

# Puritan Origins of Technological Understanding in the USA

## From William Ames's *Technologia* to Technicism

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**T**O MOST EDUCATORS, the word “technology” generates images of computers, DVD players, cell phones, Wi-Fi devices and the like, each gathered under a specific, practical assumption—technology as an object, a tool to better create and deliver curriculum that must be mastered by the student. However, such an understanding fails to penetrate the sphere that technology occupies in modern curriculum and pedagogy. The concept of technology has functioned far beyond such simplistic notions of technology as a neutral, objective tool to be wielded by students at the command of their teachers.

Technology is not only the physical object or machine used to manipulate and acquire data it is also historically embedded within notions of “technique” and “technical.” Since the mid-1800s, while in the mind of popular culture technology has been analogous to a machine, to social and curriculum theorists, it has functioned as an efficient, rationalized method and technique to measure, administer, store, retrieve and visually represent data in an effort to manage all aspects of society (Feenberg, 1995, 1999). Simply, technology has been and continues to be a discourse for organizing life, and is intimately connected to what William Doll (1993) has rightfully labeled a curriculum of control (Doll, 1993). In the modern era, human institutions surrendered local, practical wisdom to serve the discourse of technological existence (meaning a dependence upon both method and machine), and in doing so have come to embrace the technicist logic that all problems—social, economic, education, government, etc.—are but technical challenges affording only technological solutions. This cultural condition is detrimental to what many curriculum theorists conceptualize as the historical, social and individual purpose of education (Doll, 1993; Pinar, 2004; Pinar, Reynolds, Slattery, & Taubman, 1995; Postman, 1993, 2000).

As Ellul (1964) identified as early as the 1960s, technological use dictates that modern life is about finding the best “most efficient method... And this ‘one best means’ is, in fact, the technical means” (p. 21). Simply, technology has transcended the status of being a mere object or tool to sustain life; it has become a moral imperative in itself, an imperative that has been placed in the hands of education to advocate and perpetuate (e.g., Chickering & Ehrmann, 1996).

Ellul’s critical analysis travels an intellectual path cleared by the Frankfurt School of social theory in response to the twentieth-century technologies of mass destruction and the techniques used to murder six million Jews. These social theorists identified a terrible contradiction: The desire to see technology as a tool of freedom able to provide humanity with greater leisure to perform more aesthetic acts, and the reality that technology and technicist rationality actually disempowered and alienated the individual from society. In effect, democratic existence was diminished rather than extended. According to these social theorists, technology as a rationalized, administrative tool to manage modern society buried the moral, ethical and spiritual features of the kind of understanding of technology that would extend the possibilities of human existence (Feenberg, 1995, 1999; Marcuse, 1964). However, there exists a discourse of the “technological life” (Ellul, 1964) that does not disguise or hide the moral and the ethical aspects, nor reduces educational life to an objective problem of administrative and curricular control. In fact, this conception of technology is directly related to the history of curriculum in the US, emerging specifically out of the colonial Puritan efforts to build an educational theory of “the good life.” This impulse toward mapping out for the individual a path to the “good life,” resulted in the creation of the first American college, Harvard College, and the first formal curriculum entitled *Technologia* (Sprunger, 1966, 1968).

*Technologia* as a curricular construct came to the colonial Puritans by way of William Ames (1576–1633), who spent his life in England and Holland as a separatist Puritan, but whose theological and educational works and personal relationships with other significant colonial Puritan figures placed him at the center of intellectual/cultural life in seventeenth-century “America” (Gibbs, 1979). The colonial Puritans were specifically open to the logic and applications of technology and technique given their theological and scientific understanding and acting in the world (Greaves, 1969; Merton, 1938; Miller, 1953, 1957; Ong, 1958, 1971).

The Puritans embraced the principles shared between their religious and scientific sensibilities that compelled them to seek the one best method (re: technique) and tool to explore and study not just the internal world of the soul, as a means to salvation, but also the external world of creation that illustrated God’s work and plan. According to Ames’s *Technologia*, spiritual and ethical means and ends were connected within a “circle of knowledge” that was to map out an individual’s *curricula vita* (course of life) and guide him or her into a cohesive existence within a community of believers. However, during the early 1800s a gradual shift took place in which the external and internal worlds were separated, creating an opening for the technicist elements of the Puritan understanding of technology to enter and dominate even as the underlying impulse to situate technological mastery as a moral imperative remained powerful. Our exploration into *technologia* will reveal how technology and technique were integrated by the Puritans into a highly refined spiritual and ethical habitus, later altered in a way that saw these considerations sheared from the equation, leaving technology and technique to be conceived as tools applied at any time and place deemed useful to achieve the moral imperative. The logic became internalized within technology itself—if it can be used, it must, the hallmark of technical rationalism that pervades mainstream curriculum.

We will first briefly lay out at the cultural habitus that produced the Puritan predisposition to embrace certain technical/method oriented ways of seeing and acting in the world, which will situate the popularity and usefulness of Ames's writing. Ames helped define the moral nature of curriculum as a technological construct, a "circle of knowledge" (Gibbs, 1979). At the end of the paper, we will briefly address the modern effect of the shift from *technologia* curriculum as moral enterprise to curriculum as a linear, prescriptive technological discourse.

### Puritan Search for Techniques/Methods to Find God and Self

For seventeenth and early-eighteenth-century America, *technologia* was the Puritan theoretical framework to integrate and contemplate both secular and revelatory forms of knowledge believed necessary to live a virtuous life and achieve an understanding of God's plan for the individual within the corporate body. However, what seems such a vast difference in the understanding of technology from the Puritan era to the modern era is actually not so wide or surprising. For, within the Puritan framework of *technologia*, there always/already existed the seed for technology to be employed as a rationalistic technique and neutral tool, a perception that began to prevail during the nineteenth century.

For seventeenth-century Puritans, God was the ultimate *Rational* being who created humankind as beings able to access truth through rational means. In effect, mankind could participate and experience a form of God's rationality by observing, measuring, adjusting and creating morally infused methods and maps by which to proceed. God communicated by way of reason and demanded preciseness in all things to achieve an accurate measure of the internal as well as external world and an accurate diagram by which to traverse both (Greaves, 1969; McKnight, 2003; Sprunger, 1966; Triche & McKnight, 2005).

This emphasis on the rational and the need to "labour to methodize your knowledge" (Richard Baxter, 1673 as quoted in Sprunger, 1966, p. 134) reinforced an intellectual interest in secular education and a practical emphasis on developing an empirical understanding rather than leaving each believer to prepare for conversion in purely emotional terms. Cotton Mather identified and celebrated this cultural ethos in many of his writings. In *A Man of Reason*, he wrote, "The Power and Process of Reason is Natural to the Soul of Man" (as quoted in Miller 1953, p. 419). And elsewhere in his treatise, Mather again summed up the ethos: "The Voice of Reason, is the Voice of God" (as quoted in Miller 1953, p. 427). Perry Miller, pointing first to Peter Ramus (whom Ames employed as the framework for his theology), analyzed this need to understand God through rational means: "If God so desired, He could call His saints by an audible voice, or by investing them with a halo visible to the naked eye. Instead, He had chosen to deal with them as with rational creatures." (1953, p. 74–75).

It was up to man to translate the Word into a map. This map contained only the simplest and plainest of words expressing accepted translations so that anyone could easily grasp, organize, manage and recall the information printed upon it. This ease of managing knowledge enabled one to analyze and comment upon the content. This eagerness to embrace empirical language was in part due to a Christian notion of the Fall of man, which reportedly withdrew from mankind the ability to receive direct instruction from God. Hence, God infused "it [reason] in things, from which it is radiated to the brain through the perceiving senses, as is the smell of flowers through the nostrils" (Miller, 1953, p. 428). From this assumption it was not much of a leap for Puritans to "reasonably" conclude that the purpose of education and schooling was at its

heart a framework to develop “Godly learning” (Morgan, 1988) by instructing students in the techniques by which to “read” the world to access God’s reason. These lofty expectations and psychological impulses toward grandeur could not be had by faith alone. The idea that knowledge—the understanding of God’s creation—occurred through observation and testing of the natural world was acceptable for the Puritans in that it provided a technique by which to map out and then explicate an individual life moving toward spiritual conversion, which was inextricably linked to external, ethical and moral action (Bercovitch, 1993; McKnight, 2001). Such technique combined naming, ordering, analyzing, storing for quick reference and explaining experiences, each connected in a linear trajectory toward spiritual and material transcendence as well as a means to control one’s surroundings. As Miller (1953) wrote, “The first Puritans did indeed succeed in impressing upon the *tabula rasa* of America a European and Protestant seal. With their articulated sciences of theology, psychology, logic and rhetoric, they possessed coherent answers to all conceivable contingencies” (p. 14). God could be located and listened to not only by way of objective study of the natural world, but through objective and reasoned observation and study of the interiority of mankind as well. The inner world, just as much a wilderness to be made over as were the new world landscapes of “America,” was considered an object to be analyzed, reflected upon and made anew (Bercovitch, 1993; Greaves, 1969; Kaufmann, 1999; McKnight, 2003). To make over one’s inner and outer worlds was an effort to make one’s self and one’s surroundings coincide with God’s Will. The techniques employed were based on the need for mediation (Bercovitch, 1975, 1993; Ong, 1971) due to the impossibility of direct, emotional, knowledge of God to reveal the “good life.”

The key was to employ the techniques of organization, which came to the Puritans in both the Old and New World by way of Peter Ramus, a sixteenth-century French arts master. Ramist logic was the first system taught to students attending grammar schools and remained with the students through college, specifically Harvard and Yale, the two most influential higher learning institutions in the colonies (Hamilton, 1990; Miller, 1953; Morison, 1936; Ong, 1958). According to Morison, Harvard’s scholars taught their pupils Ramism’s “neat dichotomy, branching out like a family tree, and on which the student could conveniently hang all the knowledge that he acquired from either books or lecture” (Morison, 1936, p. 155).

Ramist maps provided a clear, plain illustration of the steps to be followed to comprehend and act upon received knowledge:

Employing this Ramean method, one first identified the concept to be investigated then divided it into halves, halved these again in turn, and so on until all the components were established. Once all the reasons or concepts were laid out, then an individual could start combining them to form arguments. (Mages, 1999, p. 97)

In other words, Ramus developed the technology for standardizing the method for transmitting what was considered knowledge to masses of people throughout Europe (Triche, 2009). Such mapping technology reflected the Puritan desire to find paradigms that enabled them easier access to useful knowledge. According to Ong (1971), knowledge was no longer reserved for monks and scholars, it had a new clientele:

There is an obvious relationship between this mentality and the mentality of a commercial, merchandising world, where good had to be thought of in terms of operations with a

view to possible users or consumers. Ramist methods made it possible to think of knowledge itself in terms of ‘intake’ and ‘output’ and ‘consumption.’” (pp.173–174)

What made the Ramist technique so powerful was its coupling with William Ames’s later notion of *technologia*, a philosophical-theological treatise that served as the framework of the first Harvard curriculum. For Ames and his colonial Puritan followers, *technologia* was the result of their impulse toward finding the one best means, the one best technique by which to exist through *eupraxia*, the art of right living.

Although the antecedents existed within the logic of the Puritan’s technologic approach, the very notion of technology was yet to be understood as a physical object or tool for managing information. It was, instead, understood to be the one best method for finding the means to live a good life. Miller (1953) wrote of the immense cultural importance of *technologia* as the philosophical structure for integrating Puritan piety and reason. Simply, *technologia* represented the spiritual and metaphysical map that supplied each believer with a clear signpost to follow for living a good and righteous life. It was the technique used to organize, administrate and interpret daily moral life. *Technologia*, in essence, was the method by which the Puritans maintained the greater symbolic corporate narrative of the “errand into the wilderness,” which demanded much of each believer’s effort to locate a means of “right living.” While Ramus provided the technique to organize *technologia* as an art of “right living,” it was William Ames’s (1629/1997) *Technometry* (synonym of *technologia*) that became the philosophical treatise and curricular format to integrate both spiritual and secular knowledge through the arts and sciences (Gibbs, 1979). As Gibbs (1979), commentator and translator of Ames’s philosophy, writes:

This general philosophic framework, which was really an encyclopedic outline summary of all knowledge, Ames called ‘technometry’ (Technometria) or ‘technology’ (technologia). A systematic delineation of the nature and uses of art in general and of each of the individual liberal arts, it provided...the integration of theology with all of the other disciplines...It provided a blueprint of knowledge for colonial New England. (p. viii)

#### Ames’s Technometry as Moral, Spiritual and Intellectual Technique

Ames’s *Technometry* is “an all embracing map of human knowledge and an intellectual map to truth” (Gibbs, 1979, p. 31). In his *Technometry*, Ames presents a theory of “Art,” (i.e., instruction). The term *technometry* is a combination of two Ancient Greek terms. The first is *techne*, which refers to art, craft or skill that enables one to function well on specific cultural tasks—as in the skills one achieved over time, for example, in speaking well (rhetoric), in the liberal arts, or in making shoes or pottery, in the illiberal arts. The second term is *metron* (and/or *logia*), which means to survey or study, as well as measure. Because Art was understood at the time to encompass all knowledge, *technometry* could be translated as the study or survey of all knowledge deemed useful (Gibbs, 1979). Ames’s *Technometry* was a re-constitution of what was understood from the ancients to be the “three-fold tool of education”—Nature, Art, and Practice. Nature was understood to be that which a student brought to school—his physiology and his upbringing. Art was what occurs in school, i.e., formal instruction. Art was also understood as a shortened form of “artificial,” which was used to either overcome or enhance one’s nature. As

such, there is a direct relationship between the concepts of art, artificial and technology. Practice (i.e., experience) was, then, a student's use of what was learned in school, which was to be used to improve one's life. *Technometry* re-constituted this ancient educational tool by raising Art (and thereby technology) above Nature and Practice to the primary position among the instruments of education. Ames did not jettison Nature and Practice, however. Instead, he incorporated and altered them under the umbrella of *technologia* within Art (Gibbs, 1979). In the process, Nature is transformed. It is not only identified with the talents and gifts that students possess, Ames extends Nature to include the world of things created by God. Ames's Practice, on the other hand, not only retained the significance it previously possessed; it took on a new philosophical sophistication and therefore, presented a more powerful theory of education.

Ames's *Technometry* is significant in that it was far more than a neutral framework for regulating knowledge toward certain utilitarian prescribed ends that assumed the condition of being a self-evident good. Neutrality was never claimed, nor desired. Instead, this notion of technology was infused with spiritual and ethical ideologies that were to be integrated into its use (Practice) for right living. Ames defined technometry as the "precognition of all the arts which adequately circumscribes the boundaries and end of all the arts and of every art" (1629/1997, p. 93). One brief example of how *technologia* functioned comes from the Harvard Commencement Theses of 1678, which each graduate had to be able to publicly defend, and many of which were pulled almost verbatim from Ames's *Technometry* (1629/1997): "Art is the ordered gathering and combining of understanding, science, wisdom, and prudence. Cf. thesis 10 of 1691: Wisdom, prudence, science and art do not really differ" (as cited in Gibbs, 1979, p. 43).

In *Technometry* Ames lays out a system of the arts and, then, due to the Puritan emphasis on a person's "calling" or "vocation," goes about illustrating applications for everything from scientific investigation to paper making. Hence, *technologia* as a means of organizing life was understood within a cultural context as having integrated political, economic, theoretical, practical, ethical and theological import. In good Ramist fashion, Puritans divided the concept of a calling into a "general calling" to faith in God (i.e., election) and a person's (typically a man's) "particular calling" to an occupation or one's station in life. The inter-relationship that was understood between a person being faithful to God and that person's *calling* to a particular occupation was based upon the Puritan belief that any skill or ability possessed by an individual were gifts from God. According to Ames, what you do in your everyday life, your work or career, should be performed both for the glorification of God, and just as important, to serve the community at large. Ames, however, viewed the concept of calling differently from other theologians. He believed that a person's spiritual calling was singularly focused upon one's general relationship with God. Ames had no developed doctrine of vocation and said nothing on the spiritual qualities of labor or its relationship to election. In his *Theology*, Ames (1629/1997) stated: "To what particular kind of occupation a person should apply himself depends partly upon his inward endowments and inclinations, and partly upon outward circumstances which may lead him to one course of life rather than another" (p. 322–323). While he granted that human beings receive their particular calling "by nod of God," he argued further,

this did not mean that men are set apart by God in their ordinary pursuits as a man of faith is set apart to live well. . . For nowhere in the Scriptures is any such thing indicated or the title of vocation given to a common occupation simply for itself. (p. 323)

In his *Technometry*, Ames brought into harmony the two opposing parts of the concept of the “calling.” In effect, *Technometry* was inherently a spiritual as well as an ethical and moral system due to the need for the Puritans to wed any attempt to attain both an implicit knowledge of God and an explicit knowledge of the world (Holifield, 2003). For Ames the logic of technometry was clear. God was creator who acted in accordance with Reason (philosophy). Hence, God’s meaning (which for the Puritans was the knowledge of the supernatural, the knowledge one felt) could be apprehended not only through applying Reason to biblical study but as well through the empirical study of immediate experience of the world (the practice of daily living as through his work) (Gibbs, 1979; Holifield, 2003; Scott, 2000). The belief was that such a balance was necessary in the effort to identify not only what God had in mind for one’s life (*curricula vita*, course in life), but also how to live the “right kind” of life on earth, which of course, meant the kind of life that also preserved the communal, and eventually, a national identity. For the Puritans, such instruction was to result in the art of right living, which meant the integration and balance of human reason and spiritual faith in a way that was visible in one’s day to day life and that corresponded to the larger symbolic narrative of turning America into a “city upon the hill” and a “New Jerusalem.”

Ames’s *Technometry* is influenced heavily by the pedagogical and methodological ideas of Peter Ramus. While Ramus argued for a particular method for organizing and studying the liberal arts, it was Ames who best demonstrated what a fully Ramist Art could be. By defining “Art” as “the idea of *eupraxia*, or good action, methodically delineated by universal rules” (Ames, 1629/1997, Thesis 1), Ames established the trajectory for modern, formal education. By placing Art within a methodological framework, Ames placed himself directly within a Ramist lineage. Our current educational practices, organized as they are within a methodological frame, are a logical extension of Ames’s’ concept of Art. Art here can be understood both as the organization of any individual subject for the purpose of teaching—what has come to be known as “scope and sequence,” and generally as the organizational framework for all the subjects being taught—what we today call the content disciplines found in the school curriculum (Gibbs, 1979).

Ames defined *eupraxia* as “the regular motion [logic or reason] of an agent in acting” (1629/1997, Thesis 13). Because the purpose of an Art, according to Ames, is to rule or guide the performance of an action, then one cannot engage in Art haphazardly. Art establishes the direction and guides a person’s action by the rules and procedures of that individual Art. Ames argued that Art conveys within its tenants an aptitude for good action. To act outside of Art’s established tenants meant that one is not to engaging in an Art (Thesis 14). If we replace the term “Art” with the term “technology,” then we can begin to better understand the sense of rules that established the logic for technological progress for the Puritans.

Ames’s idea of *eupraxia*, however, is neither directly equivalent to the more commonly used idea of *praxis*, nor is *eupraxia* directly equivalent to the concept of *phronesis*, presented by Aristotle as wisdom in doing. By explicitly combining the concept of *praxis* to the notion of “good,” Ames altered the accepted understanding of the theory-practice relationship.

Ames lays out his ideas about the theory-practice relationship in the following three short theses:

The commonly accepted division of art into theoretical and practical is defective in many ways and therefore must be rejected. (Thesis 88)

This division is without any true difference, so that one of its members necessarily includes the other. For there is no contemplation that should not be practice and have its own work; nor is there any action in general such as to exclude all contemplation. (Thesis 89)

There is utterly no theoretical art that should not have its practice toward which (not resting in theory) it will tend from its nature. Nor is there any practical act that should be learned without theory, or in the theory of which its hearer, after he has thoroughly learned it, is not able to rest, if he wishes, and often has so rested. (Thesis 90)

Ames's critique of the division of the arts into theory and practice is based upon his argument that such a distinction is the result of a misinterpretation of Aristotle's concepts of *praxis* and *poiesis* as separate and distinct activities. Ames's concept of *praxis* is roughly equivalent to the instrument of analysis, and his concept of *poiesis* is equivalent to the instrument of genesis (synthesis). Thus, to engage in an Art, either generally or particularly, *Technometry* calls upon both the student and the teacher not to employ merely the action of *praxis*—the act of dividing, simplifying, and classifying knowledge into inert facts—but to employ the activity of *poiesis*—the use of genesis to construct new knowing from the information being studied (Gibbs, 1979).

Ames further unites *praxis* and *poiesis* in his concept of *euprattomenon*, or good works. "Since something made by motion [logic]...necessarily and immediately follows every motion, the thing or *euprattomenon* or good works, made by the motion of art or any kind of *eupraxia* must follow" (Thesis 32). In other words, for every good action there must follow some good work made by the action. Ames's belief that a good work must necessarily follow every *eupraxia* established a foundation for his rejection that a distinction exists between theory and practice (Gibbs, 1979). The argument is basically this: A theoretical art which is not concerned with some practical use, that is whose end is not the making or doing of something, would not be an art because it would produce no work—no artifact—and thus would have no *eupraxia* that could be structured methodologically. As such, there could not exist a way of thinking or being that is not a part of some general or special art.

Ames, following Aristotle, observed, "every discipline will be an Art because every discipline is a habit of making according to reason and leaving a *work* after itself" (Thesis 33). While Aristotle is clear in the *Nicomachean Ethic* about the distinction between doing and making, here Ames is using the word "Art" in a broader sense, and is, thereby, saying something different than Aristotle. As Gibbs (1979) explains, Ames quotes Aristotle in order to arrive at the notion that all the arts, whether general or specific, brings something into existence, and that to pursue an art means to analyze how this occurs and then produce something (genesis). In addition, because an art is fundamentally related to a human action, the thing that is made or done lies not in the thing itself, but in the one who makes the thing. In Ames's concept of *euprattomenon*, where some artifact must follow human action, we can begin to recognize how the ancient concept of "*technologia*," the systematic study of an art, is transformed into our modern concept of *technology*. And just as significant, by establishing a logical necessity between an action and a work produced by that action, Ames was establishing a foundation for our current technologies of educational assessment.

Within Ames's *Technometry*, for an act of learning to be educative, because some artifact must follow from some act of study, information, to become knowledge, must by logical necessity, have some usefulness. Learning must be an act of good work that embodies both doing

and making—analysis and genesis. Through *euprattomenon*, the action of study, rather than mere learning or training, becomes the critical “work” of the educational enterprise in which both students and their teachers are called to participate. As such, Ames’s *Technometry*, his curriculum “practice,” is a highly literate practice in which *composition* or writing is the single most important activity. This focus on writing further suggests that Ames, as well as the audience of believers he was writing for, had moved well beyond the Renaissance ideas about rhetoric as the art of eloquence and oration—a mostly oral-aural enterprise.

The importance of composition in Ames’s *Technometry* becomes more clearly evident in his discussion of the role Art plays in helping one to understand scientific knowledge. Ames initiates his discussion of scientific knowledge by presenting science as an act of dialectical judgment. In so doing, Ames is moving away from the ancient concept of scientific knowledge as the demonstration of self-evident and unquestionable truth—meaning knowledge that does not require proof. Key to understanding Ames’s concept of science is his insistence that composition plays a significant role. As an act of dialectical judgment, Ames’s scientific method depends upon the practice of discovery and study about things in the world (nature). As an act of composition, Ames’s *Technometry* requires the use of both analysis and genesis—*praxis* and *poieses*—in order to complete the educational act. It is at this point in *Technometry* that Ames takes the time to praise Francis Bacon and his new method of learning from nature (Reiss, 1982). Interestingly, in Ames’s “Circle of Knowledge,” the circle is left open at the position of “Things.” Thus, similar to Bacon, Ames’s circle of knowledge is not a continuous discourse, but is broken, leaving space for wonder and interpretation (Triche, 2005) at the point at which we are called to investigate and discover God’s creation.

Ames’s *Technometry* follows from the Ramus tendency toward empirical inquiry through the use of observation and the application of one’s experiences of things in the world to the knowledge about nature revealed in a text (Triche, 2009). In a statement, surprising for so ardent a believer, Ames (1629/1997, Thesis 77) emphasizes the importance of taking an empirical position towards knowing when he declares: “Testing all things, retaining that which is good, let Plato be a friend, let Aristotle be a friend, but even more let truth (*veritas*) be a friend.” In this thesis, Ames cautions that when it comes to truth, we should not follow others blindly, even those who are generally recognized to be learned or have authority over us. He adds that we are not to be “slaves” to any man, even our “elders,” because all men are “created in the image of Adam and, thus, have the failings that all humans possess” (Thesis 77). Instead, it is wiser to question the knowledge we are given, testing nature, which is God’s creation. Because it has been created by God, nature is closer to God’s perfection than the imperfections constituted by fallible human beings.

Gibbs (1979) explains that Ames is quoting an almost identical passage from Ramus, and that the quote can be found in a number of Ames’s other works. Additionally, the passage was popular in the New England Colony and was used continuously. Gibbs attributes the last phrase of the thesis, which begins with “let Plato be a friend...” to a passage in Aristotle’s *Nicomachean Ethic*. However, he fails to point out that the key point of the passage, which begins with, “test all things ...,” is a quote from Paul’s first letter to the Thessalonians 5:21. It is most likely that it is this biblical connection that leads to its popularity with Ames and the New England Puritans. Considering the current debate between the authority of science and that of religion, it is interesting that the key “scientific” phrase in this thesis has a biblical source.

*Technologia* as a curriculum (understood more in terms of *curricula vita*, a course of life that provided a context for a course of study), remained entrenched in Harvard and Yale into the

eighteenth century, but gradually faded as the so called “New Learning,” represented by the writings of Francis Bacon, Descartes, John Locke, and in America, Jonathan Edwards took root at institutions of higher learning. While an in depth discussion of “New Learning” is beyond the scope of this work, two examples of this shift can be provided. First, at Harvard College, this shift to the “New Learning” is best represented by the transition, beginning in 1687, from the use of Ramus’ *Logic* to a number of Cartesian based logics that were influenced by the so called *Port Royal Logic*, which was first published in France in 1662 (Kennedy, 1990). Second, this shift at Harvard is also evidenced by a shift in its “technological” theses, not surprisingly beginning in 1687, away from a focus on *eupraxia* and its relationship to living a Godly life, toward a relationship to the natural sciences (Rand, 1933).

### From Technologia to Modern Technicism

To assert that the New Learning submerged the more explicit religious attitudes and impulses is somewhat misleading. For even as the humanist gradually replaced the scholastics more direct attempts to use philosophy and science to prove the existence of and read the mind of God, the impulse to “know God” persevered, as historians of science have well illustrated. This shift in discourse could often hide the same interior impulses. For instance, substituted for the Puritan notion of America as a “city upon a hill” was Manifest Destiny, and then “Progress” (Bercovitch, 1975, 1993), all of which were and are predicated upon the notion of American exceptionalism in both the spiritual and worldly sense (Madsen, 1998). And whereas the Puritans were intent on applying *technologia* as a means to parse out the interior landscape of the individual in an effort to map out the correct life of one existing within a corporate narrative, the New Learning was interested in employing technology to parse nature toward the same ends. For both discourses, control was the crucial element.

In the New Learning, the various disciplines were separated out and boundary markers set up. Hence, one no longer considered integrating theology and ethics with physics or natural history (Gibbs, 1979; Holifield, 2003). In other words, knowledge began the process of becoming specialized, fragmented and obeying the laws of rationalization (Siegel, 1990). As Siegel writes, before the object of scholarly study “was the unity of all knowledge [*technologia*] and that proper method was contemplation alone—to secular attitude that primary focus of study should be individual subjects and that knowledge was best derived through demonstration (induction) and experimentalism” (1990, p. 335). Essentially, a shift occurred from contemplation to demonstration, an act following what Triche & McKnight (2004) describe as Ramus’ “dialectic of the arts” (p. 40), that fragmented knowledge into specializations and created “technologies”—disciplinary specific methods of inquiry—to sustain each specialization. Such action effectively eliminated any reflexive ethical or moral inquiry. Technology was transformed into an applied “neutral tool” to manipulate and control knowledge within newly recognized independent specializations considered necessary for efficient social organization within the academy and larger society. In sociological circles, this is the hallmark of functionalism. Accordingly, discussion and analysis of technology as an organizing framework shifted away from what could be called theological and holistic concerns of education. Technology was detached from any interest in what constituted moral and ethical society. Simply, means and ends were separated. Instead, technology was removed from any social responsibility or culpability for any social ramification. Technology had become but a neutral means by which to bring about certain desired ends.

For the colonial Puritans, technological innovation (following Ames's concept of "good action" which then led to "good works") would have been shared to ease the life of, and to bring prosperity to, the community. Any technological innovation, therefore, was meant for the entire community and not for the benefit of any single individual or group of individuals, which is the current climate of technological existence. However, technology took on a different moral imperative that led to notions of use for the sake of use and technological *progress* for the sake of change. In effect, technology quickly fell into the sphere of a common sense instrumentalism, which framed technology as a neutral tool wielded to refashion the landscape any way social experts (social engineers) desired. All the while, these same experts escaped from having to accept any problematic ethical or moral outcomes embedded within the technological principles themselves.

As a testament to the power of the social narrative assembled by the colonial Puritans, even though technology as a concept and object of use changed, deeply rooted *American* moralistic impulses did not dissipate. Technology no longer operated within an organizing map that guided one through his or her life. However, it did generate power within a new socio-cultural context still tied to the old impulse—Humanist's faith in Progress toward a more perfect (ordered) society, a 'city on a hill' albeit without moral or ethical commentary. This impulse believed technology as discourse of control and as ever-improving machine could achieve what *technologia* never could (and never wanted to). In other words, technology became the means to secure, through rationalism and institutional mechanisms, true order in society, nothing less than a type of utopianism. As Feenberg (1999) writes, "technical progress was believed to ground humanity's advance toward freedom and happiness" (p. 2). This has become nothing less than an American secular theology fueled by the economic assumptions of capitalism that include efficiency and standardization (the two masters of modern education) and innovation (re. change that drives continued consumerism). This secular theology that operates off of a new technological imperative, is based on a linear, fixed rational track toward technological perfection (i.e., happiness), with progress never in question as long as technology continues to change and become more efficient at consuming and generating (Feenberg, 1999).

One way to conclude this discussion is to try and provide a simple summation that frames the shift from *technologia* to technology: *Technologia* was geared toward serving the human search for meaning and progress and functioned as a moral, ethical and spiritual map by which to go about that effort. Modern notions of technology, while still harboring deep impulses generated by the colonial Puritans, transposed the moral and philosophical formula—humans now serve the progress of technology.

#### About the Authors

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