Editorial

Under the Corporate Thumb: Troubles With Our MATE (Modular Approach to Technology Education)

Stephen Petrina

In 1939, Ruth Streitz, a professor of education from The Ohio State University, wrote rather candidly of a proliferation of "canned units" in education. Units of work had been somehow interpreted to be glorified lesson packets of subject matter that could be bought and sold in somewhat of an unrestrained market. Given their relevance to contemporary problems with "modules" in technology education, her concerns are instructive:

> Blind following of dictates, regardless of their sources, caused many teachers to buy ready-made units of work. The result was a mail-order business with the buyer having no idea as to the purpose and function of his [*sic*] purchases in relation to his particular group. It was just as easy to order a unit. . . as it is to order a can of peas or a can of pineapple by a number which indicates content. The "canned unit" robbed the teacher and the pupils of the fun and intellectual stimulation which comes from real discovery and shared enterprises. (p. 258)

It may be worth pursuing a theory of periodicity to help to explain the recurrence of the "canned" product in education. During the 1960s, an annual 300 million dollar industry developed on teaching machine and programed learning products. Currently, but unique to the area of technology education, the same thing is happening with "modules," or more generally, the "modular approach to technology education" (MATE).

MATE connotes a self-contained (i.e., "everything" is there for the student) instructional *system* defined by programed learning theory, technological devices and equipment. Included are instructional systems ranging from desk top technology trainers and kits (e.g., LEGO-Logo, Principles of Technology, Fischertechnik trainers, etc.) to instructional spaces defined by architectural devices and equipment (e.g., Lab 2000, Synergistic Systems Labs, Pittsburg, KS Labs, etc.). MATE can be seen as an extension of benchtop trainers and

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Stephen Petrina is a Graphic Communications instructor in the College of Education and Psychology at North Carolina State University, Raleigh, NC.

electronic kits that are/were integral to electronics and power technology labs in industrial arts and vocational education. Also, MATE is a contemporary manifestation of teaching machine and programed learning theory of the 1930s-1960s.

According to Neden (1990), MATE is "designed around self-contained, two student-workstations that support self-directed, individualized instructional methodologies. Everything needed to complete an assigned task is included in the module area" (p. 28). Graves-Humphreys (1992) explained their "Modular Delivery System" (MDS) variation of MATE, and to the question "what is a module?" answered:

> A module is a defined lab space where students spend a majority of their classroom time completing the instructional activities. This space is equipped with all the materials, tools and equipment that students may require to complete the learning activities. The students follow a set of self-directed instructions that introduce concepts, reinforces the concept, provides hands-on activity demonstrating the concept and allows for validation and evaluation by the instructor (p. 4).

Graves-Humphreys suggests that students rotate from module to module every five days. Consistent with the mechanistic, systems metaphor that Graves-Humphreys suggested to be paramount in MATE, Lundquist, Dunekack & Falling (1991) of the Pittsburg, KS Labs, recommend that the students "cycle through" (p. 36).

This paper is intended to expose some of the troubles with our MATE, and inspire dialogue and debate on what seems to me, an entirely regressive trend in education. Four points will be argued. First, MATE represents more of a continuation of problematic industrial arts practices than a change. Second, MATE has been shaped with dated theory and problematic systems metaphors. Third, MATE may represent a divestiture of authority from institutions of teacher education and a conceding of that authority to product companies. And fourth, MATE represents a circumvention of curriculum theory and a surrendering of the burden of reponsibility for curriculum development to product companies.

First, MATE represents more of a continuation of, than a change from, the traditional industrial arts practice of organizing curriculum on equipment and devices. Certainly, the equipment on which MATEs are based reflect a departure from traditional "shop" technologies. For example, Graves-Humphreys's, Pittsburg, KS's, and Hearlihy's MATEs address technologies such as plastics, biotechnology, composites, computer circuitry, and video production. Herein may lie their real appeal to technology educators. And as Sanders (1990) observed, technology educators seem "enamored" with "new technologies, without any real consideration for how they fit into the curriculum. Many believe

that a communication technology program with 'show and tell' units on fiber optics and lasers is automatically light years ahead. . ." (p. 133). Inasmuch as MATE offers different technologies than those institutionalized through industrial arts, curriculum organization is basically the same. As Sanders suggested, what is involved is often merely a replacement of equipment. Organization is based on new technologies; but still, narrowly constrained and defined by devices and equipment. A major change which accompanies MATE technologies, however, is the retrograde application of 1950s and 1960s programed theories of instruction and their explicit systems metaphors.

Second, MATE is a manifestation of dated learning theories, systems thinking, and their concomitant systems metaphors which reinforce ground-to-be-covered concepts of education. The "cycle through" process of MATE is the most obvious expression of systems thinking. Given a dominant technocratic rationality or tradition in technology education, it's not difficult to understand how programed instruction and systems thinking have come to be accepted as entirely amenable to MATE in the 1990s (Petrina, 1993, pp. 34-37). Programmed instruction and systems thinking are grounded in theories of behaviorism, cybernetics, training psychology, and instructional engineering and design (Joyce & Weil, 1980, sect. 3). These theories were given impetus and developed through work related to military and industrial training, educational practices related to control by behavioral objectives, and teaching machines of the 1930s through 1960s. Systems thinking is typically framed and articulated through models and metaphors defined by inputs, processes, outputs, and feedback loops (Romiszowski, 1981, pp. 7-35).

Systems models and metaphors are reflective of mechanistic assumptions in education. Systems metaphors reinforce values of technocratic rationality and social efficiency, and reflect "a conservative orientation [to schooling] that emphasized stability and certainty, and cast the student in a passive role to be manipulated according to uniform and predetermined behavioral outcomes" (Mazza, 1982, p. 24). Mechanistic assumptions underlie common educational metaphors such as factory, production, machine, and technical processes like "input-output" and "cycle through" (Apple, 1973; Clark, 1988; Westerhoff, 1987). As Eisner (1989) suggested, "the dominant image of schooling in America has been the factory and the dominant image of teaching and learning the assembly line. These images underestimate the complexities of teaching and neglect the difference between education and training" (p. 262). These mechanistic metaphors, according to Heshusius (1991), "narrowly conceive" and "trivialize life" (p. 38). For instance, Westerhoff (1987) suggested that as articulated through the factory metaphor:

> ...the curriculum is an assembly line, the student a valuable piece of raw material, the teacher a highly skilled technician, and the process one of

> gently molding each piece of valuable raw material in to the technician's predetermined design. Evidence of behaviorist thought are evident in this 'doing things to people' understanding of education. (p. 190)

Mechanistic metaphors have shaped thought in education since at least 1913, when Taylor's scientific management began to dominate educational discourse (Callahan, 1962, chap. 9) with a generally simultaneous emergence of Watson's and Thorndike's behavioral psychology.

In this light, there is a contradiction between product companies' claims that MATE is "the technology teaching system of the 21st century" (Hearlihy, 1992a, p. 1) and their reliance on decades-old learning theory and mechanistic metaphors rooted in the 1910s. One might also be prompted to question the validity of educators' claims of a "new departure" (Savage & Sterry, 1990b, p. 10), where the itinerary was partially developed by corporate MATEs, or "new paradigm" (Clark, 1989, p. 19) for technology education.

The relationship between systems metaphors, which frame MATE processes, and claims to a "discipline of technology" is one of mutual reinforcement. For example, Graves-Humphreys, Pittsburg, KS, and Hearlihy variations of MATE are predominantly used to access the codified bio-related, communication, production, and transportation disciplinary systems. These systems have been extensively promoted (e.g., DeVore, 1992; Hales & Snyder, 1982; Savage & Morris, 1985; Savage & Sterry, 1990a, 1990b; Wright, 1992), and widely accepted for state curriculum guides (Putnam, 1992). Tech-prep and other vocational organizations of curriculum are also reinforced through MATE. While certain groups stand to be enfranchised through this mutual reinforcement, traditional control over the ends of technology education is being challenged.

Third, MATE represents a divestiture of control and authority from a domain of technology teacher education, and a conceding of that authority to product companies and their operational context of corporate economics and politics. With product companies' traditional control over the means of technology education, and now with corporate MATE's comprehensive curricululum, authority and locus of control in establishing the ends of technology education may no longer be situated within a domain of teachers or teacher educators. In other words, the authority of teachers and teacher educators to select and fashion their own curriculum is being undermined.

It is ironic that the International Technology Education Association (ITEA) is sponsoring and promoting reforms that would replicate a MATE for teachers across the country (Wicklein, et. al., 1991). Through U.S. Department of Education funding, the ITEA's "Technology Education Demonstration Projects" has placed model demonstration technology education programs in various regions throughout the U.S. The Appalacian Region's programs are MATE centered, with "emphasis on the development of. . . technology mod-

ules" (DeVore, 1991, p. 9). With goals related to a "continued replication" of these programs, the demonstration project is aligned with various institutions of technology teacher preparation. Just how "continued replication" will occur is unclear, but there is precedence in corporate control and "canning" of educational products.

ITEA's relationships with corporate MATEs are, seemingly, intimate. The December, 1992 issue of *The Technology Teacher*, the ITEA's journal, ran a cover advertisement for Hearlihy's MATE. The cover photo of students in a classroom, with a Hearlihy manager posing as teacher, was contrived. This fact was not made known to *The Technology Teacher* readers. With authority granted through that cover ad, Hearlihy is defining what doing technology education *should* look like, and at the same time, advertising on the ITEA constituency's expense account. Possibly to capitalize on the academic authority of a specialized format of text, two MATE ads in that issue (and others) appeared, for all intents and purposes, as articles and *not* advertisements. Is the medium the message? The format and rhetorics of MATE advertising campaigns would alone supply ample content to support several critical lessons for a "corporate media and society" program.

My fourth point may be symptomatic of the previous point. MATE represents a circumvention of curriculum theory through equipment and a surrendering of the responsibility to address issues of curriculum to product companies. Indeed, Hearlihy's "thrilling high-tech curriculum," or "Modular Technology Education" (MTE), comes complete with lesson plans containing "instructor's notes, introduction, objectives, daily activities, conclusion, and tests & answer keys" (1992b, pp. 2m). A teacher's notebook which includes information on acquiring MATE funding, lab layouts, curriculum and equipment, an "outline of MTE testing and grading procedures. . . grade sheets, attendance & activity sheets & more" is also included (p. 3m). Marcraft (1992) offers a similarly comprehensive MATE which includes "combination courseware and hardware for school curriculum" (cover). Lundquist, Dunekack & Falling (1991) indicated that their Pittsburg, KS's MATE, "like the Lab 2000," can be "*purchased and installed as a package, complete with curriculum* [italics added], and has, in fact, been adopted by a large number of schools across the country" (p. 36). Similarly, Synergistic's (1991) MATE offers "the perfect learning environment" that provides "*the way to think*. . . the way to learn. . . *the way to teach* [italics added]" (p. 25). Presumably, the only thing missing from these MATEs, similar to the "canned units" of the 1930s and programed packages of the 1960s, is the student.

MATE, like textbooks, embodies the "selective tradition- someone's selection, someone's vision of legitimate knowledge and culture, one that in the process of enfranchising one group's cultural capital disenfranchises another's

(Apple, 1992, p. 5). Apple also reminds us that behind the famous question about 'What knowledge is of most worth?' there lies another, even more contentious question, 'Whose knowledge is of most worth?" (p. 4).

There is reason to be concerned when the selective tradition is passed to the hands of corporate curriculum developers and centered within a locus of corporate control. As Streitz wrote of similar concerns in 1939:

> Not only has the sale of canned "units" been lucrative but some groups have controlled their content as well. Topics which might lead children to question certain political and economic practices prevalent in the adult world of today have been omitted: "unfairness to workers," "amassing fortunes at others' expense," "selling goods known to be inferior by taking advantage of others' ignorance," "extensive advertising of goods calling attention to certain supposed good qualities to obscure the harmful ones," "refusal to admit historical data that might lead children to question certain patriotic traditions," "consideration of minority groups with rights and privileges based not upon numbers or forces but upon the right of every individual to order his own life within the social structure." The reasons for omissions are too obvious to need elaboration. (pp. 258-259)

Likewise, corporate MATEs admit only selected views and ideologies on the social and cultural interaction with technology. Shaped by corporate values and market interests, corporate MATEs basically amount to "company" views of the technological world; and consequently, determine *what* and *whose* knowledge is legitimate. It would be difficult to find a corporate MATE that was sensitive to critiques which focused on gender, racial, military, labor, and class biases in modern technology; or, represented reconstructionist and reconceptualist views of the social order and social change. It would be surprising to find references to critiques grounded in the contemporary scholarship of the history, sociology, and philosophy of science or technology.

Like weather vanes, product companies may very well point in the direction that the wind is blowing in technology education classrooms. The nature of the popularity and the extent of MATE have not been well documented. Carter & Atkinson (1990) reported on a 1988 study of the use of the Principles of Technology/Energy Concepts, Inc. variety of MATE, but provided minimal descriptive data for the popularity reported.

The problematic condition of middle and high schools in the U.S. makes any criticism of something that anyone is "enamored with," including industrial arts projects, a sticky endeavor. However, in a context of a scarcity of resources and tax-payer dollars, the "revolution in [technology] education" that MATE companies are fueling, possibly through the Perkins Act of 1990, is disturbing (Synergistic, 1992, p. 33). With Synergistic's MATEs ranging from

$2,495.00 to $12,980.00, Hearlihy's from $329.00 to $3,235.00, and other corporate MATEs within similar ranges, a critical look at MATE, if only from the standpoint of a concerned citizen, is warranted.

The notion, or panacea, of restructuring through new equipment and corporate curriculum, as opposed to pedagogical theory and sound practice, deserves critical assessment by educators. Otherwise, curriculum planning within technology education classrooms is liable to be nothing more, as Streitz suggested of the "canned unit" in 1939, than "shopping."

Reflecting on Schubert's (1986) comments, curriculum planning should rightfully be something more than shopping, in that what we are dealing with is "the fate of our children and youth, and what it means to turn their lives toward greater growth. . ." (p. 8). Certainly, Graves-Humphreys's, Marcraft's, Pittsburg, KS's, Synergistic's, or Hearlihy's MATE is no match for the practices of an imaginative and resourceful teacher with a grounding in contemporary educational theory, who can plan, design and redesign curriculum; and understands the difference between merely doing and a contextually rich educative experience. As Schrage (1990) wrote of the current "nintendo" mentality in education, which has much to do with technology educators' courtships with corporate MATEs: "The question *isn't*, 'what technologies do we need to best educate our children in the schools?' It's *'what is the real mission of the schools?*" [italics added] (p. F3).

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