- Defining goals and outcomes for mentoring.
- Positing the program in the organization.
- Determining and obtaining program resources.
- Developing and coordinating the program.
- Selecting and monitoring participants.
- Assessing the program.

These provide an overview of issues that must be considered. Their successful implementation will require commitment by the participants, the department, and the institution.

The development of faculty in technology programs who can work, manage, and lead in a diverse environment ought to be a mission of our institutions and programs. The preparation of graduates who are well prepared to meet the challenges of careers in technology professions requires a highly qualified faculty. Members of a diverse faculty who are prepared to provide the appropriate learning experiences may also provide critical elements as role models for all students and faculty.

Informal and formal mentoring designed to facilitate the development of highly qualified and diverse faculty enrich and strengthen academic institutions. As academic programs in technology evolve and grow, the need for highly qualified diverse faculty will increase. Mechanisms and strategies to meet the challenge of the 21st century must be implemented and institutionalized to meet the requirements of industry and education for a diverse professional workforce. These challenges can only be met if the academic role models are in place to inspire, motivate, educate, and meet the needs of America's greatest strength—diversity.

Richardson and Skinner (1991) asserted that "the principal obstacle to changing the learning environment to better accommodate diversity and quality is the degree to which current arrangements serve the purposes of those who operate the higher education enterprise" (pp. 253-254). The future of our professions, and that of our students, may be enhanced through continued examination of issues related to quality and diversity. Open minds must apply this knowledge and available resources to develop, implement, and institutionalize successful mentoring programs to meet the needs of students, institutions, industry, and society.

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3. Government Policies Impact Technology Education in India

by R. Natarajan

Since the country's independence in 1947, a series of well-conceived policy statements has been enunciated. They include the Scientific Policy Resolution (1958), The Technology Policy Statement (1983), The National Policy on Education (1986), and a series of Industrial Policy Resolution Statements beginning in 1948, the latest one being drafted in 1991. A draft for a new technology policy was circulated for discussion in 1995. It is generally accepted that science, technology, and education are critical ingredients for national economic and social development. While science and technology influence the utilization of natural resources and capital, education is concerned with human resource development. July 1991 marked the beginning of a sea change in our perception of national economic development. The New Economic Policy and the New Industrial Policy (of 1991) were aimed at promoting globalization, privatization, and liberalization.

In post-independence India, the goals of education have been tuned to be in line with national goals and aspirations. These include economic development to further the material well-being of people, social and political development for living harmoniously and promoting a democratic and just society, and intellectual, cultural, and aesthetic development to enrich the quality of life. There is no doubt that there has been a discernible and credible quantitative expansion in science and technology, research and development, and technology education in India since independence. Whether quality, excellence, and relevance to national needs have been achieved and ensured is a moot point.

FUTURE DEMANDS ON THE TECHNOLOGY EDUCATION SYSTEM

It is becoming necessary to prepare engineering graduates for an increasingly quality-minded corporate environment. The engineers of the present and of the future must contend with rapid changes and should possess traits such as a strong grasp of engineering fundamentals, communication skills, a desire for continued and lifelong learning, a flair for innovation, and the ability to work effectively with others in a group environment. Increasingly, the fact that engineers will work in different countries, with different laws, cultures, procedures, and standards relating to the education and practice of engineering, places additional responsibilities on the educational systems.

The structure and sequence of engineering programs have remained unchanged for too long. Major changes are necessary in order to produce integrative curricula that will promote interdisciplinary skills and relevance to real-life problems. Concomitantly, India must produce a new breed of faculty, with research and development expertise and who are also capable of generalizing in their instruction and are familiar with pedagogic techniques based on educational technology.

THE 1986 NATIONAL POLICY ON EDUCATION

The National Policy on Education (1986) called for the All India Council for Technical Education (AICTE) to be vested with statutory authority and to organize mandatory periodic evaluation of engineering institutions and programs by a National Board of Accreditation (NBA); the NBA was established in September 1994. Accreditation is a process of quality assurance involving appraisal by groups of external peers. To a large extent it is analogous to the ISO 9000 certification; just as the latter is welcomed by the corporate sector, it is hoped that accreditation will achieve the desired purpose.

Accreditation is a process of quality assurance whereby an approved institution or program is critically appraised at intervals, not exceeding six years, by a group of external peers as to whether an institution or a program meets the norms and standards prescribed by the Council from time to time. Accreditation does not seek to replace the system of award of degrees and diplomas by universities and boards of technical education. Accreditation is intended to accomplish the following objectives:

1. To assist the public, prospective students, educational institutions, professional societies, potential employers, and government agencies in identifying those institutions and their specific programs that meet the minimum norms and standards prescribed by the Council.
2. To provide guidance for the improvement of the existing institutions and programs and also for development of new programs.
3. To stimulate the process of bringing about continual improvement in technical education in India.

THE 1991 ECONOMIC AND INDUSTRIAL POLICIES

The New Economic Policy and the New Industrial Policy of 1991 incorporated the concepts of liberalization, globalization, internationalization, and privatization. They also incorporated the following significant features: emphasis on consumer concerns, such as quality, cost, and variety; encouragement of competition; quality assurance and the need to continuously upgrade quality, and at reduced costs; a borderless, boundary-less world, incorporating free exchange of money, ideas, and expertise; fostering of strategic partnerships and alliances in the best service of the consumer; and human resource development.

The recent economic and industrial policy reforms call for integration of the Indian economy and industry with their global counterparts. This calls for quantum leaps in our levels of productivity and efficiency to survive in the face of international competition. In addition to resource constraints, we will have to conform to international levels in terms of energy use and environmental appropriateness, in addition to quality, reliability, and costs. Simultaneously, we have to maximize employment opportunities.

CHALLENGES

It is essential that the technical education sector responds rapidly and properly to the changing scenario. There is a wide range of technical institutions, even at the degree level, in the country—the Indian Institutes of Technology (IITs), Regional Engineering Colleges (RECs), governmental colleges, university colleges, aided colleges, and self-financing colleges; some are unitary institutions, some autonomous, and the majority are affiliated with universities. Except in a few cases, administrative and management structures are archaic and rigid; there is no scope for innovation, effectiveness, or efficiency.

Over the years, curricula have been modernized, obsolete equipment and instrumentation have been replaced by modern counterparts, but not so for administrative and management systems. In fact, they are struggling to cope with the information technology revolution—how to deal with information transmission such as FAX and email, and the concept of the paperless office, after having been submerged in a flood of paper and signatures and countersignatures. It was more important to safeguard against making mistakes than to accomplish tasks. And it is not as if these checks and balances prevented mismanagement and maladministration!

Resource Allocation for Technology Education

There are traditional sources of funds for technical institutions such as central government, state government, government departments and agencies, research and development agencies, public and private sector industries, international agencies, alumni, and students. Funding from government sources is drying up in the context of the new economic and industrial policies that call for privatization and a decreasing role for government in higher education, and in the face of increasing demands for funding primary education. Hence, there is a dire need to look for more funding from other sources and innovative strategies for attracting these funds. The technical institutions must not expect a dole from the donor organizations but be prepared to market and offer their strengths to earn the enhanced funding.

The Private Sector

Private sector initiatives in technical education are just over a decade old, and most of their resources are derived from donations and tuition fees. Their principal activity is undergraduate education, and the opportunities for additional resource generation are very limited. It takes a considerable amount of time before competence, expertise, and infrastructure are assembled and developed to such an extent that industrial research and consultancy can be offered.

It is in this context that industry partnership and sponsorship are essential for technical education. Government incentives to industry for promoting technical education and R & D are positive factors, not only for resource management, but also for making the educational processes effective, relevant, and purposeful.

IMPLICATIONS OF THE 1993 DRAFT TECHNOLOGY POLICY

This policy statement gives more importance to technology inputs and technologists than earlier policy statements. While it is necessary to increase the percentage of the GNP deployed for research and development, mechanisms must be evolved to ensure maximum effectiveness of these inputs. In addition to devoting attention to the input side, it is also necessary to monitor the outputs, both in terms of the quality and quantum of outputs and results.

The 1983 Technology Policy Statement observed that "technological advances are influencing life-styles as well as societal expectation." Technology policy should make contributions in both areas, by promoting those that result in wholesome lifestyles and tempering societal expectations in consonance with our meager resources and our ability to distribute them equitably among our people.

The recent United Nations Development Program Report on global development has bemoaned the "jobless growth" currently characterizing the economies of many countries. The principal expectation of those in our population who pursue professional education is preparation for employment. Educating and training the country's population without simultaneously creating employment potential and opportunities will lead to social and societal discontent, frustration, chaos, and anarchy. The critical index of development is the number of jobs created per thousand population, not the total number of educated and trained manpower, not even the total number of jobs created.

Our technology education system needs to be re-engineered, keeping our resources, our needs, and our goals in focus. We also need to forge strategic and organic alliances and partnerships between industry, academe, and the government to achieve synergistic results.

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This is based on a presentation at the second Jerusalem International Science and Technology Conference in Israel, January 1996.

4. Science and Technology Education Sponsored by an International Organization

by Silvio Schlosser and Baruj Zaidenknop

ORT Argentina is an organization of the World ORT Union, the largest non-governmental training organization in the world as well as a worldwide Jewish charity that assists disadvantaged individuals and communities to become self-sufficient. ORT is best known for educating and training people in skills that will provide them with sustainable employment in today's and tomorrow's marketplace. Founded in 1880, ORT (Organization for Rehabilitation through Training) now has programs established in more than 60 countries,including the United States, Israel, and China. It also teaches and trains more than 250,000 people in its schools and colleges annually.

ORT uses the most up-to-date methods and equipment to train students for careers that will make them independent and contributing members of their society. As a truly independent organization, ORT has the freedom to pioneer new ways of teaching and training both students and teachers. Its schools often lead the way in education, and since it is an open organization, everyone across the world can benefit from innovations.

There are two ORT technical schools in Argentina whose curricular innovations and reforms are the results of careful analysis. Experts study the social and economic situation of the country and the demands of the productive and academic sectors on the educational system, particularly the technical high school area. An important part of the curricular reform process is the application of a classroom-workshop methodology in technological education combining the contributions of technology with work carried out with not more than 15 students per teacher.

The technological process here is conceived as a process of creation motivated by man's natural wish to find ever newer and better ways of satisfying human needs. It involves decision making, the analysis of alternatives, planning design, and a careful evaluation of costs. During the stage of production proper, the product that has been designed takes form. Final evaluation includes the feedback of the entire process and whether the original motivational force has been satisfied.

But the result of the technological process largely depends on the know-how that has to be added to the wealth of techniques, materials, and devices of proven usefulness. The whole training process in the technological area is characterized by a high level of integration of technical and scientific areas by the rapid succession of modifications required by society. Science-Technology-Society (STS) forms an inseparable unit in current technical and techno-