaestle, 1988).

Long before schools as we know them today Greek philosophers like Plato and Aristotle, debated the purposes and types of human learning. From the

R. Hansen (hansen@uwo.ca) is an Associate Professor with the Faculty of Education at the University of Western Ontario, London, Ontario, Canada.

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earliest record one can trace the beginning of academic thinking. Plato wrote about the difference between learning as a purely mental activity versus learning through physical, spiritual, and mental activity. His view was that matters of the mind were more important than matters of the body. Aristotle's analysis was more sophisticated. He differentiated between episteme (theory), techne (technique), and phronesis (practical wisdom). To Aristotle there was an equal amount of intellectual virtue in all three areas. Today, modern schools are operated, almost exclusively, on academic or epistemic thinking. School curricula are, especially at the secondary and tertiary levels, tied to the knowledge disciplines developed over the last three centuries in universities. Technical thinking and learning (learning through experience as well as knowledge), by comparison, has tended not to be a valued method, let alone ideology, for learning.

The following quote from a woodworking teacher provides some insight into one person's tendency to learn technically.

> …it must have been when I graduated from secondary school. At age 19 I decided to spend a year at a practical school in a class that worked with building furniture. Through that year I got to know the inside of a real handcraft with its standards and qualities. It was very meaningful and from that time I have had this tendency to look upon all things in life the way a carpenter does, which I think is a very useful perspective; because it is both realistic (the chair has to be stable) and aesthetic (a beautiful chair is lovely to own), it responds to all sides of the personality in a way that theoretical subjects often lose.
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> So when I treat my wife in a carpenter's way or make my lyrics (pianist) the same way or if I run this school according to carpentry standards I think the results often become successful. Besides, my dream is, when I am to retire as an old man, I want to be living as a happy carpenter. In fact this thought helps me going good through my days as a headmaster.
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> *Peter (pseudonym) is a technical teacher and headmaster, 2003*

Peter's TLT tendency is no different than what children experience at the beach. They attempt to build castles and other imaginative things out of water and sand. Is this not being technical? The journal entry from Peter, a fifty year old, is revealing. When he writes "I tend to look upon things in life the way a carpenter does" he is describing his preference for technical thinking and learning. The engineers and technicians who completed the twenty-two mile tunnel under the ocean to join the two nations of England and France were also being technical. The instinct being displayed by both children and adults is the same instinct. It is an inherent biological or genetic given that we attempt to modify the natural environment around us to improve, or experiment with improving, life's comforts and nature's challenges (Burke, J. & Ornstein, R., 1995; White, 1962). When someone asks a non-technician, "are you a technician?" chances are most people would answer no. Not everyone earns a living doing technical work even though the instincts and tendencies are there. There is a little technician in each and every one of us according to Ortega y

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Gasset (1962). Gasset, in his chapter "Man the Technician," defines technology as the extra natural program that is man (sic) himself. To behave technically is so common that we take it for granted. It becomes invisible.

The finest written material on technical accomplishment is done by historians. Durant (1977), for example, in his autobiography, is careful to point out how inventions like the printing press and the grinding of glass were critical to human and cultural development over time. White (1962) and Burke & Ornstein (1995) have documented how civilization as we know it today is an evolutionary story traceable consistently to the technical instincts of men and women. Bennett in the early decades of the nineteen hundreds wrote a comprehensive history of technical learning. The following analysis aims to: define TLT; find a way to express a technical "way of knowing" that words alone cannot convey; reveal how school learning displaces experiential learning.

The History of Technical Learning and Thinking

The earliest forms of "technical being" date back to 700 BC. The defining achievement of this early period was the controlling of fire. At this point humankind was able to cook food, melt metals, and shape tools. Eventually humans became miners, smiths, carpenters, masons, weavers, and so on. Systematic learning, if there was such a thing during this stage, is not well documented. It was a natural and instinctual process, you might say. The first evidence of organized learning came from groups who valued a trade, skill, or craft. Ancient Jews, for example, sent their children to school for religious studies in the morning and skill development in the afternoon. Failure to give a Jewish boy an honest means of livelihood (manual trade) was to exclude him from becoming a useful member of the community (Bennett, 1926). Furthermore, the Jewish people felt labor held religious significance. It was regarded as a man's (sic) duty.

At no point in the pre-renaissance period is there what could be called a system of instruction. Sons and daughters learned from their fathers and mothers. Their goals were always survival and betterment for the family members and eventually for larger communities of people. Even if a son was taught by someone other than his father or mother the relationship was a paternal one, master and apprentice. During the Homeric age (700 to 300 BC) Greek handicraft people respected mechanical aptitude. Later, however, mechanical arts lost their status. Much like the status of technical learning in schools today, experience (compared to the neat and tidy academic-based curriculum organizers) is a cumbersome, undervalued, and poorly understood phenomena/framework for learning. The beginnings of a stigma emerged. Manual arts were thought to be for the peasant class and not fit subject matter for upper class youth. In 300 BC upper class boys were taught drawing. The lower classes continued to apprentice under a master as in earlier times. Interestingly, the orators, lawyers, and physicians of the time employed the apprenticeship method in their training.

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Christian monks, much like the Jews, elevated manual labor. Labor was required of everyone – weavers, carpenters, curriers, and tailors. Similarly, the Benedictines (450 –600) made manual labor a cardinal principle. Their thought was that labor banished indolence (the enemy of the soul). For every time they celebrated the praises of God they devoted one hour to labor. The religious zeal and missionary enthusiasm of the Benedictines carried them from Italy, north of the Alps, into Germany. Germany became filled with monasteries each of which became a center of civilization. Many of the church structures from 900 to 1200 are the work of Benedictines. Bookmaking and building followed with the development of the printing press in 1450. "Through the promotion of agriculture, the handicrafts, and art, along with religious instruction for all, and book learning for a selected few, the Benedictines became the civilizers of barbarians and examples of enterprise, thrift, and Christian culture" (Bennett, p. 20). The sole educational institutions of this period (900 – 1500) were monasteries. Their subject matter was religious writings. "Outside of the monasteries, participation in skilled labor was the principal means of education, though not the kind of education which was recognized as such by schools" (p. 21). As trades and crafts developed i.e., became more differentiated and specialized, apprenticeship included a large body of information, tools, and techniques. The master was to teach the recipes, rules, applications of science, mathematics, and art of the craft. The method was imitative and most instruction was outside of school walls.

A new conception of the process of learning began to emerge in the 1400's; the same spirit that led to discovery of new methods for the schools. According to Bennett, this period spawned two new fundamental ideas upon which modern instruction in the manual arts has been built (p. 30). The first is that the senses are the basis of thought, and consequently, of knowledge. The second is learning by doing. The idea that children could learn by working through a process and making something by themselves, with tools, was seen as rational thinking. The expansion of public schools and the placing of handicrafts in schools followed, both predicated on the belief that learning was a physical as well as cerebral act.

British thinkers began to contribute to the technical learning story in the 1600's. It was Francis Bacon (1561 – 1626) who first articulated learning based on nature and the arts of daily life. Comenius followed (1592 – 1670) by advocating learning that starts with the senses, then memory, the intellect, and finally the critical faculty. "The child perceives through the senses; every thing in the intellect must come through the senses" (p. 36, cited in Bennett). In 1663 Moxon published a volume entitled "Mechanik Exercises or the Doctrine of Handy Works." The subjects ranged from smithing to joinery and made extensive use of illustrations. Locke (1642 – 1727) became the main spokesperson for the idea that education should "fit a boy for practical life" (Bennett, p. 61). Rousseau (1712 – 1778) took Locke's ideas a step further. He believed agriculture was the most respectable of all arts and professions. Next to this came smithing and then carpentry. Bennett quotes Rousseau: "The great

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secret of education is, to make the exercise of the body and mind serve as relaxation to each other" (p. 80, cited in Bennett). Ultimately, technical learning found its way into the school curriculum across Europe alongside but different from the classic academic subjects of mathematics, science, language, history, and religion.

It was in the early 1800's that developed countries of the world began to search more deliberately for technical knowledge and wisdom. The industrial revolution was well underway and advancements of all kinds were surfacing, e.g. the harnessing of steam for power, the development of water and sewer systems for towns, the controlling and distribution of power for factories, etc. From these developments and the migration habits of people came the need for people to be technical and productive in new ways. They needed to learn from one another more now that ever before. Practical knowledge of the local artisan, farmer, or smith, needed to be shared to solve larger and universal problems. Technicians were now needed in greater numbers; someone who could apply individual ingenuity to large-scale needs and problems, e.g., larger boats for transporting goods on water, engines to power-boats, trains, and eventually cars. Societies around the western world were moving ahead into a mechanical era, not unlike the electronic era today.

The Devaluing of Technical Learning and Thinking

It is doubtful the devaluing of technical thinking and learning can be attributed directly to the industrial revolution. Many philosophers since this time have debated the essence of how people learn and what aspects of that learning are significant. Dewey recognized and tried to explain how learning was first and foremost an experiential process, not an academic or intellectual one. However, his views along with those of others, have had very little impact on school leaders and programs. Part of the problem Dewey and others confronted was an absence of an answer to an important question. How do people learn? Similarly, the historical roots of technical learning are not documented or, when they are documented, they are not framed very well. Technical thinking and learning pre-dates academic learning but is not written about or articulated in books or archival materials. These important undocumented roots are traceable to the early conquerors, the Romans and the Vikings, of earlier times and to indigenous cultures, e.g., aboriginal peoples, today. They (the roots) are found in museums, in non-print archives, and in oral stories. Artifacts from Viking and Roman archeological sites, for example, testify to the creativity and functionality of tools, jewelry, social organization, and building structures developed in early times. Viking boats have been discovered dating to the early ninth century. They used a building process and a design that indicates a timeless intelligence and ingenuity.

This kind of ingenuity reflects years of trial and error, years of technical learning and thinking. It was passed on orally and in the form of artifacts from one generation to another. Wooden and metal templates were made, modified, and passed down. In today's society evidence of TLT is obscured. It can be

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found in the oral traditions and artifacts of indigenous groups. Unfortunately these sources of study and learning are discounted as being unimportant. The trial and error learning process tends to get overlooked in the rush for efficiency and cost effectiveness. Today's technological inventions and advancement, by comparison, are useful but not always as dependable over time. What remains constant is the invention process. A need or perceived need is followed by rudimentary designs and prototypes, to finished functional products. While the process of learning is still pragmatic and experiential at the core, the way we disseminate information about it takes on an academic appearance. Knowledge is separated from the historical experience that created it, leaving the essence of TLT concealed.

Today we use the term "problem solving" to teach young people about the historical and universal process. What is the problem for which a stable and dependable boat is the solution? The fact that the two kinds of thinking and learning (academic versus technical) are very different, may be one of the explanations for why TLT has not been articulated clearly and why it has not found a home in formal schooling practices. There is a resulting conundrum. The notion of constructing knowledge and creating academic subjects for its dissemination is itself an anomaly. McLaren writes:

> Critical education theorists view knowledge (school subject knowledge) as historically and socially rooted and interest bound. Knowledge acquired in school – or anywhere, for that matter – is never neutral or objective but is ordered and structured in particular ways; its emphases and exclusions partake of a silent logic. Knowledge is a social construction (p. 173).

The fact that school knowledge and its dissemination is contrived or constructed and that it has limitations comes as quite a revelation to many education leaders today! Sheridan states, "schooling contributes to a priority of legitimacy of literacy, and this denies the legitimacy of experience, which is necessary for learning" (p. 23). School teachers, moreover, are not taught about this dichotomy, this contradiction. A significant dilemma in schools awaits exposure. Ironically, this "missing understanding" is spoken about informally in workplaces and around the kitchen table all the time by families and people who trust their experience and life's work ahead of what they learned or did not learn in schools.

There is a classic question that grows from this dilemma. Can schooling which depends so heavily on a single and narrow model of learning be condoned? Dewey writes: "Connect schooling to everyday life and the curriculum will necessarily be relevant." Layton underscores the same point when he states that schools decontextualize knowledge (p. 15).

If "being technical" were better understood and articulated in schools would our attitudes towards and understanding of those around us who design, build, and use technology be more complete? The limited number of ways to convey to others what it means to be technical poses a challenge to technical teachers. Given the limited historical documentation of what it means to be

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technical, to feel what a technician feels, to explain how this history augments understanding and human existence, the prospects are not good. The very telling of the TLT story is problematic. Can words ever convey what it means to be technical as a human being? Can the understanding and political will ever be sufficient to enable a TLT ethic to prevail? Technical achievements are of a physical and experiential nature. These achievements and the learning process associated with them do not, over time, flourish in schools. Being technical isn't something that is easily expressed or impressed.

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