College and universities seek to respond to the manpower needs of industry, business, and government through continuing reappraisal of computer education. Reappraisal was the unifying theme at the Fourth Joint College Curricula Workshop in Computer Science, Engineering, and Data Processing. Nearly 100 educators considered course content, model curricula, instructional materials and methods, two- and four-year program articulation, and employer needs. The workshop, held February 2-4, 1978, in Orlando, Florida, also provided sessions dealing with the use of microcomputers and top-down programming methodology in community college computer education.

Objectives of the workshop were
(1) to discuss course content, curricula, instructional systems, computer applications, and hardware and software required to support educational programs in computer science and data processing, and to appraise data processing programs at American community and junior colleges;
(2) to discuss computer education for business, management, and information systems specialists, to review new and existing programs in computer science and engineering designed for undergraduate, junior, and community colleges, and to discuss articulation problems between two- and four-year college programs; and
(3) to discuss new and existing courses and degree programs in computer and information sciences, to identify the needs of industry, business, and government, and to recommend how colleges and universities should meet these needs on both a local and national level.

Community and data processing educators expressed concern over the future of their profession. They asked the following questions:
(1) How do community colleges find and keep good business data processing or engineering technology faculty?
(2) How, with heavy teaching loads and low professional incentives, do community college educators keep up to date?
(3) How should community colleges use microcomputers? How should they be used in community college curricula, and how much do data processing and engineering technology students have to know about them?
(4) How and to what extent should top-down structure design and programming be taught in the community colleges?
(5) How should educators teach various computer courses, and what should such courses contain? How should educators structure the curriculum and what materials should they use to support it?
(6) How can community college educators get together professionally, especially two-year instructors in business data processing and computer technology in small schools, educators currently setting up business data processing and computer technology programs, and educators searching for the right computer facilities for their programs?

The participants agreed that there should be a "total disagreement" over the adoption of a single model curriculum for the large variety of computer science, engineering, and business DP programs. In considering the question of a model curriculum, the workshop identified the factors that had the greatest influence on curricula implementation, especially in community colleges. They included background of the faculty members, enrollment and faculty size, community needs and the regional job market, and the placement of the curriculum in a given department of the institution.

Although great differences presently exist in computer curricula, an emerging trend is the design of two-year programs which interface with four-year programs. Some colleges offer a multiple-phase program offering both two- and four-year degrees.

One highly recommended ingredient in successful computer education programs at the two- and four-year levels is practical experience which develops problem-solving skills. It can be provided through internships, cooperatives, volunteer projects in industry, and senior projects and case studies on campus.

Because industry, business, and government demand four-year degrees of beginning applications programmers and systems analysts, more and more community college graduates are continuing their education at four-year institutions. This tendency creates a need to establish articulation agreements between community colleges and four-year colleges and universities. Articulation, i.e., transfer credit for courses, would offer many benefits, including greater uniformity of course content, less course repetition by transfer students, and definition of course content lead-
A number of invited speakers addressed the workshop. At right, Gerald L. Engel of Old Dominion University dealt with current needs and offerings in computer science curricula. Below, Joyce Currie Little of the Community College of Baltimore, spoke on community and junior college computer curricula.

ing to better planning of basic and advanced courses (permitting four-year institutions to concentrate on advanced courses). Articulation agreements could also spur the development of accreditation standards.

One session at the workshop described effective use of mini and microcomputers in teaching computer architecture at four-year colleges, while another session reported that students in community colleges are highly motivated and interested when they are first required to work with simple digital hardware in a laboratory. This is especially true in the computer technology and pre-bachelor of electronic technology programs. Other areas of special interest to the community college and small college teachers attending were the spiral approach in the teaching of introductory computer courses; awareness of the widening use of structured programming and software engineering techniques in industry, business, and government; and examples of new curricula in business systems analysis.

Both speakers and participants indicated that a courses-oriented model curriculum has a more direct impact on four-year rather than two-year institutions, since two-year programs are tied so closely to community needs and the curricula chosen by nearby four-year institutions. Two-year schools and small colleges address local needs, whereas universities serve a wider regional/national need and graduate a computing professional who is required to know, or is assumed to know, subject matter from the core and kernel model curricula of the national societies. Accreditation guidelines are based on this core material.

At a meeting following the workshop, the Education Committee decided that it would work on a number of curricula areas in the following year, including

1. computer technology curricula materials for community colleges and BET programs,
2. software engineering tracks at the undergraduate and graduate levels,
3. a review of the model curriculum,
4. undergraduate and lower-level graduate curricula for computer technology programs in the health sciences, and
5. business/engineering information systems programs.

The committee chose subcommittee chairmen for each interest area. Dr. L. Jahn, University of Dayton, and Dr. J. Little, Community College of Baltimore, will chair the group on computer technology curricula materials, while Dr. Richard Fairley, Colorado State University, and Dr. Randel Jensen, Hughes Aircraft DP, will head the group on software engineering. Dr. Gerald Engel, Old Dominion University, and Dr. Oscar Garcia, National Science Foundation, will lead the model curriculum review group, and Dr. Karen Duncan, University of South Carolina, Dr. David Possel, University of Rochester, and Dr. Edward Angel, University of Rochester, will head the subcommittee on health-science computer-technology curricula. Dr. David Rine, Western Illinois University, and Dr. Gerald Wagner, California Polytechnical University, will chair the group on business/engineering information systems programs.

Persons interested in working on one of these subcommittees should contact Dr. David C. Rine, Vice Chairman IEEE-CS Education Committee, Suite 447, Stipes Hall, Western Illinois University, Macomb, IL 61455; (309) 298-1315.

Workshop proceedings are available and may be purchased from the IEEE Publications Office. The Bookshelf, page 129, provides information on ordering this publication.