# NSF Supported Engineering Technology Programs and Institutional Changes

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In FY95, Sinclair Community College was awarded NSF grant to establish a National Center of Excellence for Advanced Manufacturing Education. Now in its third year, the AME Center has made major progress in transforming engineering technology education as it prepares students for careers in the Manufacturing Engineering Technology

Under the guiding influence of the AME Center, the learning environment is evolving through the pilot testing of curriculum modules that have been developed for basic science and mathematics. In contrast to the traditional classroom model, the new modules are more discovery-oriented. They are activity-based and paced by the development of the students' individual interests. To add a distinct flavor of relevance, the modules are more contextual, in the sense that they relate the basic knowledge to specific application areas. They involve greater emphasis on more rapid learning through teamwork, and they have gained industry validation.

Faculty are already being trained in the philosophy and use of the new modular approach. The first series of faculty workshops was held in the summer of 1996 through the Sinclair's emerging Center for Interactive Learning. Additional workshops are being scheduled throughout the academic year. They will emphasis not only the facilitation and delivery of the learning modules, but an understanding of how the modules are developed.

Traditionally, individual curricular programs have tended to be separate, stand-alone entities. The conventional structure has been successful in educating students in specialized areas, but it has inhibited an appreciation of the interrelationships among specialties. The new approach emphasizes increased integration across curricular boundaries (or barriers); within the Manufacturing Engineering Technology program, the process is referred to as the "integrating manufacturing experience." It serves the essential purpose of demonstrating to the students the importance of interfacing and working effectively with fellow students and coworkers from different disciplines. The philosophy is being used in many of the modules. Beyond the modules themselves, the philosophy is being adopted in courses in quality engineering technology, industrial engineering technology, and applied arts.

In FY95, Sinclair Community College was also awarded a NSF grant for the acquisition and installation of special stereolithography, or rapid prototyping, equipment to support the drafting technology program. The instrumentation accepts a CAD drawing in digital format and automatically molds an actual model of the part under study, in a matter of a few hours. Precision of the instrumentation is such that parts generally conform to the stated dimensions within about 0.005 inch.

The rapid prototyping equipment has been in full operation since February 1996 with great success. Student response has been particularly enthusiastic. Traditionally, to the drafter the part

being drawn has often been an abstract concept, and the technical drawing is an abstract representation of it. Now, however, with one simple added step the abstract concept quickly becomes an actual three-dimensional rendering and abstraction becomes reality.

A major benefit of Sinclair's rapid prototyping capability is that students receive training that is up to, and sometimes well beyond, current industry practice. It adds a valuable dimension to their education and notably increases their marketability.

Steps have been taken to make training and experience in rapid prototyping accessible to students in other curricula. Workshops have been held, for example, for TechPrep students. Faculty and students in the fine arts departments have used the equipment for generating original sculptures. It has been used in commercial arts courses for designing prototype company logos, and the medical technology departments have expressed interest in producing medical prosthetic devices.

Plans are just getting underway to offer the rapid prototyping equipment for course enhancements in other departments across the entire campus. Through Sinclair's distance learning initiatives, we are offering the rapid prototyping enhancement to other institutions. To date, remote access has been provided to six local companies to assist in their product development activities, and we expect to accommodate numerous additional requests in the future.

In FY95, Sinclair was awarded another NSF grant to organize and host a national "workshop to define a national agenda for the future of engineering technician education." This three-day event was held on the Sinclair campus in October 1995, and was attended by 75 invited participants from academia, industry, and government. Purpose was to examine the many cultural changes that are certain to occur in the near future, specifically in the area of engineering technician education, and to develop an investment strategy for implementing the most productive changes in the most effective manner.

The final workshop report has been completed, printed, and distributed to a predetermined mailing list. In additional, more than 600 independent requests for copies have been received as the result of an internet posting. Comments on the quality of the report have been universally positive.

The workshop participants and the follow-up editorial team identified a number of desirable initiatives in seven broad areas: evolution of the educational environment; program assessment; the changing nature of program accreditation; the education-career continuum, interacademic articulation, and the importance of lifelong learning; promotion and marketing; the changing nature of technical employment; and faculty issues.

A number of areas are considered appropriate for immediate implementation at Sinclair Community College, or at least to influence cultural changes that are happening currently. For example, the perennial issues of faculty workload, faculty job descriptions, faculty account-ability, and faculty performance evaluation are currently under intense review. It is not clear how the traditional system will ultimately be modified, but the review process is certainly one that could benefit from the insights brought by the workshop participants.

Articulation agreements with other academic institutions are under continuous review and revision. Generally, the agreements are written in broad and terms and do not address, specific issues of, for example, course credit transferability when there is an incongruence in the way and in the sequence that course material is delivered. Using the recommendations of the workshop report and the leadership role of the Manufacturing Engineering Technology modular learning initiative, the intent is to negotiate a series of landmark articulation agreements that are flexible enough to accommodate these cultural changes and assure that the transferring students will benefit thereby.

The report points out that, with the exponential growth in the availability of educational opportunities in various electronic formats, institutional identities are growing less and less distinct. A student who has a learning experience by any of the distance-learning modes may easily lose awareness of which institution of higher education is delivering the course material. This is particularly true in statewide consortia that provide regular broadcast services and a process for awarding academic credit. If a number of widely separated students receive the same learning experience from a common source and achieve comparable results, does it really matter whether their transcripts all carry the same institutional label? Within the engineering technology disciplines, we will negotiate and explore with sister institutions processes whereby course materials might be delivered by a common process (or, more important, an alternate process with comparable results) and enable the students to receive recognition by all of the participating institutions.

The workshop's original planning team has also become the editorial board for the final workshop report, and stands ready to propose specific prioritized initiatives to put the many recommendations into practice.