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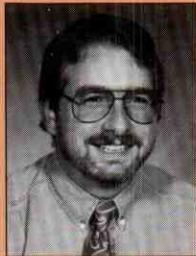
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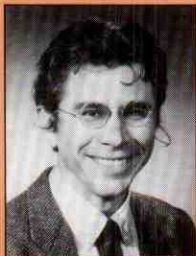
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Educators Address Modular Instruction

T*he modular teaching approach in technology education has been hailed by some as the future for the profession, meanwhile other educators denounce the use of the approach. This divergence of opinion has increasingly become a discussion item, and in some cases, a point of contention among educators within the technology education profession.*

In order to publicly examine this issue, four educators, who represent divergent points of view, have been asked to respond to a series of five statements concering the use of modular instruction in technology education. These statements were developed by Michael K. Daugherty, Illinois State University, and Patrick Foster, University of Missouri, in an attempt to represent all divergent points of view relating to the development and use of modular instruction in technology education. This discussion was initiated under the direction of the Technology Teacher Editorial Review Board in an attempt to promote scholarly debate.

The modular approach in technology education is an exciting, efficient, and effective student-centered means of introducing students to a variety of broad technological concepts.

Gene Gloeckner: This is certainly a true statement. Some modules are clearly more exciting, efficient, and effective than others, but modular education works. Whether modules are developed by vendors or teachers, the modular approach allows far more exposure to tools, materials, and processes than previous laboratory designs. At the same time, this design saves school districts money by needing only one set of materials per module. Teachers also modify modules without disrupting the entire curriculum. The idea of rotating students through a broad variety of technological tools provides the essential initial knowledge base which youth must possess in order to solve real-world problems. The most successful modular programs integrate problem-solving activities throughout the curriculum to ensure that students can use their newly-discovered knowledge to solve real problems.

Pat Hutchinson: I think that the first time kids see some of the activities, many of them find them exciting.

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PATRICK FOSTER

And the idea of *processing* them through the experience may be efficient, although that sounds like a teacher- or administrator-centered value. In most cases, I do not see modules as particularly effective in providing students with the transferable tools they need to solve problems in the larger world. I don't think most of the technological concepts introduced are broad, especially for the levels for which they are introduced. When broader conceptual organizers such as "structures" or "mechanisms" are introduced, I feel students need more time than can usually be given in a modular experience to reflect upon how it applies to a number of different contexts (that is, transferability).

Mike Jensen: In this period of education reform, the use of modules to manage the classroom/lab environment allows for great opportunities in the realm of teaching technology, yet the greater attribute is the ability to manage large classes with the ease of an appropriately sized class. More important, in the use of modular instruction, is the emphasis on the students to organize and manage their learning environment as well as create accountability in their work. Another consideration that I have observed personally is . . . if one views our system of technology as content, it is the methodology of modular instruction that helps to model the aspects of management that we need to include in our instruction of technology as content.

Steve Petrina: False! The common suggestion that modules are a "student-centered means" raises two points. First, modules are "module-centered," not "student centered."

Modules are the feature of the curriculum. When modules are turned-on, and students-plugged in, there is strong behavioristic control at work. Sessions are filled with simple stimuli and response but student freedom of choice and expression of response are extremely limited by the modules' designs. Second, quite a bit of discourse has been given to the "means" and "delivery systems" of technology education and little attention paid to the "ends." If the end of technology education is to impress students and administrators with a glance at someone's narrow idea of the future, or train students in the use of certain narrow technologies, then modules may be effective. But if the end is technological sensibility and political astuteness for students as citizens, then modules are irrelevant.

The modular approach holds great promise for improving the public image of technology education. It is responsible for a resurgence of outside interest in the field; furthermore, it encourages the integration of school subjects with technology.

Hutchinson: I've heard the public image argument a good deal, and I know of a number of "high tech labs" that have been purchased in order to buy time to actually do the homework necessary to develop thoughtful, innovative curricula. From people who took this route some time ago, I also hear that it was an expensive strategy; in the long run, the more highly programmed, turn-key facilities have not had the flexibility to keep up with evolving insights of teachers and growing demands of students. I see little evidence that modular labs foster integration—indeed, the opposite.

Most modular labs promote the image of being self-contained. At any rate, integrative programs are much more the result of teachers' and administrators' attitudes than physical settings.

Jensen: Technology Education is the integrator of instruction and is a common, fundamental thread that binds the course work and subject areas of English, social studies, math, art, science, and others. Due to the use of the modular approach to instruction, a technology learning module switches quickly to a module for another subject area or a unit of instruction for the student who desires to go beyond the limits of standardized classroom instruction. The use of modular instruction has afforded us, at Paonia High School, an opportunity to provide students with an alternative style of learning. Changes in the delivery of instruction have allowed us to establish rigor that sets the technology education program at an equivalent level with all subjects in our school.

Petrina: True. Modules are image driven, and impressive to those who would be apt to judge education in the 1990s on superficial image. Construction of this image entails a large investment of scarce tax payer dollars in education. Maintenance of this image will not come easily as competition increases and budgets shrink. Modules will dilapidate and, like benchtop trainers, die hard. It's ironic that after claiming a large share of school budgets in the past, we are insisting on capital investments as a bailout from the past! Before image, ought we concern ourselves with credibility, professionalism and the social construction of relevant knowledge? Modules are not bringing groups of students and

teachers to tackle some of our most severe environmental and urban problems through a democratic dialogue that may or may not require that a simple "equation" be solved.

Gloeckner: During a recent visit to a modular high school laboratory in Colorado I was able to see five teachers and a vocational counselor using the technology laboratory during the same hour. The teachers included two from technology education, one from physical education, one from physics, one from biology, and one from business. Clearly, this facility is a center of learning within the school and provides a natural setting for integration. In fact, at this same school, three teachers have developed an integrated pre-engineering class. The mathematics, physics, and technology teachers are working together, using the technology laboratory as the vehicle for this integration. Several model modular laboratories have helped technology education explode over the past few years, providing an intelligible example for school boards and the general public to view.

Modular technology education is an unfortunate return to outdated practices, emphasizing equipment over concepts. It is a return to "unit shops"—an unrealistic attempt to divide all of technology into segments, each of which is essentially meaningless without the others.

Jensen: Having been a technology teacher in unit shops and in general shops, I find that the use of modular instruction, as a method of instruction, to be a prime unifying force in tying all aspects of technology together. Modular instruction allows for superior

instruction in the breadth of the curriculum, as well as greater depth of the curriculum. Most technology programs, utilizing modular instruction, are providing students with activities that cover the gamut of technology systems, and can allow for the student to delve into the depths of concepts and skills at enhanced levels. The commonality to any modular system of instruction is the management system, it is the heart of modular instruction and should have been the heart of any traditional shop class/lab if students were to succeed at learning.

Petrina: False and True. Modules do not represent a "return" to "outdated practices"—for we never left! Modules are proof that technology educators are no different than most industrial arts educators, or their colleagues in other curricular areas. Elsewhere in education, schools are investing heavily in "integrated learning systems" laboratories. These are commercial, "student-centered" and "computer-based" systems for remediation and test preparation in core subjects. By 1992, over 45% of our schools had already made this investment. Modules are not designed to provide a holistic view of real world contexts and problems, and are more educationally constraining than industrial arts machines were. The equipment has changed, but our notions of what and whose knowledge is most relevant has not changed.

Gloeckner: Modular technology education could be divided into meaningless segments; but this statement assumes ignorance on the part of the teacher. Teachers will use modules once and alter modules to fit their district's curricular needs as well as the needs of their students.

Technology teachers are not going to support teaching equipment and processes which do not have a realistic use. There is also an assumption in this statement which concerns me. It is assumed that if you use modules you cannot use any other delivery system. This simply is not the case in most schools. Modules are only one pedagogical tool used by our professional technology teachers.

Hutchinson: Emphasizing equipment over concepts is unfortunate, wherever it happens. And while I think it is possible and even necessary to "chunk" technology in order to introduce needed technical skills and insights, I don't see doing "CAD/CAM" or "Robotics" with junior high students as components of a basic experience. It would seem unlikely to me that a number of modules chosen for their value to "create a public image" would add up to a meaningful program.

The development and implementation of the modular approach in technology education has been spearheaded by corporations, ignoring the pedagogical expertise of teacher educators and abandoning proven delivery methods.

Petrina: False. The production of modules has largely been a commerical affair, but the adoption of modules has been an educational and political affair. On one hand, a lucrative educational market is enticing to vendors. Ignoring any motives to indoctrinate, their business is to diversify and make profits, not educate. Their success is measured by sales, and I suspect most are doing a good job. Educators on the other hand, partially driven to centralize through federal monies, are defining what technology

education must look like. Modules are a serious mechanism for centralized authority in technology education. Given the condition of teacher education, maybe it was inevitable that commercial vendors would step in to provide teachers with their commodities. But the fact is, corporations and their modules are not going to solve the most critical professional problems in technology teacher education.

Gloeckner: This statement bothers me. Vendors have dedicated millions of dollars to research and development. They are developing both content and delivery systems which are unique. Instead of being criticized, vendors need to be appreciated for their contribution to our profession. Many states, universities, and local districts have developed curriculum materials. Nationally, curriculum materials in our field have been and are being developed by National Science Foundation projects, U. S. Department of Education projects, The Center for Occupational Research and Development, and NASA, just to name a few. Many technology teachers have chosen to incorporate vendor-driven modular technology education. My guess is that they are choosing modular technology education because it does work. Modular technology education is simply one more tool to help teachers assemble a curriculum which makes a difference to their students.

Hutchinson: Not exactly, to my mind. For the last fifteen or twenty years it has been dawning on industry, government, teachers, teacher educators, school administrators, parents, students, educational vendors, and entrepreneurs that a new kind of technological education

is needed. Change has been most tangible where it has been driven by a profit motive. I don't think vendors have tried to ignore educators, but teacher education across the country has not been particularly forthcoming with a clear vision of the nature of this new field. Actually, many of the modular labs have been developed by former teachers, so they are already factoring in their image of what constitutes a worthwhile educational experience. It seems to me most of them came through behaviorist-type teacher-training programs, and I think Dewey provides better models for the educational reform we *really* need.

Jensen: I am always amazed at people who attack corporations for promoting modular instructional practices. Since I have been in the technology education community, I have seen more modular instruction developed by curriculum teams and by classroom level instructors than any corporate entity. I was a student teacher in 1979, in a modular industrial education instructional facility and that school was using the modular plan long before 1979. Traces of modular instruction could be found in very innovative industrial/technology programs when Sputnik began to shape the realm of American education. One must consider that the tried and true methodologies have changed extremely, such as lectures becoming more interactive and multimedia based. Standardized techniques must be altered to accommodate all student needs, all of the time. It is the teacher's responsibility to ensure that the instruction is appropriate for the student and the technology program; a skill acquired from the teacher educator.

The modular approach to technology education is a positive experience for the learner. By placing the responsibility for learning on the shoulders of the student, modular instruction allows them to work at their own pace, and to some degree, to make decisions about what areas of technology they will study.

Gloeckner: In general, I agree with this statement. Some students find the modular delivery and value its ability to help them learn how to learn. During one of my first visits to a modular technology education middle school program, I talked to a girl working on a pneumatic activity. I asked her if she knew that most girls in America are not exposed to the technical units she was studying. I'll never forget her response: "That's too bad. How will they know how things work?" The modular approach, however, does not work for all students. Some find the modular approach boring. One technology teacher referred to modular education as "tech by numbers." However, I argue that modular technology education is what you make it. The technology teacher will need to use additional tricks from his/her education and experience to help motivate students who lack the discipline to learn how to learn through a self-paced system.

Hutchinson: If we want to place the responsibility for their learning on students, we need to work with them to set up appropriate problems in which they are truly interested. I do not think this is accomplished by putting them through predetermined activities in a programmed way or by relegating teachers to the role of monitor. I feel that much of the work that has gone into developing elaborate modular lab programs has

been misplaced. There is a place for short units of self-instruction and it is not center stage, as the total or even core component of a student's technology experience. Rather, it is on the sidelines, in the resource area. In a truly design-based technology program, the teacher has a *very active role*, setting up appropriate contexts, guiding inquiry, fostering reflection, setting standards and constantly refocusing on the individualized needs of the students.

Jensen: The increased responsibility, honesty, integrity, and accountability of learning has led to one very positive aspect I have admired with our students . . . flexibility. Most students seek the modules as a refuge for learning from 6:30 a.m. until 9:00 at night in order to complete the projects required in technology courses and other programs in the entire school building. The modular learning system has provided students with active learning, cooperative learning, individualized learning, and interdisciplinary learning that the student has accepted as being a highly successful part of their overall learning experience in a rural, secondary school environment.

Petrina: True and false! Inasmuch as modules are a form of entertainment, they can offer a therapeutic, and seemingly positive, experience for students and teachers. Like Nintendo and television, modules cannot promote nor offer criticism on students' speaking, writing, and social processes. Therapeutic as they are, modules are a far car from the laboratory of democracy, where real world experiences are reconstructed, and values tested and critiqued, that Dewey advocated eighty years ago. Students, or the teacher for that

matter, make no decisions on what (and whose) technologies will underwrite the theme of their commercial modules. Modules on Third World technologies, the kitchen, or the office and service industries are not available. What would a module on bicycle technologies do for a middle school child? It would be heresy to produce a module on the furniture (wood) industry's technologies! I recommend a module to provoke students to interrogate their use of module technologies.

Summary

The panelist respondents, while representing divergent opinions and populations, have disagreed on some of the major tenets of modular instruction, but at the same time, have come to some common agreement on a number of issues. The panelists seemed to agree that by utilizing modular instruction in technology education, educators can reduce the time necessary to develop a technology-based program. Additionally, all four panelists indicated that modular instruction can help reduce the effort technology teachers' must exercise implementing mundane classroom management duties. However, the panelists did not all agree that this reduction in classroom management effort was a positive factor. Panelist Mike Jensen stated that modular systems give the teacher "the ability to manage large classes with the ease of an appropriately sized class." Conversely, panelist Pat Hutchinson warns of the dangers of "relegating teachers to the role of 'monitor.'"

The panelists also expressed moderate agreement on the effectiveness of modular instruction in technology education. But effective

for what? If the purpose of a technology program is to "impress students and administrators," panelist Steve Petrina contends, "then modules may be effective." But to panelist Mike Jensen, "the use of modules . . . allows for great opportunities in the realm of teaching technology."

The modular-technology debate has been ongoing for some time, and it has produced much healthy discussion among educators. The debate about the merits and drawbacks of modular instruction in technology education will not be settled here. However, The Technology Teacher Editorial Review Board would like to thank these four panelists for helping the profession take the next logical step—bringing the dialogue concerning this critical issue out of casual discussions in hallways at conferences and on the Internet, and into a more formal, professional debate.

Undeniably, modular instruction has become a part of many technology education programs. Perhaps, it is time for the profession to reach a consensus on the role modular instruction plays and should (or shouldn't) play in the delivery of quality technology education instruction. As panelist Gene Gloeckner puts it, "modular technology is what you make it." Hopefully, through this and other professional debates and discussions we can decide what we make it!