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ABSTRACT

Although 6 of the 20 fastest growing occupations are associated with high technology, only about 7 percent of all new jobs projected for the remainder of the century will be in high-tech areas. Bureau of Labor Statistics data indicate that far more job openings will occur in low- and entry-level occupations than in highly skilled or professional occupations. Many analysts feel that it is still impossible to assess the impact of high technology on the labor market of the future and it seems highly unlikely that individuals will be able to hold the same job for the 40 or 50 years of their working lives. Therefore, vocational educators should concentrate on providing students with sound training in the basic and transferrable skills, encouraging student participation in a system of recurrent or lifelong education, and developing a program of technological literacy education that would begin in the elementary grades and extend through the postsecondary grades. Most planners agree that, even at the postsecondary level, vocational educators should emphasize development of transferrable skills and should, for the most part, leave job-specific training to those industries hiring vocational graduates. (MN)

# OVERVIEW

ERIC DIGEST NO. 46

Clearinghouse on Adult, Career, and Vocational Education



## JOBS OF THE FUTURE

Before vocational educators can develop curricula to meet future labor market needs, they must first determine what the job market of the future will be like and which occupations will be in demand. This overview examines projected labor market needs for the remainder of the century and outlines some models for vocational and technical curricula to prepare workers for entry into the job market of the future.

### Projected Labor Needs for the Remainder of the Century

Most economic and educational planners would agree that high technology will have a profound impact on the world of work in the next few decades; however, no consensus exists concerning the extent of the impact of high tech or the types and levels of job skills workers will need. Although some planners view high technology as the solution to the Nation's unemployment problems, others view it as a force that will eventually result in the displacement of massive numbers of workers and the ultimate loss of great numbers of jobs. Yet a third view suggests that the impact of high technology has been overestimated by many forecasters.

Grubb (1984) cites an ongoing study of the occupational composition of high tech and standard manufacturing in Texas as evidence of the fact that, when attempting to forecast future labor force requirements, planners must distinguish between percentage of growth and absolute growth in terms of numbers of job openings created. Using Bureau of Labor Statistics (BLS) figures as the basis for his analysis, Levin (1984) draws the following conclusions concerning employment projections between 1978 and 1990:

- The 20 occupations expected to manifest the largest absolute growth in terms of numbers of new jobs created are as follows: janitors and sextons, nurses' aides and orderlies, salesclerks, cashiers, waiters and waitresses, general office clerks, professional nurses, food preparation and service workers, secretaries, truck drivers, kitchen helpers, elementary school teachers, typists, accountants and auditors, trades helpers, blue-collar worker supervisors, bookkeepers, licensed practical nurses, guards and doorkeepers, and automotive mechanics. None of these is a high-tech occupation.
- Although 6 of the 20 fastest growing occupations are associated with high technology (data processing machine mechanics, computer systems analysts, computer operators, office machine and cash register servicers, computer programmers, and aero-astronautic engineers), only about 7 percent of all new jobs will be in high-technology occupations.
- Far more job openings are expected to occur in low- and entry-level occupations than in highly skilled or professional occupations. For example, BLS statistics predict that three times as many new job openings for janitors and sextons will occur than for the top five fastest growing occupations.

### Accuracy of Labor Market Projections

Levin (1984) writes that labor market projections developed by the Department of Defense are quite similar to those of the BLS. This is not to say, however, that the projections are without potential sources of error. Levin cites two such possible sources: (1) the impact of anticipated increases in the current administration's military budget that, if enacted, would increase the demand for scientific and technical personnel and (2) the accelerated rate at which U.S. manufacturers are shifting their high tech production operations to other nations.

According to Grubb (1984), vocational education itself may have an impact on the level of skills required by labor force participants. He suggests that current rates of expansion of community college programs could lead to a surplus of community college graduates. These surplus graduates could either be absorbed into jobs that could have been filled by individuals with less preparation, resulting in what Grubb terms "skills upgrading or, more cynically, as credential inflation" (p. 443), or they might take the places of those with more training, thus causing a "de-skilling from professional-level positions" (ibid.).

### Implications for Vocational Education

Analyses of BLS projections such as those done by Grubb and Levin underscore the fact that despite the care that goes into the compilation of employment projections, they remain projections or, in other words, "best guesses." Concluding that it is impossible to predict accurately which jobs will be available to any one individual throughout the 40 or 50 years of his or her participation in the labor force, Levin (1984) suggests that "in order for elementary and secondary education to meet future labor market conditions, strong general skills to enhance versatility and the ability to benefit from further training should be stressed—rather than narrow, labor market preparation" (p. 21) and that planners should develop a system of recurrent education that would take place in a "recurring pattern with work and leisure" (p. 23).

### Models for Technological Literacy Education

Since high tech will have an ever-increasing impact on all aspects of society, it is more important than ever for educational planners to develop a comprehensive plan for technological literacy education. Dyrenfurth (1984) and Lemons (1984) have each described models for providing pretechnology or technological literacy education. Dyrenfurth's model calls for coordination and articulation on the part of the school, public, and private sectors to address the following stages of technological literacy:

- first-order technological literacy (awareness of all technology)
- second-order technological literacy (awareness and exploration of a subset of technologies)

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- third-order technological literacy (exploration, pre-specialization, and preparation in a component of a subset of technology) (p. 18)

According to Dyrenfurth's scheme, not all persons would need to achieve all three levels of technological literacy. First-stage technological literacy instruction should be incorporated into existing elementary, junior high, and middle school curricula Material designed to help students attain a second-order technological literacy can be infused into middle and secondary social studies, industrial arts, home economics, and practical arts curricula. Dyrenfurth points to the model proposed by the Center for Occupational Research and Development (CORD) for secondary vocational education as a system that would allow high school vocational students to achieve second- and third-order technological literacy. The CORD model calls for students to cover 1 topic per week, spending the first 2 days viewing lab demonstrations or videotapes and participating in discussions, using the third day to explore the analytical applications of the technical concepts and principles covered on the 2 preceding days, and devoting the last 2 days to hands-on, practical application of the technology. Additional training in technological literacy would be provided by labor unions and by the private sector in personnel development programs.

Concluding that the role of secondary vocational education is to prepare students for postsecondary programs or for in-house training provided by employers, Lemons proposes a model for pretechnology education that includes the following components: training in elementary industrial arts for preschoolers; an introduction to technology and industry for elementary school children; training in technology, enterprise, and career awareness for middle school students; and training in basic skills, a technical core, and a chosen high-tech area for secondary school and adult students. Lemons goes on to call for articulation between secondary and postsecondary vocational programs, citing the "two plus two" model involving 2 years of secondary pretech courses and 2 years of postsecondary technological courses that was proposed at a workshop sponsored by the American Vocational Association and the Center for Occupational Research and Development (2 + 2 1984).

### Postsecondary High-Tech Training

Like Lemons and Dyrenfurth, Grubb (1984) agrees that postsecondary vocational institutions, especially community colleges, are where training for high-tech occupations should be provided. Although he views the recent explosion in community college high-tech programming as a generally positive phenomenon, Grubb offers a few words of caution to planners of such programs. First, he advises program developers and policymakers to resist the temptation to attempt to "resurrect depressed areas of the country by attracting new industry (especially high tech industry) in search of a trained labor force" (p. 444). Acknowledging the potential benefits of partnerships between vocational education and local industry, Grubb goes on to warn that "through skill training or socialization to specific company norms, students may become tied to one company" (p. 446) and that institutions succumbing to local industry pressures to drop many liberal arts requirements so as to provide time for more industry—or even firm-specific training—run "the risk of undermining the justification for public support of community colleges" (ibid.). Thus, Grubb would advocate the same foundation in basic skills called for in secondary pretechnology programs also be provided in postsecondary training for high-tech occupations.

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