Technological Learning and Thinking: A Pedagogical Analysis

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Abstract

The knowledge-acquisition orientation/tradition that underpins schooling in western societies continues to enjoy an unquestioned place in the minds of most parents, policy makers, and professional educators. At the same time the importance and place of experience versus knowledge as an orientation or tradition for learning, awaits analysis. First, the need for a deeper understanding of what it means to learn in a human, technical, and social sense requires documentation and clarification. How and what one learns when being instinctive, is an elusive but culturally significant pedagogical terrain.

This analysis will attempt to expose the assumptions that govern institutionalized forms of learning and explore a way forward that starts with the nature of peoples’ learning when it is self-directed. The irony of comparing technology mediated learning (TML) with the knowledge acquisition model which dominates school curriculum is that both are aberrations. This paper starts with a definition of institutionalized learning and proceeds to expose the assumptions upon which it is based. TML, if institutionalized in a formal curriculum sense, may never realize its potential. Sharing common assumptions about the nature of learning and the proper methodology for theorizing about it is the focus of this analysis.

Introduction

What constitutes learning in the 21st century will be contested terrain as our society strives towards post-industrial forms of knowledge acquisition and production without having yet overcome the educational contradictions and failings of the industrial age. Educational reformers suggest that the advent of new technologies will radically transform what people learn, how they learn, and where they learn, yet studies of diverse learners’ use of new media cast doubt on the speed and extent of change. (Warschauer, 2007).

Warschauer, in his paper ‘The Paradoxical future of Digital Learning’ examines the nature of digital learning and points to the role of social, cultural, and economic factors in shaping and constraining educational transformation in the digital era. My purpose in this paper is to describe the pedagogical terrain associated with the educational contradictions and failings of the industrial age.

Formally trained educators have become habituated to a method of achievement that is, in essence, antithetical to intelligence and to any meaningful kind of learning. Teacher education, in particular, is important to understand and to scrutinize. Grundtvig and Lindeman, among other Danish education philosophers, identified the problem years ago: “education conceived as a preparation for life locks that learning within a vicious circle. Youth educated in terms of adult ideas and taught to think of learning as a process which ends when real life begins will make no better use of intelligence than the elders who prescribe the system.” (1926, p.3). The absence of this understanding among the general population and teachers who are often victims in the process, presents a huge dilemma in schools and in societies. We homogenize and standardize people and cultures at a huge cost.
Institutionalized learning is defined for purposes of this paper as the learning that takes place in local formal settings where the organizing dimension of people’s work shapes relations and actions for that institution (Smith, 2005). The most common example of such an institution would be a school or university but the definition is intended to include all institutional forms; hospitals, prisons, corporations, government offices, religious entities, among others, as learning takes place in all such settings.

Once learning is institutionalized two dilemmas are created (Jarvis, 1985, p. 194). Institutions, claims Berger (cited in Jarvis, 1985), ‘provide procedures through which human conduct is patterned, compelled to go, in grooves deemed desirable by society. And this trick is performed by making these grooves appear to the individual as the only possible ones’. Education, as such, is ‘institutionalized’. The paradox of this reality is that knowledge is divorced from life learning, and personal experience. The learner, who should be encouraged to develop his or her natural curiosity and instinct for learning, is asked to defer those tendencies. The content and pace of learning, examinable subject matter, and time limits imposed by the academic year, all define the human conditioning process. Secondly, normative order inside the school exerts itself. All who wish to teach or learn, or both, within that organizational milieu are expected to conform to that order. This normative order is thought by most parents to be insignificant, or part of an acceptable socialization process. ‘… my child needs to learn how to behave in the company of others and to be self-disciplined’ [author’s words]. Sociologists (Pomfret, 1990; Jarvis, 1985) are less accepting. They argue that those norms are ‘class-based’ and favour some children over others (e.g., middle over working class origins). Meanwhile the coveted goal of most public education institutions is egalitarianism – equal opportunity for all. What educational sociologists like Pomfret and Jarvis argue is that schools are not egalitarian places at all. They privilege some forms of learning over others, among other things.

**Two kinds of learning**

Concurrent with the sociological analysis of schools is the history of technology. Yes, technology is part of the story – quite a unique part. The technical printing press heretofore, and technology mediated learning today, have paved the way for a single and widespread way of transmitting important information and ultimately knowledge (Harnad, 1991). What needs to be recognized is that both the oral and the written forms of information dissemination, and the ways of learning associated with them, are equally significant and inextricably connected. The wisdom, it was thought, that could be passed on from one generation to another by book learning was never realized, not because people failed to assimilate the learning but because the product of the schools is not wisdom at all. Yes, it is knowledge but of a limited kind. So, the assumption that knowledge leads to wisdom, is flawed. Now, as understanding for, and adoption of, TML learning takes hold, we have to watch that a similar fate is avoided.

The fact that the two kinds of thinking and learning [academic versus practical/experiential] are very different, is important. There is a resulting conundrum in schools that needs to be exposed. The notion of constructing knowledge and creating academic subjects for its dissemination is itself an anomaly. Eisner (1994) and Schubert (1994) describe the pedagogical terrain well. They suggest that it is the educational ideologies and perspectives of the creators of curriculum that initiate a curriculum conception, i.e., discursive over non-discursive learning.

In order to explore the mechanisms and policies in society that work against the integration of experience into the curriculum I have chosen to compare and contrast what is best thought of as ‘experiencing’ versus ‘schooling’ in this paper. A review of the prominent experiential modes of education throughout recent history helps clarify. What are the limitations of the academic model of learning and thinking for teachers/students and for schools generally?

**What it means to be technical**

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. Case study information from a technical-minded school headmaster is analyzed in order to clarify a human tendency that is central to understanding how technical learning is or is not embraced in the schools.
The concept ‘technical learning and thinking’ (TL&T) is defined as the aptitude, ingenuity, and penchant for solving practical problems that technical educators employ in their work (Autio, 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. Yet the world and our instincts for creature comforts and achievement are endless.

The following quote from a woodworking teacher/headmaster 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 loose.

So when I treat my wife in a carpenter’s way or make my lyrics [as a 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.

Peter (a pseudonym) is a technical teacher and headmaster, 2003.

Peter’s TL&T tendency is no different than what children experience at the beach when they attempt to build castles and other imaginative things out of water and sand. 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 requirement 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). There is a little technician in each and every one of us according to Ortega y Gasset (1962). To behave technically is so common that we take it for granted. It becomes invisible. Gasset, in his chapter ‘Man the Technician’ defines technology as the extra natural program that is man [sic] himself.

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.

Missing from the science-based knowledge-building academic model is a way of learning that recognizes knowledge that comes from experience. Finnigan and Layton (1994) refer to this experience-based learning tendency in their annotated bibliography on teaching and learning in the third culture.

So far as the schools are concerned these developments [the recognition that technological activity is fundamentally different from science] have a direct and practical implication. If there is a distinct ‘technik’ [technical thinking and learning], with characteristics which distinguish it from the sciences and humanities, should it not have a place in the general education offered by the schools? Are there, indeed, three cultures not two, as C.P. Snow suggested, the third corresponding to the creative, problem-solving and productive activities of the engineer or designer? Ought we not to recognize more clearly in curriculum terms that the fundamental difference between science and technology is social, a difference in values between a community whose sovereign value is ‘knowing’ and another whose ultimate goal is ‘doing’? And if the
Questions about the validity and verification of knowledge as the featured commodity of schools are also found in the field sociology of knowledge literature (Young, 1971; Rogers, 1997; Stark, 1956). Rogers (1997) in her paper on new views of knowledge and its representation in schools, illustrates the differences between subject matter learning and disciplinary learning. She explores some of the problems posed by using the disciplines as the primary source of authority in shaping the curriculum, and goes on to propose a more radical, alternative model for thinking about curriculum. The alternative integrates the influence of the disciplines with other influences such as the child’s world, the particulars of context, and the knowledge of the professions. She argues we should think more broadly about the possible sources of influence and authority for the curriculum in schools.

As nations and economies rush to claim a knowledge-based lifelong learning model the need for TL&T to have its true nature and form properly recognized and valued, in and out of the formal learning institutions, is vital. A narrow approach that looks at human beings as capital will detract from an adequate theory of lifetime learning. There is a nagging but important question that plagues educational policy and thought. Can schooling, when separated from everyday reality, ever be relevant? Dewey (1938) writes: “Connect schooling to everyday life and the curriculum will, of necessity, be relevant”. Layton (1993) underscores the same point when he states that schools de-contextualize knowledge. “A general characteristic of school technology and one which makes it different from many other school subjects is its engagement with practical action in the made world. No subject challenges the historic role of schools as institutions which de-contextualize knowledge quite so strongly as does technology.” (p. 15). Buchmann and Schwalle (1983) perceptively ask: “Can knowledge be acquired and retained independent of practical action, by observing and imitating others and by extracting knowledge from experiences coded in text? Does learning in schools have to be an interpretation of reality rather than reality itself?” (p. 11).

Sheridan, an Irish-Canadian who grew up alongside an indigenous community, writes: “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 unfortunately, technical or otherwise, are seldom fully informed of this dichotomy/irony. Pang-Yu (2009) describes the conundrum as a paradox. “The paradox of modern education is that it divorces knowledge from life, practice, and values.” (p. 11). Missing from the literature is a fresh look at the assumptions upon which institutionalized learning is based.

A Look at our Assumptions

“One of the fundamental aspects of life learning is contrary to one of the most basic assumptions our society makes about education. And that is that learning can and should be produced in people. This assumption is based on the idea that learning is the result of treatment by an institution called school…. which is, of course, one of the many conventional beliefs that life learning families are overturning.” (Priesnitz, 2011, p 1).

Priesnitz’s comment is timely and profound for us in formal education. We are in the midst of a technological revolution and don’t understand or have any policy reference points for knowing how to respond. We responded to the industrial revolution by making schooling mandatory and following many of industry’s ways. Does that mean we should respond now by a second wave of even more formal institutionalized learning? A look at the industrial age assumptions we made, and the subsequent contradictions that followed in education, helps expose how they [the assumptions] failed us, and how we can avoid the same fate this time.

Debate about the validity of scientific knowledge seeking and ordering (Kuhn, 1962) has been robust. Seldom is any credence given to a knowledge generation model or theory that emerges from people who value ‘doing’ as highly as ‘knowing’. Scholars point to the scientific method as a source for deriving new knowledge and validating it. The knowledge seeking and validation process is described in the literature as ‘positivism’. Acceptance of positivism, even though it enjoys a nineteenth century history, has come under increasing scrutiny. Kuhn’s challenge to positivism, along with that of Hooker (1987), points to a renaissance of thinking regarding sources of knowledge, existing and new. Schooling assumes assimilation into society via academic achievement is an exclusive right and necessity for all citizens. This assumption is predicated on the notion that matters of the mind are superior to matters of the body and spirit. Evidence from recent research reports (Harre and Gillett, 1994,
Kessels and Korthagen, 1996), however, suggests the “academic-diet-for-everyone” assumption, is flawed. Assumptions like these lead to a devaluing of subjects like technology in the school, not to mention art, physical education, drama, and music. There are three assumptions that technological education and technology teachers provoke us to consider in order to better understand the magnitude of the problem: a) book learning in schools is an irreprouachable method by which to learn, b) an academic curriculum enhances human development and self-esteem, and c) a science knowledge-based curriculum is superior to an personal experience-based one.

a) Book learning in schools is an irreprouachable method by which to learn.

Recent scholars (Noddings, 1995; Sheridan, 2000) suggest that new ways of thinking about learning, new ways of understanding the relation between learning and personal development, and new ways of structuring formal learning over the life-span, are worthy objectives. While their sentiments are welcomed, the evidence they marshal and the arguments they frame, do not go far enough. A great opportunity to better understand what is missing in the life of school systems becomes possible when nothing is taken for granted and the needs of students and communities are put ahead of the needs of the government, industry, and school systems. School systems in western society are not egalitarian nor do they augment economic, cultural, and political structures as much as we assume they do. Missing from our analysis of schooling, the author contends, is an honest assessment of the advantages and disadvantages that 12 years of institutional confinement and academic programming brings.

Sociologists are one of the few groups who understand that schools perform positive and negative functions for society. The positive functions can be found in the school literature in the form of goals and purposes. The negative functions are not well understood or discussed widely. They include the “holding” function that schools perform on behalf of society, the conformity function, and the standardization function. “Our schools/Ourselves” monograph series (1992) points out that schools construe learning in one way only. As graduates of our schools most of us have come to accept that the way in which knowledge is packaged and dispensed in schools is a given. This “knowledge packaging and absorption process”, the author contends, is problematic.

The experiential learning tradition, by comparison, provides some hope for re-thinking the formal school curriculum and how more students can learn in alternative ways. The question that educational psychologists have answered seems to be “how do children learn in schools?” rather than “how do children learn?” We know that when children are in formal school learning situations they behave in certain ways. The design that has been used to research and answer the question “how do people learn”, as such, is flawed. It doesn’t consider how people learn when not in institutional settings, i.e. when they [learners] are self-directed? Some work has been done on learning in non-formal and informal situations by people in the field of adult education (Boud, 1989). Adult educators conclude that learning, when not undertaken in a school environment by adults, is a natural problem solving process. When this problem solving and balance occurs learning has meaning and is lasting. Technology teachers know this to be true when they encourage students to undertake problem-solving in their workshops.

Primary school teachers are another group that know how students learn. Most elementary school teachers, according to Alamaki’s study (1999), understand children’s natural tendencies for learning and design their learning environments accordingly. Evidence of student learning preferences and practices at the secondary school level is much less clear (Little, 1995). For a variety of reasons secondary school teachers expect their students to develop a cognitive capacity, as if it were somehow possible and necessary to separate cognitive, emotional, and psychomotor needs (no doubt a carry-over from their institutionalized learning).

The deferment or postponement of practice mentality is the overarching reality of learning in formal institutions. It is as if we assume ‘these young adults should be mature enough to defer their needs for a physical or emotional confirmation of some phenomenon.’ [author’s words]. Research from the field of educational psychology has led us to believe that because young adults are mature enough to understand something in the abstract, our secondary school curriculum should be designed to emphasize the abstract rather than the concrete. In reality we do mature in our capacity for abstraction. However, this does not mean that our concrete learning tendencies and preferences are any less important or that they should be abandoned. In spite of the school system’s push to separate concrete from abstract learning, experiential learning is an integral part of our natural desire and capacity to learn (Boud, 1987). Many of us also know from experience that there are some things in life we prefer to learn when our centerings are emotional and physical as well as cognitive.
b) An academic curriculum enhances human development and self-esteem

The assumption that didactic learning and an academic curriculum is essential to human development/fulfillment and self esteem is a second prominent and unchallenged assumption underlying schooling. The assumption implies that such learning enhances both personal and cognitive development. The universal assumption is that there is a correlation between cognitive and personal development, and that academic endeavor is essential to individual and societal growth. Harre and Gillett (1994) have contributed significantly to the explanation of what contributes to personal development in human beings. They conclude that having a “sense of physical location” is what leads to self-esteem, not academic accomplishment. Self-esteem, the ingredient so often missing in young learners, is crucial. It may be that life in school drains rather than builds self-confidence. “You can’t learn on an empty spirit.” (Purkey, 1971). In technological education, learning involves utilizing a range of sense-making capacities and assumes physical action as well as knowledge acquisition as essential components for understanding. Technology students have the chance to develop a practical wisdom much like that developed by practicing technologists, engineers, and technicians. Unfortunately their [students’] success in achieving this wisdom is tempered by the models of learning that are perpetuated in teacher education institutions and in general studies subject matter. The true pedagogy associated with practicing technology goes unheralded. This phenomenon is identified by Lindfors in her statement when she laments how the goals and content of sloyd became artificial when transferred to schools. The problem of curriculum relevance exists to this day in most western societies, not because technology teachers fail to recognize and do something about it but because the curriculum framework and teaching methodology they are expected to adopt is philosophically too narrow to include their workplace and life experience preferences for learning.

c) Knowledge-based curriculum is superior to an experience-based one.

Knowledge, the keystone or central element upon which institutionalized learning is based and a highly regarded commodity, has been elevated to such a high degree over recent years that it is taken as a universal and exclusive standard for achievement and success, especially in secondary schools. The irony is that most knowledge conveyed in formal education institutions is constructed knowledge. It is packaged you might say, for delivery and consumption the same way a new product is for the retail market. It is referred to as ‘school knowledge’ (Eisner, 1992). There is a further problem. Its consumption reinforces human capital thinking, thereby diminishing the ‘human development’ purposes of learning. ‘The more formal education I get, the richer I will be, and the more I can shower myself with material things’ [author’s words].

Knowledge in western society generally is portrayed and legitimized at the expense of experience, life and work. The sociology of knowledge literature explains this irony quite effectively (McLaren, 1998). Conceptions of ‘experience’, by comparison, do not exist and are not felt to be important. It is devalued compared to knowledge.

“Critical educational theorists view school 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 assumption that knowledge-based learning leads to understanding is the single most prominent but unchallenged assumption we make as educators working in formal education institutions. A meaningful curriculum that would include experience as well as knowledge, as placeholders, goes unnoticed. The challenge is to find a way to express an experiential ‘way of knowing’. Only when this is done can we know how school learning displaces experiential and life-course learning.

In Canada, teachers who enter the profession in our country are the high achievers from universities. They are not required to have any work experience in their respective fields or disciplines. They have proven they can be successful in the knowledge-driven environment and are not asked to account for life-course experience. They have mastered the narrow cognitive world of schooling. Furthermore their attraction to, and acceptance into, teaching ensures that the system as it is currently construed, perpetuates itself.
The experiential pedagogical terrain in recent years has been tempered by the introduction of design as a precursor if not stand-alone component of what is sometimes referred to as Design and Technology in the schools. The notion of designing is often so prominent that undertaking a technical project and learning to be technical is discarded or deferred. Design and technology serves as a reminder of what happens when technical learning and thinking is defined in a general education context. It becomes what McLaren (1998) calls another socially constructed subject.

Hansen (1996) describes the apologetic nature of technological studies teachers in his teacher socialization research. Another series “Our Schools, Ourselves” provides a rare and comprehensive compilation of stories from trades and union people who voice how technological knowledge is marginalized in the schooling process. Lindeman puts it bluntly: “Too much of learning [in schools] consists of the vicarious substitution of someone else’s experience and knowledge.” (p. 6).

In every situation there is a physical, emotional, and cognitive balance. What Lindfors’s statement adds/conveys is that existing conceptions of schooling/knowledge do not take into account the variables, (e.g., economic and workplace realities, cultural differences, family diversities), which ultimately shape our development as human beings. In other words, schooling, by virtue of singling out specific aspects of knowledge for dissemination to our young, is too narrow or too oblique in its purpose to help children grow in the fullest sense. To broaden their scope schools would have to cast human learning in a different light, (e.g. learning not just about language, computing, history, etc.),[learning from study of subjects] but learning about one’s own aptitudes, competencies, gifts, weaknesses, emotions, [learning from experience]... a kind of holistic learning in a socio and socio-cultural context, rather than in an academic context. Schools, Lindfors would say, cannot help but be artificial places because they are removed from everyday community reality and they do not attempt to relate school to life. Dewey, were he alive, would surely concur. School goals and content are constructed or manufactured, you might say. They are places where we ‘simulate’ learning. Some might even characterize schools as surreal (seldom attempting to connect with anything from the everyday world because they don’t have that purpose). They portray the world as a place that is best understood in terms of words, concepts, and formulae rather than problems, actions, and consequences.

There is another poorly understood problem. Not all technology teachers utilize their life-course problem solving methodologies once they find themselves in school teaching positions. It seems, once in the system, they behave much like Lindfors suggests. They abandon their allegiance to practical problem solving in favour of more manageable and dispensable pieces of knowledge and skill that simulate problem solving. In our practice as school teachers, regardless of what we teach, we are actually swept along in a singular way of doing things [author’s words]. On the one hand we want what is best for our children but because of the narrow curriculum we do our children a disservice. We portray a world not as it is but as it is perceived by us and/or people who write the books from which we learn. We delude them.

References


