From Industrial Arts to Technology Education: The Search for Direction

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Editor's Note: This is the second of three articles that examines the historical relationship between industrial arts and technology education. The first appeared in this journal's Winter/Spring 1996 issue. It examined the curricular underpinnings of industrial arts in the 1930s and the historical and conceptual relationship to technology education. This article focuses on the subsequent development of industrial arts from the 1940s through the end of the 1970s. This was a period when the profession attempted to refocus industrial arts in response to major national curriculum changes. A third article that examines the transition to technology education in the 1980s and the challenge that the field faces in defining technology education in terms that relate to the present educational climate is scheduled for a sub-sequent issue of this journal.

It was in the decades following World War II that the ideas for what we now term *technology education* began to form. Schools rapidly expanded to keep up with the baby boom, and more children, teenagers, and adults than ever before went to school. The postwar prosperity made it possible for more people to seek out educational opportunities; equally important, though, were the changes in the content of education. Rapid industrialization and technological change placed new demands on schools to develop the scientists, engineers, technicians, and skilled workers who would continue to propel the economy forward. Education increasingly became more technocratic in purpose, and the curriculum more differentiated, as educators struggled to design curricula that would appeal to the ever-growing numbers of students as well as prepare them for the emerging technological age. The new age seemed to warrant a new kind of education, including a new kind of industrial education.

This article examines the period following World War II to the end of the 1970s during which the prewar concept of industrial arts was repeatedly reformulated in an attempt to create a subject that would more closely address the educational concerns of the time. Technology education of the 1980s grew out of this effort. To understand the curricular dimensions of technology education, it is important to understand these antecedent decades also. Technology education is linked both historically and conceptually with industrial arts.

Although the transition from industrial arts to technology education started in the 1940s and 1950s, it was overshadowed by changing mainstream educational practice. In response to postwar political and economic changes, there was a reassertion of the ideas of academic rigor and social efficiency. In the 1930s, a program rationale had been formulated for industrial arts that placed the subject at the center of school reform. But this rationale was based mainly on progressive education concepts that stressed social objectives and individual development, concepts which provoked considerable opposition in the contentious social and political climate of the 1950s and 1960s. The 1960s and 1970s are best characterized by an attempt on the part of industrial arts educators to accommodate a more conservative curriculum perspective. However, the subject field was never successful in formulating a coherent curriculum rationale that would establish it as a mainstream secondary school subject. Curriculum content also failed to reflect technological change. Technology education was a response to the perception among industrial arts educators that the subject field had to be substantially reconstructed.

GROPING TOWARD CHANGE

The term *industrial arts* fell out of favor in the industrial and business communities immediately after World War II and was replaced by the more inclusive term *technology*. Industrial arts was discarded as a way to refer to technical activity primarily because it failed to capture the impact of science; the word *arts* was associated with nonscientific activities.

In response, William E. Warner (1965) and his graduate students at Ohio State University developed, in 1946-47, A Curriculum to Reflect Technology. Basically, it was an extension and modification of Warner's (1936) Laboratories of Industries developed in the 1930s. Five general categories were used as curriculum organizers: communication, construction, power, transportation, and manufacturing. Frederick Bonser had earlier proposed to organize the study of industry around the basic materials of production, such as metals, textiles, and clay, but this scheme never worked (Russell & Bonser, 1914). The program lacked continuity because there was no obvious organizing pattern at the level of instruction. Warner (1936) thought he had solved the problem by focusing on a limited set of objectives in relation to each of the identified categories. It was left to Warner's graduate student, Delmar Olson, however, to attempt to flesh out the substance of a curriculum structured around technology.

Working from the Census of Manufacturers' Classification and the Annual Survey of Manufacturers, Olson (1958) identified eight categories, adding electronics, research, management, and service to the categories already identified in A Curriculum to Reflect Technology, but dropping communication. He further broke down each category into subcategories and proposed to study each in relation to technical, cultural, and social "functions." However, the potential content was extensive. It was impossible to cover everything of importance, yet no practical way of limiting instruction was presented. Warner and Olson failed to provide guidelines that teachers could follow.

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Nevertheless, the attempt to develop a technology-based curriculum was significant in two ways that were later to have an impact on technology education. First, it focused national attention on technology and its use as a descriptor for instructional programs. Second, the use of industries, segments of industries, or other categories as curriculum organizers was introduced and has continued to be used. The Jackson's Mill industrial arts curriculum theory, for example, is structured, in the manner of Warner's and Olson's work, around four "industrial/technological systems" representative of technology: communication, construction, manufacturing, and transportation (Hales & Snyder, 1982).

It was the life-adjustment movement of the 1940s, however, that captured national attention and presented industrial arts educators with their best opportunity. Since the 1930s, high school enrollment had been expanding rapidly, and educators expressed concern over the large numbers of students attending school who did not aspire to go on to college, yet were not interested in pursuing vocational studies. This group, often referred to as the "new 50%," were generally disinterested in serious study, performed poorly, and were often the source of school problems (Butterfield, 1934). Concern over the "new 50%" in the 1930s expanded into a full educational movement following World War II and resulted in wide-scale, national curriculum change.

Educators were groping for ways to deal with the increasingly large group of students who attended school with no apparent goal in mind. Nationally known vocational educator Charles Prosser provided the apparent answer in a resolution he introduced before a conference sponsored by the U.S. Office of Education in 1945 on "Vocational Education in the Years Ahead." Since the late 1930s, Prosser (1945) had been advocating a special "life-education" curriculum. He protested that the disinterested and less academically inclined students were ruining both vocational and college preparatory subjects. An alternative had to be made available for those students not interested in going on to college or enrolling in vocational education, Prosser told the conference, and this should be in the form of a general curriculum designed to prepare good citizens.

Prosser's ideas drew an immediate national response. As a follow-up, regional conferences were held and national commissions established under the sponsorship of the Office of Education. One outcome was the development of a national curriculum of "life-adjustment" education emphasizing healthy living, family and social relations, citizenship, and avocational interests (Zeran, 1953). Another outcome was political action to extend life-adjustment education to local school districts across the country (Spring, 1976). By 1950, the life-adjustment movement was firmly entrenched. One lasting outcome has been the much maligned "general curriculum."

In the 1930s, industrial arts had successfully acquired an identity as a general education subject suitable for all youth. Therefore, the life-adjustment movement had obvious appeal to educators in this area. Progressive educators such as Dewey (1916) and Bonser and Mossman (1924) had persuasively argued for a broad-based study of industry for all students. Industrial arts educators responded by formulating an activity curriculum that stressed practical work as well as the broad social objectives advocated by the progressives. Warner's early work was in line with this new movement; he, as well as other industrial arts educators, stressed the general educational, in contrast to the vocational, value of the subject field. They also adopted much of the progressive educator's rationale, even though the field was characterized by considerable diversity at the program level.

Life-adjustment education would put industrial arts at the center of national curriculum reform. With little hesitation, industrial arts educators climbed onto the life-adjustment bandwagon (Hornbake, 1950) to join the progressives who were playing an increasingly important role in the movement.

The severity of the social and economic conditions of the 1930s, however, had strengthened the hand of the more radical elements within the progressive education movement and had enabled them to gain command by the late 1930s (Bowers, 1969). Counts (1932), for example, advocated using public schools to change the social order by replacing capitalism with a planned, socialized economy. By the end of the war, however, many progressives were attempting to redefine themselves in more moderate terms. The concerns of the 1930s were no longer the concerns of the postwar period. Prosperity had returned along with a strong sense of patriotism, which served to discredit radical talk of reshaping the social and economic order. Progressivism underwent a reformulation that stressed "democratic living," social cooperation, and new methods of instruction emphasizing group interaction and communication. These themes fit nicely into life-adjustment education (Bowers, 1969). Its association with the radical progressives, however, helped to destroy the life-adjustment movement. It also helped to throw the field of industrial arts into disarray.

PROTECTING THE NATIONAL GOOD

"Almost without warning," Kliebard (1986) suggested, "the decade of the 1950s became a period of criticism of American education unequaled in modern times" (p. 260). Critics like Bestor (1953), Lynd (1950), and Smith (1949) savagely attacked public schools as being too anti-intellectual. They wanted to put a clear academic stamp on American education. As Bowers (1969) observed, these individuals were successful in solidifying in the public's mind the perception that progressive education and the life-adjustment movement "lacked subject content, failed to produce disciplined people, showed a general disregard for moral values, and was conducted by teachers who aimed at indoctrinating students with socialist thought"(p. 240). Industrial arts was implicated by association.

Arthur Bestor of the University of Illinois led the attack on life-adjustment education. He was particularly effective in rallying academic colleagues. His book *Educational Wastelands* (1953) attracted national attention. In 1956 he helped organize the Council for Basic Education and served as its first president. The council was used as a forum for attacking public schools and professional educators as anti-intellectual. Critics argued that the schools had to discard the notion of a differentiated curriculum and emphasis on socialization, and return to a single program for all students organized around mathematics, science, history, English, and foreign languages, ideas that were to be expressed again in 1983 in the U.S. Department of Education's report *A Nation at Risk*. Bestor and others criticized industrial arts, regardless of how it was construed or what terminology was used, for not being academically rigorous.

The move to reassert the primacy of the academic disciplines was linked to political developments, specifically the McCarthy hearings (Bowers, 1969; Cremin, 1961; Spring, 1976). Progressive education, with its ideology of social reconstruction, came under attack and was accused of being at least deep pink, if not outright red. Some educators lost their jobs because they were considered too liberal (Cremin, 1961). The National Council for American Education, headed by Allen Zoll, organized anti-communist campaigns to uncover un-American activity in schools. Joined by other conservative organizations, such as the American Coalition of Patriotic Societies, the American Council of Christian Laymen, the Anti-Communist League of America, and the John Birch Society, campaigns were mounted to remove subversive books from school libraries, censor textbooks, reform curricula, require teachers to take loyalty oaths, dismiss suspect individuals, and oppose tax increases for public education (Nelson & Roberts, 1963; Spring, 1976).

The charge of suspicious political ideology doomed the life-adjustment movement and caused industrial arts educators to reformulate their program rationale. Industrial arts, moreover, was not immune to conservative demagoguery. Following the lead of the John Birch Society, William Warner, for one used patriotism as a pretext to attack the loyalty of others. Moreover, industrial arts programs built upon progressive ideas, such as the work of Heber Sotzin at San Jose State College, were soon discarded in favor of more technocratic forms of instruction. Existing divisions within the profession over such concerns as the "vocational value" of the subject or the content of instruction were deepened, as doubt was cast not only on certain practices but also on individuals.

Cold war concerns were used effectively in the attack on public education. Critics contended that America's schools were a weak link in the national defense chain. The arms race was projected in terms of a race for technology. On October 5, 1957, Sputnik was launched, and almost overnight a national consensus formed that "soft" pedagogy was at least partly responsible for the Soviet triumph over American science. Educational reform soon became couched in terms of cold war survival. Vice Admiral Hyman G. Rickover (1959) asserted that the degenerating condition of American education threatened national security. America had to catch and surpass the Soviet Union in scientific and technical accomplishment, and this required greater academic discipline.

On September 2, 1958, Congress passed the National Defense Education Act (NDEA), which strongly emphasized mathematics, science, and foreign language instruction. This was the most far-reaching piece of federal educational legislation ever passed. The act not only signaled greater federal involvement in public education, but it put the stamp of federal approval on what the critics were saying: Schooling had to be more rigorous (Kliebard, 1986, p. 267).

Although the attack on public education was largely political and ideological, it also underscored significant pedagogical differences. The critics promoted what we today refer to as an academic rationalist curriculum perspective. The student-centered instruction of the progressives was rejected in favor of teacher-directed instruction designed to promote the mastery of specific subject matter.

The curriculum was to be organized around a limited number of separate subjects representing the accepted "disciplines." The goal of instruction was to instill in students an understanding of the most important knowledge of the past. Social and personal development objectives were not considered important.

Academic rationalism had gone through changes in the 1930s, mainly due to the work of essentialists, such as Bagley (1938), who contended that all students should have instruction in a common core (the essentials) of current and useful subjects. Although Bestor and other critics in the 1950s tended to subscribe to the more traditional perspective, academic rationalism in the form of essentialism has subsequently dominated conservative educational thought and contrasts sharply with the social reconstruction curriculum perspective of the progressives (Zuga, 1992).

By the 1960s, then, the curriculum rationale that early industrial arts advocates had shaped was largely irrelevant to national concerns. It had been structured on the work of the progressives, who were out of favor, if not disgraced. The life-adjustment movement had aligned industrial arts with a national general education curriculum, but this too was discredited. It was hard to reconcile the subject field of industrial arts with academic rationalism, however. Some educators continued struggling to define the field in relation to the early work of Bonser and Dewey, and to reflect a social reconstruction and personal relevance rationale as they understood it (Maley, 1973), but the rapid ascendance of separate subjects as a preferred organizing pattern of the curriculum increasingly pushed industrial arts out of the educational mainstream. "No longer," Kliebard (1986) suggested, "would projects or areas of living be actively promoted as substitutes for the subject" (p. 268). Sensing this shift, some industrial arts educators attempted to put the subject field on a similar pedagogical footing with academic rationalism.

RECASTING INDUSTRIAL ARTS

Of particular importance was the work of Face and Flug (Anderson & Oldstad, 1971) at Stout State University (The American Industry Project) and Lux and Ray (1969) at the Ohio State University (The Industrial Arts Curriculum Project). They formulated proposals that attempted to place industrial arts instruction clearly within the academic rationalist camp. Through the National Defense Education Act, large amounts of federal money were made available for curriculum development. National curriculum efforts were launched, including the Physical Sciences Study Curriculum (PSSC), under Jerold Zacharias of MIT, the School Mathematics Study Group at Yale University, and the American Institute's Biological Science Curriculum Study (Ford & Pugno, 1964). These national curriculum activities directly addressed the concerns of Bestor and other essentialists. The goal was to add more intellectual rigor to the public school curriculum.

Some federal money was made avaliable for other fields, and it was this limited funding that Face and Flug, as well as Lux and Ray, obtained. Independent of their efforts, Henry Ziel (1971) at the University of Alberta developed a comprehensive approach to the study of technology based on representative processes; William Micheels and Wesley Sommers (1958) advanced the Minnesota Plan, which incorporated core studies in science and mathematics, technology, and design; and, importantly, Paul DeVore (1964, 1968) theorized that technology could best be conceived of as a "discipline" to be studied similar to other school disciplines.

The work of Ziel and DeVore, along with the earlier work of Warner and Olson, was important because it promoted the idea that technology could serve as a curriculum organizer. In addition, the work of Face and Flug and also Lux and Ray, along with the theorizing of DeVore, was important because it represented a significant pedagogical break with the 1930s, 1940s, and 1950s, bringing industrial arts more into line with the academic rationalists, such as Bruner (1960), who were arguing that the fundamental structure of a discipline should be the basis of organizing instruction.

EDUCATION AS A DISCIPLINE

The 1960s saw a major restructuring of the academic rationalist perspective, and this helped to broaden its appeal and provided the foundation on which industrial arts educators attempted to build a rationale for the subject. Bruner (1960), Phenix (1964), Schwab (1973), and others emphasized identifying the underlying "structure" of the various disciplines and the accompanying elements that make up the organizing pattern of the curriculum. This has been an important and influential variation on the academic rationalist design pattern. It focuses attention on higher level conceptual learning, and, in addition, coherence is given to what is sometimes a fragmented and loosely organized collection of bits and pieces of knowledge. Without exception, the curriculum initiatives in math and science launched through the NDEA followed the work of Bruner. The same can be said of the work of Face and Flug and also Lux and Ray. The powerful influence of Bruner and his disciples continues to be reflected throughout American education. The Holmes Group (1986), for example, urged universities to reorganize courses "so that undergraduate students can gain a sense of the intellectual structures and boundaries of their disciplines" (p. 216). Teachers are advised to become better versed in subject matter and in the ways to transmit it to students.

To an unrecognized degree, technology education has been influenced in the 1980s and 1990s by the academic rationalist design pattern primarily because of the work of the structuralists. DeVore's (1964) theorizing is the purest example. He identified technology as a "discipline" and attempted to identity its structural characteristics. As suggested, elements of the American Industries Project (Anderson & Oldstad, 1971) and The Industrial Arts Curriculum Project (1969) reflect this orientation. The attempt is to identify the "structure" of industry. The Jackson's Mill industrial arts curriculum theory (Hales & Snyder, 1982) also contains elements of the academic rationalist perspective.

There is considerable preoccupation throughout the field with defining the boundaries of the "discipline" of technology. When technology educators, for example, talk about the "intellectual domain of technology," they are expressing an academic rationalist perspective as reconceptualized by Bruner and others.

TOWARD GREATER TECHNICAL EFFICIENCY

While one group of industrial arts educators was talking about the discipline of technology and its structure, another was redesigning curricula to focus more directly on technical skill development. Early industrial educators, such as Selvidge and Fryklund (1930), had advocated, in the 1920s and 1930s, the use of practical units of instruction based on the analysis of job tasks. Unlike the progressives, they emphasized the utilitarian value of industrial arts in contrast to its social relevance, and they promoted what we now refer to as the technical/utilitarian curriculum design pattern (McNeil, 1990; Saylor, Alexander, & Lewis, 1981). The mastery of specific outcomes in the form of competencies is the anticipated result of instruction. This pattern had been applied in industrial arts because of the logic and ease of application. Today, the use of this design pattern is particularly widespread among technology education programs centered on technical specialties (Clark, 1989).

The technical/utilitarian curriculum design pattern became more entrenched throughout education in the period of national curriculum upheaval during the 1950s and 1960s. During the cold war, the efficient preparation of manpower was an appealing idea. Youth unemployment also became a dominant topic politically, and national concern was expressed over the technological displacement of workers (National Commission, 1966). These concerns added support for the efficient preparation of human resources. It is no surprise that new national vocational legislation was passed in 1963, and again in 1968.

Also, the efficiency proponents stayed clear of the social and political issues that rocked the educational establishment during the 1930s and again during the 1950s, and this no doubt contributed to their public appeal. Theoretical constructs along with practical procedures were formulated, which helped to guide instructional design and implementation. A considerable amount of this work was financed through military and government funding. The curriculum design pattern was linked to scientific management of human capital, meritocracy, and efficiency (Herschbach, 1992).

Throughout the 1960s and 1970s, the use of behavioral objectives coupled with improvements in evaluation methods resulted in the extensive application of competency-based instruction as a means of achieving greater instructional efficiency and accountability. Behavioristic psychology supported a mechanistic concept of teaching, which fit nicely into a technocratic view of educational management (Newman, 1994; Shor, 1986).

Although the efficiency proponents were aligned with the progressives in the 1930s, by the 1960s they had realigned with the academic rationalists. It was an uneasy alliance. The widely applied ends-means curriculum model popularized by Tyler (1949) provided a common way of designing instruction. Behavioristic psychology supplied the theoretical underpinnings and came to dominate educational thinking. Academic rationalism was applied to content selection. Even though Bruner may have wanted to focus instruction on the underlying structure of the disciplines, in classroom practice his ideas were often transformed into lists of behavioral objectives, ordered instructional sequences, and measures of performance designed to assess student outcomes. In a sense, the academic rationalists were co-opted by the efficiency advocates.

In their zeal to impart more rigor to the curriculum, the academic rationalists focused on instructional content rather than design. The design of instruction, that is, how to deliver lessons, was taken up by Magar (1962), Popham and Baker (1970), and other advocates of competency-based instruction, and came to overshadow curriculum concerns. In combination, however, the two exerted a pervasive influence on education in the 1960s and 1970s (Shor, 1986), and continue to do so.

Throughout the 1970s, the American Industrial Arts Association supplied guidelines for the use of behavioral objectives. Few areas of education failed to come under the influence of the Tyler model. Those within technology education who use what is referred to in curriculum theory as the technical/utilitarian curriculum design pattern do so for the same reasons it was used in the past. Teachers are comfortable with its application. It appears logical; it involves familiar tools, materials, and processes; technical activities form the heart of instruction; students learn skills that they can apply; and its major objective of efficiency is easily understood.

THE FRAGMENTATION OF PROGRESSIVE THOUGHT

While the academic rationalists and efficiency advocates vied for the curriculum spotlight, proponents of other perspectives continued to be active in the background. American education has never been characterized by a single educational ideology.

Freire (1973), Goodman (1964), Illich (1971), and Kozol (1967), among others, advocated alternative perceptions of teaching and learning in the tradition of the progressives. Some, including Illich and Freire, advanced positions that were considered to be more radical than even those of Counts in the 1930s; not unexpectedly, they were denounced in some quarters as subversive. Liberals argued with conservatives over purpose, standards, discipline, classroom organization, outcomes, and control (Shor, 1986; Spring, 1976). Industrial arts educators were not exempt from these arguments.

In the 1960s and 1970s, remnants of the progressive movement of the 1930s and the life-adjustment movement of the 1940s could be found in the schools. In terms of social philosophy, the clearest manifestations are in the alternative school movement (exemplified by schools organized on the Summerhill or Montessori models), civil rights legislation, and educational programs for the handicapped. Today, the social ideas of progressives are best represented by those advocating critical pedagogy (Giroux, 1988; Kincheloe, 1995; Shor, 1986; Simon, 1992). In terms of instruction, such practices as open classrooms, learning centers, and active learning have wide appeal. The idea of student-centered instruction in contrast to teacher-centered instruction has had an enduring impact. The concepts of developmental psychology continue to be important.

Following the 1950s, however, progressive education was unable to exert the collective influence that it once had on educational practice, and it continued to be the target of attack from conservatives. In the 1960s and 1970s, what had been identified previously with progressive education was little more than fragments of practice carried out in an educational environment increasingly dominated by the advocates of intellectual rigor and efficiency. This was also true of industrial arts; teachers employed bits and pieces of instructional practice associated with progressive concepts but gave little attention to the curriculum theory surrounding their use. The field, in general, clung to pieces of program rationale that centered around social and student-centered objectives (Svendson, 1963).

The work of Maley (1973) was the most cohesive example in the 1970s of the attempt to apply progressive ideas to industrial arts. His concept of an experience-based curriculum based on group activities, experimentation, and the integration and correlation of subject matter was clearly in the progressive mold, and reflects the progressive tradition he encountered as a graduate student in the 1940s at the University of Maryland. Maley's work is significant in that it offered a curricular alternative to those industrial arts educators who were searching for a more student-centered approach to instruction. Almost alone, he challenged more technocratic concepts of industrial arts. Along with others, however, Maley struggled to define his program in terms that would have broad appeal within an educational climate that itself was highly fragmented and changing, and within a professional arena that was increasingly occupied with technology and its instructional interpretation.

THE SEARCH FOR DIRECTION

The 1960s and early 1970s can be characterized in general as a period of creative curriculum innovation within industrial arts. The leadership confronted the pedagogical crosscurrents swirling about within the educational community and grappled with the question of how best to represent industry and technology in the curriculum. Cochran (1970) reported on 21 curriculum plans developed in the 1960s alone, ranging from the "Functions of Industry" concept of Bateson and Stern and the "Orchestrated Systems Approach" of Lewis Yoho to the "Georgia Plan," the "Maryland Plan," and the "Maine Plan." These initiatives were part of an overall national curriculum reform that was occurring on an unprecedented scale throughout American education in response to both cold war concerns and the war on poverty legislation. However, with the exception of the Industrial Arts Curriculum Project, the work of DeVore, and a number of state reform efforts, the national influence of curriculum reform efforts in industrial arts was short-lived. Federal and state money to support curriculum change became scarce as educational priorities shifted in the 1970s to other national concerns. Curriculum reform efforts in industrial arts became increasingly marginalized in the face of such issues as busing, accountability, academic excellence, teacher power, student rights, and mainstreaming, which increasingly occupied the public's attention (Spring, 1997). With the demise of the life-adjustment movement, industrial arts was no longer fully allied with a reform movement that could give the field national stature. Within industrial arts itself there was no single core of curriculum ideas around which the field could coalesce. The great number of curriculum proposals, not to mention the differences among them, indicates the high state of flux that the field was in and the difficulty that the profession encountered in the search for a common curriculum direction that would resonate with the educational public. Both within the field and outside, there was a lack of clear perception concerning the purpose of the subject, who it best served, and how.

By the late 1970s, the way was open for the emergence of technology education. The professional leadership itself sensed that substantial changes were needed if the subject field was going to continue to play a significant instructional role in public schools (Industrial Arts and Vocational Education, 1966; Kagey, 1972; Olson, 1972; Paulter, 1976; Scobey, 1977). Two decades of curriculum experimentation had created a climate for change. New curricular possibilities called out for further development.

Technology itself had rapidly acquired national focus. Its immense power as both an economic and social force occupied public discussion (National Commission on Technology, Automation, and Economic Progress, 1966). Much of the school reform in math and science was linked to technology (Ford & Pungo, 1964). Why not industrial education? Technology appeared to be a theme that could not only unite the subject field and provide curricular direction, but it also had the potential to appeal widely to the educational public.

However, the professional leadership continued to struggle with the question of how best to address technology through instruction. The same problems of how to organize instruction that confronted Bonser, and later Warner and Olson, still confronted those attempting to redefine industrial arts. There was no apparent way that such an extensive concept as technology could be reduced to curricular elements easily translated into instruction. Moreover, the movement for technology education could not easily isolate itself from the curricular crosscurrents buffeting industrial arts. As we have seen, curriculum reform is not neutral. It is embedded within larger competing arguments over what is important to teach and how. Debates within industrial arts concerning program purpose and design were essentially a reflection of the larger national political debates over competing educational ideas and interests. Technology education itself became inextricably enmeshed in the legacy of industrial arts and its struggle to find curricular direction within the context of competing progressive, essentialist, and technocratic ideas concerning education.

Early ideas about technology education also reflected the curricular fragmentation and inconsistency that characterized industrial arts. Among early proponents of technology education, those who talked in terms of technical skills, competency-based instruction, and performance testing, may not have clearly perceived their fundamental differences with those who increasingly talked of technology as a discipline. These differences were to become clearer in professional discussions during the 1980s as "conventional" industrial arts came under increased scrutiny by the advocates of technology education. By the late 1970s, critics were questioning the theoretical foundations of industrial arts, and by the 1980s, reformers were calling for not only a fundamental restructuring but also for a change in name to "technology education." However, there was no clear professional perception of the curricular direction that technology education should take.

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