High Schools and the Changing Workplace: The Employers' View

DETAILS

66 pages | 8.5 x 10 | PAPERBACK
ISBN 978-0-309-03476-0 | DOI 10.17226/18490

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84-0065

ID09818 PB84-240191

High Schools and the Changing Workplace: The Employers' View (Final rept)

National Academy of Sciences, Washington, DC. Committee on Science, Engineering, and Public Policy.

Corp. Source Codes: 019025186

Report No.: ISBN-0-309-03478

c1984 67p

Library of Congress catalog card no. 84-80887.

Languages: English

NTIS prices: PC A04/MF A01 Journal Announcement: GRAIB426

Country of Publication: United States

The purpose of the report is to state the views of employers on the education that provides the best foundation for a successful working career for high school graduates who do not intend to go to college. The study does not, by deliberate choice, deal with the problem of drop-outs nor does it offer curricular advice. The report is divided into three chapters. The first gives the panel's view on the likely occupational patterns and, hence, demand for job skills, that are expected to develop within the next decade from this analysis, the report offers in the second chapter its outline -- a listing of competencies -- of the essential education needed by high school graduates if they are to be successful in their working lives. The competencies discussed are: command of the English language, reasoning and problem solving, reading, writing, computation, science and technology, oral communication, interpersonal relationships, social and economic studies, and personal work habits and attitudes. The final chapter suggests the various responsibilities of different groups -- from employers to school boards to government -- for providing that education.

Descriptors: *Education; *Employment; *Youths; Performance evaluation; Analysis; Statistical distributions; Motivation; Ethnic groups

Identifiers: High school graduates; Career development; NTIS$NASNRC

Section Headings: 51 (Behavioral and Social Sciences--Personnel Selection, Training, and Evaluation); 70D (Administration and Management--Personnel Management, Labor Relations, and Manpower Studies)

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THE EMPLOYERS' VIEW

Report of the
Panel on Secondary School Education
for the Changing Workplace

National Academy of Sciences
National Academy of Engineering
Institute of Medicine

Committee on Science, Engineering,
and Public Policy

NATIONAL ACADEMY PRESS
Washington, D.C. 1984

NATIONAL ACADEMY PRESS 2101 Constitution Avenue, NW Washington, DC 20418

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The Committee on Science, Engineering, and Public Policy is a joint committee of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. It includes members of the councils of all three bodies.

Library of Congress Catalog Card Number 84-60887.
International Standard Book Number 0-309-03476-0.

Photographs by UNIPHOTO Picture Agency: Charles Gupton, cover, xiv, 16; Billy E. Barnes, 5; Rick Reinhard, 23; John Kleinman, 28

Printed in the United States of America.

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Why Another Education Report?

RECENT STUDIES OF AMERICAN EDUCATION have given relatively little emphasis to the high school graduate who does not go on to a four-year college—yet these graduates represent the largest segment of the American work force and play a central and critical role in the nation's economy.

This report addresses the needs of these graduates from the perspective of the private businesses and public institutions that will employ them. The report, then, has a narrow purpose: to define the educational competencies that will be needed by the high school graduate for success in the workplace, both at entry level and throughout a 45- to 50-year career in a constantly changing economic environment.

The report does not address the serious problem of high school dropouts, it does not offer specific curricular advice, and it does not concern itself explicitly with educational preparation for effective citizenship and social participation. Its sole objective is to identify, from the employers' perspective, the basic education needed for effective, upwardly mobile, lifelong participation in the American work force.

The panel for this study represents many types of public and private sector employers, among them the agricultural, electronics, automotive, chemical, construction, retail, health care, communications, and food industries as well as financial institutions and the federal government, including the military services. Labor unions are represented, as are scholars from leading universities and governmental agencies who have examined the forces that will influence the occupational environment in the years ahead. Finally, the educational community is represented on the panel to contribute professional perspectives at state and local levels.

The report reflects the diverse experience of panel members and is the result of their study and discussion. The employers on the panel looked separately for answers to questions agreed upon at the panel's first meeting, such as present and future job opportunities for high school graduates and the likely requirements for such jobs. As an example of the process, one panel member provided the results of a review by major financial institutions in his area considering employment needs; another member surveyed five manufacturing plants within his company, each plant representing a different operation. This approach is selective, but the panel believes that the results are representative. During the panel's eight-month tenure, its findings were generally supported by papers it commissioned, by presentations of experts, and by the growing literature on the topic, including several surveys of employer needs.

The panel was formed under the auspices of the Committee on Science, Engineering, and Public Policy, a joint committee of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. Funds from the Academy-Industry Program and from a consortium of foundations supported the study financially. The consortium includes the Carnegie Corporation of New York, the Charles E. Culpeper Foundation, the John D. and Catherine T. MacArthur Foundation, the Andrew Mellon Foundation, and the Rockefeller Foundation. The Cecil and Ida Green Fund supported the dissemination of this report to over 30,000 policymakers.

RICHARD E. HECKERT
Panel Chairman

Summary

THE LARGEST SEGMENT OF THE AMERICAN work force consists of high school graduates who have not attended college, and the nation's economic well-being depends heavily on their performance (see Appendix A for data on educational attainments of the U.S. work force). However, recent studies have documented the fact that large numbers of young people graduate from high school lacking the basic educational skills that are essential to successful participation in the work force. Additionally, recent surveys of employers indicate wide dissatisfaction with the educational quality of high school graduates and confirm much of the general criticism that has been made of American education.[1,2,3]

What is Needed

This report concentrates *solely* on the needs of high school graduates entering the labor force from high school and reflects employers' views of what these graduates will need to perform effectively in the workplace in the years ahead of them. The study panel recognizes that many high school graduates will enhance their career prospects eventually with further training in two- or four-year colleges, the military services, technical schools, or vocational programs. Nevertheless, it is high school education that lays the foundation for future success, both academically and in the world of work.

The panel approached its task from the viewpoint of necessary skills rather than required courses. *How* employees obtain skills matters less to employers than *whether* they possess them. This report, therefore,

does not attempt to prescribe how schools should achieve the goal of well-prepared high school graduates. Instead, it describes a set of core competencies—knowledge, skills, attitudes, and habits—that the panel believes will equip young people for success in the labor market throughout a working lifetime.

These core competencies are described in Chapter 2 of this report and are based in large measure on an examination of the future pattern of job opportunities. That pattern is complex and somewhat unpredictable, but it is a certainty that changes will occur continuously. It is also certain that today's young people will face, during their 45- to 50-year working careers, cumulative technological and organizational changes every bit as great as those that confronted their parents. Young people, therefore, must prepare for a lifetime of change, both in the nature of work and in the working environment. Many of these potential changes are discussed in Chapter 1.

Findings

The panel's basic findings are that:

- *The major asset required by employers of high school graduates seeking upwardly mobile careers is the ability to learn and to adapt to changes in the workplace. The continual evolution of work functions will require that workers master new knowledge and new skills throughout their working lives. The ability to learn will be the essential hallmark of the successful employee.*
- *The core competencies described in Chapter 2 of this report can provide the basic understanding and skills needed both to perform entry-level jobs and to continue the learning process. Technical education, vocational training, and curricula providing specific job skills can enhance a student's employability, but cannot substitute for education in the core competencies.*
- *A positive attitude and sound work habits are of basic importance. Employers place a high value on reliability and cooperation. At the same time, with increased employee participation in decisionmaking, the ability to offer constructive dissent without hindering teamwork will assume greater importance.*

The panel concludes that the schools' primary responsibility is to provide the core competencies and that other goals, whatever their

merit, must come second. Those who enter the work force after earning a high school diploma need virtually the same competencies as those going on to college, but have less opportunity or time to acquire them. Therefore, the core competencies must *always* come first during the high school years.

The assertion that high school graduates who proceed directly to the workplace need very nearly the same education in the core competencies as those going on to college may seem startling, but the panel believes such education to be essential. The panel does emphasize that these competencies are goals, and not minimum standards; not all students will attain them fully, but all must be given the opportunity to try to do so to the best of their abilities. Further, the competencies described in Chapter 2 do not make for a complete education, one preparing young people for thoughtful citizenship and full personal development. Education has broader goals than training students for jobs.

The panel also emphasizes that employers, like all sectors of a democratic society, require people who combine imagination and the capacity to give and take constructive criticism with the ability to adhere to the traditional patterns of work, citizenship, and social life. No one benefits from uncaring and uncritical workers.

Many schools may not possess the resources to provide rigorous, comprehensive education for the world of work. However, other elements of society share the responsibility of preparing our young people for adult life. The panel thus proposes, in Chapter 3, closer cooperation among schools, school boards, government, employers, parents, students, and community groups in developing the career guidance, information, and training that prospective workers and their teachers need.

Changing educational processes is slow and hard and, given their crucial mission, school systems by nature must be conservative in changing directions. Mistakes can be costly. However, the panel believes that adoption of its findings will contribute to a better working life for high school graduates; it also realizes that implementation of its findings will require dedication, patience, and very hard work by all concerned.

Finally, the panel deplores the tragic waste of talent, energy, and aspirations symbolized by the large numbers of young people who do not finish high school. The panel did not, however, investigate the specific needs of high school dropouts. A high-quality secondary education represents the *minimum* preparation a young person needs to participate successfully in our economic system. Were every young American to

possess a significant measure of the knowledge, skills, and attitudes described in this report, our national life would be enriched immeasurably.

References

[1] Richard Hulsart and Paul Bauman. *Report of Results: Colorado Employability Skills Survey*. Denver: Colorado Department of Education, November 1983.
[2] *Basic Skills in the U.S. Work Force*. New York: Center for Public Resources, February 1983.
[3] Leonard Lund and E. Patrick McGuire. *The Role of Business in Precollege Education*. New York: The Conference Board, Inc., to be published in 1984.

Jobs for High School Graduates

AFTER DECADES OF WORLD SUPREMACY, the American economy has entered a period of apparently dramatic change. Media reports often portray a disturbing future in which high technology, foreign competition, new patterns of organization, and export of jobs will change beyond recognition the way Americans work, produce, and earn. Some observers prophesy a bifurcated America, in which only the most technologically sophisticated and those willing to perform repetitive, menial tasks will find ready employment.[1] Others foresee much more egalitarian workplaces, where workers will exercise far greater control over the way they work and the quality of the goods and services they produce.

What do these possible changes mean to the career prospects of young people without advanced education? Can high school graduates realistically hope to find worthwhile work and adequate material returns in the decades to come? Does the new age mean the end of the opportunity and upward mobility that have been synonymous with work in America? Or does it mean that young people will have to clear new hurdles on their way to traditional goals?

Jobs Today

Over a working lifetime, most individuals work for several employers—10 on the average—and in at least as many different jobs.[2] For young people recently out of high school, however, opportunities tend to cluster in a narrow range. While the military services are the single largest employers of young Americans, many find their first "real" job with a small concern.[3] This might be a dynamic new company whose fast growth

TABLE 1 Employed Persons Ages 16 to 24 Not Enrolled in School, by Industry and Class of Worker

Industry/Class	October 1979		October 1982	
	High School Graduates	Non-High School Graduates	High School Graduates	Non-High School Graduates
Total (thousands)	12,636	2,916	11,648	2,286
Percent	100.0	100.0	100.0	100.0
Agriculture	3.0	5.6	3.8	9.1
Nonagriculture	97.0	94.4	96.2	90.9
Wage and salary	94.3	91.3	93.5	88.0
Mining	1.1	1.2	1.0	1.5
Construction	7.6	12.8	6.1	10.5
Manufacturing	22.8	30.8	16.3	23.8
Transportation and public utilities	5.6	3.9	4.8	3.3
Trade, wholesale and retail	24.1	23.8	30.3	27.5
Finance, insurance, and real estate	7.7	1.8	7.6	2.0
Other services	21.7	14.6	23.6	16.4
Public administration	3.2	0.7	2.8	1.0
Private households	0.6	1.9	1.0	2.0
Self-employed	2.6	2.8	2.5	2.8
Unpaid family	0.1	0.2	0.1	0.1

Source: Table compiled from Bureau of Labor Statistics, Bulletin 2192, *Students, Graduates, and Dropouts, October 1980-1982*. Washington, D.C.: U.S. Government Printing Office, December 1983.

offers an excellent opportunity for advancement or a new firm that will fail and die. More likely, however, it is a stable firm with few positions at higher levels, thus offering a young worker slight hope of advancement. Well over half of the young high school graduates in the civilian labor force find work in wholesale or retail trades or the service sector.[4] This contrasts with the experience of those lacking high school diplomas, who hold a slightly higher proportion of the jobs in manufacturing industries and construction. From the very outset, therefore, a high school diploma makes a difference. (See Table 1.)

TABLE 2 Employed Persons Ages 16 to 24 Not Enrolled in School, by Occupation

Industry/Class	October 1979		October 1982	
	High School Graduates	Non-High School Graduates	High School Graduates	Non-High School Graduates
Total (thousands)	12,636	2,916	11,648	2,286
Percent	100.0	100.0	100.0	100.0
Professional and technical	10.9	1.4	10.3	1.5
Managers and administrators	5.4	1.8	6.4	2.2
Sales	6.3	1.8	6.4	3.0
Clerical	25.9	7.8	23.8	9.1
Crafts and kindred workers	13.4	14.9	11.3	15.0
Operators except transportation	13.1	26.9	10.5	20.7
Transportation equipment operators	3.7	5.3	3.1	3.7
Nonfarm laborers	7.3	16.3	7.9	15.0
Total service workers	11.8	19.8	17.4	22.9
Total farm workers	2.0	4.2	2.9	7.0

Source: Table compiled from Bureau of Labor Statistics, Bulletin 2192, *Students, Graduates, and Dropouts, October 1980-1982.* Washington, D.C.: U.S. Government Printing Office, December 1983.

First Jobs

New graduates rarely get the most desirable jobs. About half of the employed 16- to 24-year-olds are service workers, clerks, or nonfarm laborers; only about 5 percent are managers or administrators. (See Table 2.) They start at the bottom, in entry-level positions that require few specialized skills and often become "dead ends," lacking challenge, intrinsic interest, or opportunities for advancement. However, few people stay in their first job very long. As high school graduates mature, they move into other occupations and other, often larger, organizations. Before long, their occupations and sources of employment mirror those of the population as a whole. Most grow into more responsible positions offering brighter futures.

The first job, therefore, does not necessarily set the direction of a career. It does, however, allow a career to begin. It is a doorway, not a highway. It permits people new to the workplace to master its habits and customs and to demonstrate the makings of a desirable worker. Even jobs without futures, viewed in this light, serve the vital purpose of changing untried young people into proven employees who can bring to subsequent employers the inestimable benefits of work experience.

Unemployment Young people who fail to get or hold a first job, or first few jobs, cannot obtain the experience needed for better jobs. This is the tragedy of teenage unemployment: someone who cannot find work or keep it cannot start an adult career. New workers have special kinds of learning to do and, to do it, they need jobs that do not require previous experience. Nevertheless, while many unskilled teenagers have great difficulty finding jobs, some small employers report persistent difficulty in locating certain kinds of skilled, but noncollege-educated, workers.[5] The panel believes, therefore, that improving the quality of high school graduates—sending better equipped young people out into the job market—will help more of them to overcome the difficulties of finding the crucial early jobs. A well-prepared individual constitutes a far better prospect for an employer.

To say this is not to state that schools can solve the problems of youth unemployment themselves. Schools alone cannot cure the ills of the national economy; however, a well-educated work force is important to the cure.

Jobs Tomorrow

Even in a period of apparently rapid and unpredictable dislocation, continuity remains a dominant feature of American working life. Changes in employment patterns and workplaces occur constantly, but generally by gradual evolution rather than drastic upheaval. This is not to deny that particular individuals, companies, or even whole industries will experience unpleasant shocks. It is merely to assert that the great majority of workers 10 to 15 years from now will earn their livings in a job market and a working environment more like today's than unlike it.

The automobile, for example, did not replace the horse overnight. Buggymakers gave way to firms manufacturing automobile bodies; blacksmiths turned their metal-working skills to automobile parts. Looking back over decades, one sees the contours of titanic industrial and occupational change, but, for those involved, most years brought some-

Today, with the age of the small computer upon us, hundreds of thousands of Americans still work—and for the foreseeable future will continue to work—as pencil-and-paper bookkeepers.

thing more in the nature of challenging novelties. Today, with the age of the small computer upon us, hundreds of thousands of Americans still work—and for the foreseeable future will continue to work—as pencil-and-paper bookkeepers.[6]

Change, nonetheless, will be the worker's constant companion and continuing changes, however small, will compound with each passing year. Today's 18-year-olds face nearly half a century of work until retirement, and each year's novelties, although manageable at the time, will make the workplace less like it was when they left school.

Today's young graduates, then, should expect many changes that will affect their ability to succeed in the work force. These will include demographic and structural changes, the effects of foreign competition, the requirements of new modes of organization, and the impacts of new technologies.

Demographic and Structural Changes The very composition of America's working population will change. As the average age of the population rises, there will be fewer youths to fill entry-level positions. More women and minority-group members will participate in the labor force.[7] Continuing immigration also will alter the composition of the labor force. These trends will certainly affect the terms of competition for jobs among traditional population sectors, but they will not affect what employers look for in new employees. They may alter the scenery of one's career, but not the script.

Structural changes in the economy also will alter the employment landscape. According to the U.S. Bureau of Labor Statistics, over the next decade manufacturing industries are expected to continue to lose ground in proportion to some faster growing sectors, notably services, although the absolute number of jobs in manufacturing industries will increase. Government's share of employment will remain fairly stable.[8] High-technology industries will grow rapidly, but will not become major sources of employment because they start from so small a base.[9] For example, while jobs for computer service technicians are projected to double by 1995, their proportion of total employment is barely measurable—less than one percent. (See Table 3.)

The International Economy Important trends in international trade will affect how some firms, particularly in the industrial sector, do business and thus may alter the responsibilities and opportunities of employees. Foreign competition and some movement of production facil-

TABLE 3 Twenty Fastest Growing Occupations, 1982-1995

Occupation	Percent Change	Employment Change (thousands)	Percent of Total Job Growth
Computer service technicians	97	53	0.21
Legal assistants	94	43	0.17
Computer systems analysts	85	217	0.85
Computer programmers	77	205	0.80
Computer operators	76	160	0.62
Office machine repairers	72	40	0.16
Physical therapy assistants	68	26	0.09
Electrical engineers	65	209	0.82
Civil engineering technicians	64	23	0.09
Peripheral electronic data-processing equipment operators	64	31	0.12
Insurance clerks, medical	62	53	0.21
Electrical and electronics technicians	61	222	0.87
Occupational therapists	60	15	0.06
Surveyor helpers	59	23	0.09
Credit clerks, banking and insurance	54	27	0.11
Physical therapists	54	25	0.10
Employment interviewers	53	30	0.12
Mechanical engineers	52	109	0.43
Mechanical engineering technicians	52	25	0.10
Compression and injection mold machine operators, plastics	50	47	0.19

Note: Includes only detailed occupations with 1982 employment of 25,000 or more. Data for 1995 are based on moderate-trend projections.

Source: Table compiled from George T. Silvestri *et al.*, "Occupational Employment Projections Through 1995," *Monthly Labor Review*, Vol. 106, No. 11, November 1983, Table 3, p. 46.

ities to overseas locations will certainly decrease employment in some industries. But foreign trade, by increasing demand for U.S. products and services, will have the opposite effect in other industries. Legal services, finance, insurance, real estate, and new construction, for example, will be among the net gainers.[10]

In most industries, the need to compete effectively with foreign commerce will mean increased attention to quality and costs of production and, therefore, increased need for an ever more competent labor force.[11]

Changing Employer-Employee Relations Especially in larger firms, concern with international competition has helped already to spark a trend toward less centralized authority and decisionmaking. As employers strive to increase quality and cut costs, they are taking a new look at the talent and expertise in the shop, the office, and the assembly line—resources that previously often went to waste in highly centralized, hierarchical organizations. The example of overseas competitors has shown the value of asking for advice on improvements from the people who are closest to the work.

Some firms have established quality circles, smaller, more informal work groups, quality-of-life committees, and various other forms of labor-management cooperation. These innovations potentially give employees at all organizational levels new roles in decisionmaking and control over work processes, performance standards, and evaluation of results.

Employees of many large industrial corporations, therefore, may find themselves working in smaller units and participating more in decisionmaking, just as their counterparts in small businesses have done. This situation implies new opportunities and new responsibilities. Greater decisionmaking at lower levels affords more scope for workers' talents and initiative and indicates greater trust, confidence, and interdependence between workers and management. It also requires that workers be able to formulate and express their views with clarity and precision. Under this system, supervisors function as facilitators and coordinators in addition to overseeing, and workers and their unions take part in some decisions formerly reserved for management. Workers, therefore, find themselves in the often unaccustomed position of participating in committees that deal with problems transcending their usual responsibilities. In such organizations, responsibilities in some jobs will broaden, with fewer narrow specialties among operators, technicians, and mechanical and office workers. This probably will permit more employees with the appropriate skills and initiative to progress from entry-level to operative jobs and beyond.[12]

New Technology Perhaps the most problematic—and feared—changes will flow from new technology and increased automation. Technological change will pervade many workplaces in the 1980's and beyond, as it has in the past. Even some small employers in unchanging businesses will acquire computers, for example. All workers, therefore, no matter what their occupation or position, will have to learn to do some new things, or will have to learn to do some old things in new ways.

The pace of change affecting entry-level jobs probably will not differ much from that of the past but, as graduates mature and move out of entry-level jobs, the effects of change may become more pronounced. Although difficult to predict with precision, several general developments seem clear. Computer applications and automation will increase productivity and quality. Intensified mechanization, instrumentation, and computerization will assist managers and employees in making more rapid and accurate decisions about work functions; new transmission technology, coupled with greater availability of timely data, will permit more rapid and exact communication within and among organizations. All of these imply a continuous need to understand and master constant technical change.

How Jobs Will Change What does all of this mean to the young, would-be worker planning to end his or her education with a high school diploma? Can the individual without advanced education compete in the high-technology workplace? Or will such individuals find themselves tomorrow's buggy-whipmakers? Of all of the issues surrounding the future of work, the consequences of new technology on what workers actually will do is probably the most controversial—and the least predictable.

People throughout our society intuitively sense that new technologies will alter how they work in the future. Many assume that the growth of computer technology implies a need for drastically higher skills in computer science and programming. Tens of millions of Americans, however, spend their lives today in intimate dependence on automobiles, with only the most rudimentary understanding of how they work. Just as the automobile revolution did not make us a nation of automotive engineers or automotive mechanics, the computer revolution need not transform us into computer programmers and technicians. The computer may, however, pervade our society as widely and as decisively as the automobile did, and bring about changes just as profound.

From the worker's standpoint, the nature of many jobs will change in the coming years, although their titles may remain the same. Obviously, the degree of change will vary from job to job and industry to industry, sometimes drastically, sometimes slightly.

New Versus Different Many people assume that advanced technology requires higher skills; in reality, it often requires different, and sometimes lesser, skills. Just as the word processor's keyboard resembles the typewriter's, so the skills needed to operate both of them overlap; there is

an enduring need for competence in grammar, punctuation, and vocabulary. Yet, the skills differ, although not so greatly that a typist cannot become a word-processing operator fairly easily. In the same fashion, a stock clerk who once recorded inventory on paper forms may now keyboard the same information into the employer's computer or enter it by passing a special sensor over the bar codes printed on the goods.

In some occupations, advanced technology will reduce the demands for skills from workers. New diagnostic tools used in the health services, for example, are vastly more sophisticated than their predecessors and are increasing the effectiveness of diagnosis, laboratory testing, and therapy. The medical technician will need only the ability to follow instructions rather than the exacting skills involved in performing the same chemical analyses by hand and sensory perception. Complicated mechanical and electronic equipment, including computers and automobiles, often incorporates features that permit automatic diagnosis of its own malfunctions, indicating which components or circuits need to be replaced.

Repairing this equipment, therefore, no longer requires the experience and skill acquired over years. The shift from mechanical repair to computer repair requires new knowledge, but the simplicity of product design and the power of new technology to assist in diagnosis may make computer repair less demanding than traditional mechanical repair.

Situations requiring decidedly higher skills also will arise as some new technologies generate new industries. Examples may include robotics, biotechnology, and some new systems being developed by the military services.

In short, the effects of today's and tomorrow's new technologies promise to be as pervasive and unpredictable as some of yesterday's technological revolutions: automobiles, electricity, mass production, and the telephone. Some occupations will decline and others will flourish. But it is clear that the skills required of workers will change over their working lifetimes.

The Future Job Market

These trends have important implications for high school graduates who want to start and maintain successful lifelong careers. Ambitious, well-prepared young people will still find opportunities in the American economy if they know where to look for them. As the economy shifts away from some of its traditional bases, this knowledge will be ever more vital.

The U.S. economy is expected to generate more than 25 million addi-

tional jobs between 1982 and 1995.[13] By comparison, it added some 20 million jobs between 1969 and 1982.[14] Americans work in hundreds of occupations; for example, the Bureau of Labor Statistics (BLS) in the U.S. Department of Labor tracks 1,700 different job categories but, the Bureau estimates, only 40 of these together will account for more than half of the expected employment growth. (See Table 4). Obviously, therefore, different job types will grow at very different rates. BLS estimates that some will nearly double their numbers in only 13 years, while others will grow much more slowly. Some will decline. The growth of many jobs—such as custodians and cashiers—reflects their large starting base. These job categories should be interpreted cautiously; for example, the title "building custodian" reflects a broad spectrum of responsibilities, from managing a maintenance crew for a large building to having sole charge.

These tables do *not* state where the jobs will be in 1995. The tables are projections based on a host of assumptions about where the growth in number and proportion of jobs is likely. The exact ordering of items on such lists must be viewed as an estimate rather than a fact, as a projection, not a prediction. However, the general patterns represent the judgment of experienced observers of labor trends and conform to projections relying on different models of the economy.

The projections do affirm that the American economy will continue to generate an astonishing number of diverse occupations, many of which will be quite familiar even if the ways they are done will change. The projections also show relatively few young people working in new occupations. Rather, the bulk of new opportunities will exist in occupations that are very familiar to us already. Well-prepared high school graduates, therefore, can realistically hope to compete for the jobs of the future.

They can expect, like their predecessors, to find opportunities in all kinds of enterprises. To be sure, many large organizations, public and private, have experienced only modestly rising, static, or even falling employment levels in recent years as they introduced additional automated equipment and restructured jobs around it. Hiring continues, however, to replace employees who leave, retire, die, or are promoted. Large organizations still present important employment opportunities for many graduates.

Opportunities in Small Firms A large proportion of new openings, however, occurs in small firms, which present opportunities to high

TABLE 4 Forty Occupations Will Account for About Half of All New Jobs Generated, 1982-1995

Occupation	Employment Change (thousands)	Percent Change	Percent of Total Job Growth
All occupations	25,600	25	100.0
Building custodians	780	28	3.0
Cashiers	740	47	2.9
Secretaries	720	30	2.8
General clerks, office	700	30	2.7
Sales clerks	690	24	2.7
Nurses, registered	640	49	2.7
Waiters and waitresses	560	34	2.2
Teachers, kindergarten and elementary	510	37	2.0
Truck drivers	430	27	1.7
Nursing aides and orderlies	420	35	1.7
Sales representatives, technical	390	29	1.5
Accountants and auditors	340	40	1.3
Automotive mechanics	320	38	1.3
Supervisors of blue-collar workers	320	27	1.2
Kitchen helpers	300	36	1.2
Guards and doorkeepers	300	47	1.2
Food preparation and service workers, fast food restaurants	300	37	1.2
Managers, store	290	30	1.1
Carpenters	250	29	1.0
Electrical and electronic technicians	220	61	0.9
Licensed practical nurses	220	37	0.9
Computer systems analysts	220	85	0.8
Electrical engineers	210	65	0.8
Computer programmers	210	77	0.8
Maintenance repairers, general utility	190	28	0.8
Helpers, trades	190	31	0.7
Receptionists	190	49	0.7
Electricians	170	32	0.7
Physicians	160	34	0.7
Clerical supervisors	160	35	0.6
Computer operators	160	76	0.6
Sales representatives, nontechnical	160	27	0.6
Lawyers	160	34	0.6
Stock clerks, stockroom and warehouse	160	19	0.6
Typists	160	16	0.6
Delivery and route workers	150	19	0.6
Bookkeepers, hand	150	16	0.6
Cooks, restaurants	150	42	0.6
Bank tellers	140	30	0.6
Cooks, short order, specialty, and fast food	140	32	0.6

Note: Includes only detailed occupations with 1982 employment of 25,000 or more. Data for 1995 are based on moderate-trend projections.

Source: Table compiled from George T. Silvestri *et al.*, "Occupational Employment Projections Through 1995," *Monthly Labor Review*, Vol. 106, No. 11, November 1983, Table 2, p. 45.

school graduates who can meet their special needs. Small size often creates quite a different working environment from that of a large organization. There is usually less hierarchy and less specialization. A clerical worker in a one- or two-person office might file, handle billing, type letters, answer the telephone, greet visitors, and offer advice in an office crisis; a counterpart in a giant corporation might handle one or two procedures as one member of a large department.

Size also often limits severely the resources available for helping employees to learn skills. Where a large corporation or agency may maintain an elaborate training program—perhaps even a formal school—a small enterprise might be hard-pressed to release an experienced employee to train a newcomer. Large corporations frequently prefer to hire bright, well-educated nonspecialists and teach them their own way of processing data, mixing chemicals, maintaining equipment, and the like. A small employer, however, often needs an employee who already possesses specific job skills. Skills obtained in vocational courses or previous work experience might be crucial, therefore, to getting a good job with a small employer; such skills often matter less to large employers who intend to put a new worker through a training program anyway. Because small employers constitute so significant a number of those who hire young workers, vocational skills, in addition to a sound education in the core competencies, certainly increase employability.

Self-Employment

An often overlooked opportunity for high school graduates is not to work for someone else, but rather to earn a living through self-employment. At least 8 percent of working Americans earn their main livings as their own employers; over 17 million people do some kind of self-employed work, often in addition to working for another employer.[15,16] This career path offers certain high school graduates the possibility of doing work they enjoy while achieving social and economic rewards far greater than would be possible as employees. As there are no organizational ranks to rise through, lack of advanced credentials need not bar the way.

Self-employment, however, is not generally a beginner's option. It usually follows work experience as an employee. The median age at which people start working for themselves is the early 30's—old enough for the worker to have learned a business, accumulated some capital, and spotted a likely niche, but young enough not to be set into another career track.[17]

Jobs for a Lifetime: Careers

Before workers have the confidence, contacts, and wherewithal to strike out on their own, before they have the experience and expertise to assume a responsible post with an employer, in other words, before they can hope to arrive at a position that satisfies the urge for upward mobility, they generally will have passed through a number of jobs and employers. Only about one American worker in a hundred is with the initial employer 10 years later.[18] Indeed, one in five American workers leaves his or her occupation every year, the young more often than average, the mature less frequently.[19]

A job, in other words, is not a career. A career is a series of jobs, each often involving new responsibilities, new knowledge, and new skills. The ability to learn a new job is vital both to the employer—who cannot employ a person unable to master the requisite skills—and to the employee—who cannot expect to hold a job without that mastery. The ability to learn, therefore, is vital to every worker throughout an entire working lifetime.

Workers change jobs for many reasons. Young workers, for example, are explorers searching the economy for an occupation to their liking and a situation that meets their needs. Workers generally do not advance up a single job ladder but zig-zag from firm to firm as conditions change or opportunities for bettering themselves open up.

First jobs often offer low pay and scant advancement—and may even discourage some new workers about their chances of finding better employment. But even jobs that do not offer opportunities for advancement provide the initial experience that every young worker needs; so, the quality of early jobs is less important to career prospects than that of later jobs.

This may be the single most important fact that young people need to understand about the job market. Careers are built on performance over a number of years and, ideally, on a number of increasingly desirable jobs. The early ones need not either define or limit the ultimate character of a career. What defines and limits a career is the individual's ability to learn throughout life. Technology will change, businesses will change, the content of a given job will change, and one's employer will change. What will never change is the need to adapt to new opportunities.

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[8] Personick, *op. cit.*

[9] Richard W. Riche *et al.* "High Technology Today and Tomorrow: A Small Slice of the Employment Pie," *Monthly Labor Review*, Vol. 106, No. 11, November 1983, pp. 50-58.

[10] Personick, *op. cit.*

[11] Robert B. Reich. "Beyond Free Trade," *Foreign Affairs*, Vol. 61, No. 4, Spring 1983, p. 782.

[12] See, for example, Henry M. Levin, "Education and Organizational Democracy," in *International Yearbook of Organizational Democracy*, edited by C. Crouch and F. Heller, London: John Wiley & Sons, Inc., 1983, Vol. I, Chapter 11; also, Joel I. Susman, *Autonomy at Work: A Sociotechnical Analysis of Participative Management*, New York: Praeger Pubs., 1976; also, Ralph Barra, *Putting Quality Circles to Work: A Practical Strategy for Boosting Productivity and Profits*, New York: McGraw-Hill Book Co., 1983.

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What High School Graduates Need

THE PANEL HAS ATTEMPTED TO PROJECT the future of the American job market to determine the sort of worker who will prosper in the future. It has asked its employer members to describe the employees they will need, and be able to employ, in the years ahead. A single answer comes from both sources: a person who is able and willing to learn throughout a working lifetime.

A person who knows how to learn is one well grounded in fundamental knowledge and who has mastered concepts and skills that create an intellectual framework to which new knowledge can be added.

It is precisely in the basic intellectual skills, however, that young employees show the greatest deficiencies. Many lack the ability to draw correct inferences from written, pictorial, or mathematical information; to understand oral instructions; to develop alternatives and reach conclusions; to express their ideas intelligibly and effectively; and to apply such basic concepts of economics as profit and cost.[1] All of these skills are important, even in entry-level jobs. Advancement to more responsible posts requires skills of an even higher order, including the ability to compose tables and reports, to consult reference and source materials, to apply mathematical concepts and procedures, to control complex equipment, and to address groups.

These conclusions derive from the panel's collective experience and from examinations by its members of their own industries. For example, representatives of leading banks and brokerage houses in New York City said they will need high school graduates with skills in reading, writing, mathematics, and oral expression at least as good as those of today's workers to fill entry-level jobs such as messenger, general office clerk,

and teller. Applicants for higher entry-level jobs such as secretary, adjuster, or clerical supervisor will need even better skills.[2] The federal government has developed precise hiring standards for the hundreds of thousands of civilian high school graduates it employs in scores of white- and blue-collar occupations.[3] Some federal jobs require no more than a high school diploma, but many demand specific technical skills or knowledge acquired through apprenticeship, technical training, or work experience. Even these special skills, however, are built on a core of competencies that can be acquired in high school. For example:

- Every federal employee, whether a laundry worker, personnel clerk, or technician, must be able to follow written and verbal instructions, keep accurate records, and convey information orally.
- Workers as diverse as accounting clerks, upholsterers, and aircraft mechanics must be able to compute accurately to estimate costs, determine materials needed, and develop work plans.
- Occupations as varied as dental hygienist or equipment repair technician require familiarity with basic concepts of biology, chemistry, or physics.
- Very disparate workers, such as nursing assistants, clock repairers, and surveying technicians, need to be familiar with equipment used in laboratory work.

Beyond these specific skills, the panel agrees that young people need additional characteristics to succeed on the job: attitudes and understanding that lead to good work habits and successful interpersonal relationships. A clear understanding of the rights and responsibilities of workers and employers, and of the place of each in American economic and social life, will help students to function effectively as workers and to exercise their rights as employees and citizens.

Schools cannot meet the specific demands of every employer, of course. They cannot, for example, train students to fill out a particular organization's invoices or requisition slips or to follow its costing procedures. Yet, schools can, and must, teach students the basic skills that underlie these specific job requirements. A young person who can read skillfully and compute accurately will master quickly the versions of these skills required by a given employer. A young person who lacks the basic skills, however, probably cannot learn to fulfill an employer's expectations. (See Appendix B for a brief description of studies on the relation of cognitive skills to job performance.)

The panel has concluded, therefore, that the need for adaptability and lifelong learning dictates a set of core competencies that are critical to successful careers of high school graduates. These competencies include the ability to read, write, reason, and compute; an understanding of American social and economic life; a knowledge of the basic principles of the physical and biological sciences; experience with cooperation and conflict resolution in groups; and possession of attitudes and personal habits that make for a dependable, responsible, adaptable, and informed worker and citizen. Together, these competencies comprise what are needed to prepare a young person for an uncertain future.

That these competencies form the basis of all high-quality education is not, in the panel's opinion, accidental. The panel believes that the education needed for the workplace does not differ in its essentials from that needed for college or advanced technical training. The central recommendation of this study is that all young Americans, regardless of their career goals, achieve mastery of this core of competencies up to their abilities. For those intending to enter the work force directly after completing high school, additional training in specific vocational skills will increase employability and is naturally desirable. But no other skills, however useful or worthwhile, can substitute for the core competencies.[4]

Young people not planning on going to college may not require advanced or highly theoretical courses in mathematics, science, or other academic subjects, but they must have a working knowledge of these disciplines to permit them to perform job tasks accurately, correctly, and with understanding.

The workplace ordinarily affords a narrow margin for error. Workers who misinterpret instructions might damage costly machinery or tools and endanger themselves and others. Workers unable to compute with precision might fill orders improperly, losing their employers the good will of customers, or miscalculate cost information, confusing their employers' accounting systems and adding unnecessary costs.

Mastery of the core competencies to the best of one's abilities is both a necessary and reasonable goal. What differentiates students who end their education upon completion of high school from those going to college is not necessarily the ability or desire to learn; frequently, the differences take the form of economic resources, social backgrounds, cultural exposure, life styles, aspirations, or values. These differences do not dictate any lowering of educational standards, but they may suggest some variation in educational settings or techniques. Some students

learn best in a scholastic environment; others in settings closer to "real life." Students not planning on postsecondary education, however, actually have *less* time to master the foundations of learning than those going on to college.

The panel has not attempted to recommend specific routes to mastering the core competencies; this lies properly in the realm of educators. The panel does urge in the strongest possible terms, however, that all educational programs be evaluated on the basis of their ability to provide the skills that all young people will need.

The Core Competencies

The core competencies judged by the panel to be required by employers and, by extension, for success in employment, are given below. The list is not exhaustive, but rather illustrative. Some of these skills, or similar concepts, have been advocated by others (see reference 1, for example); this report attempts to put them in one context. These competencies are transferable, vital to almost every job except the least skilled, and essential to upward mobility and adaptability.

Command of the English Language The panel predicates this list of competencies on possession of the most basic skill of all—a command of the English language, which it believes to be essential for success and mobility in American society. Although a second language may be useful in job mobility, all American young people, regardless of their home or native tongue, need a functional command of standard English in its written and spoken forms.

Reasoning and Problemsolving The capacity to reason and solve problems is the central indication of an educated person. Throughout their working lives, individuals will encounter problems or situations with various possible solutions. The ability to understand the consequences of alternative courses of action is an essential condition for success in employment. Well-developed reasoning capacity requires a person to be able to:

- Identify problems
- Consider and evaluate possible alternative solutions, weighing their risks and benefits
- Formulate and reach decisions logically

- Separate fact from opinion
- Adjust to unanticipated situations by applying established rules and facts
- Work out new ways of handling recurring problems
- Determine what is needed to accomplish work assignments.

Reading Each student needs to be able to read, comprehend, and interpret written materials. Job success often hinges on following written instructions, manuals, or labels. Workers must frequently use catalogs and reference books, read and draw inferences from correspondence and reports, and interpret correctly forms such as vouchers, requisitions, and work orders. Neither reading nor writing is taught separately in most high schools. However, every course in every academic subject can require students to read and write critically and extensively. Competent reading requires the ability to:

- Understand the purpose of written material
- Note details and facts
- Identify and summarize principal and subsidiary ideas
- Be aware of inconsistency in written material
- Verify information and evaluate the worth and objectivity of sources
- Interpret quantitative information; for example, in tables, charts, and graphs.

Writing It has been said that a person can write no better than he or she can think. All students need to be able to organize information and state it clearly and concisely in a written form that is grammatically correct. Employees in many lines of work are called upon to fill out forms, document experiences and procedures, record events, and present their ideas in memorandums, letters, and notes. Skillful writing requires the ability to:

- Gather information suitable for the purpose
- Organize information in a logical and coherent manner
- Use standard English syntax
- Apply the rules of correct spelling, punctuation, and capitalization
- Attribute references correctly
- Use reference books such as a dictionary, a thesaurus, and an encyclopedia
- Write legibly.

Computation All students need to be able to understand and apply basic mathematics, at least through elementary algebra. An understanding of geometry and trigonometry is desirable. Countless work tasks require computations of cost, time, volume, area, percentage, fractional share, and other mathematical relationships. Precise computation requires that a person be able to:

- Add, subtract, multiply, and divide whole numbers, decimals, and fractions accurately
- Calculate distance, weight, area, volume, and time
- Convert from one measurement system to another, for example, from English to metric
- Determine the costs, time, or resources necessary for a task
- Calculate simple interest
- Compute costs and make change
- Understand simple probability and statistics
- Calculate using information obtained from charts, graphs, and tables
- Use ratios, proportions, percentages, and algebraic equations with a single unknown
- Estimate results and judge their accuracy.

Science and Technology Whether employed in a factory, farm, office, shop, or retail store, American workers need to feel comfortable with technology.

Many jobs, of course, demand specific understanding of the physical and biological sciences, including the practical experience developed in laboratory work. Technical occupations of all kinds—in the fast-growing medical and health service fields, in communications, and in the military services—call on workers to deal effectively with mechanical and electronic equipment.

As the use of advanced technologies becomes ever more pervasive in our economy, schools must encourage students of both sexes to acquire a firm grounding in science and technology. Lack of an adequate scientific background and technological experience has precluded many, especially women, from competing for large numbers of desirable jobs in the past.

High school graduates, therefore, need the confidence that they can understand how things work. Nothing builds this confidence so effectively as the study of specific technologies and the scientific principles

High school graduates need the confidence that they can understand how things work. Nothing builds this confidence so effectively as the study of specific technologies and the scientific principles underlying them.

underlying them. While devices may consist of thousands of parts, individual parts are often simple, as are the rules for their interaction. Facility with technology comes from understanding these rules and in working with devices embodying them. That, the panel believes, is best achieved by combining classroom study with practical experience in school laboratories or outside school; for example, learning the principles of chemical combinations and performing simple chemical reactions; learning the basic electrical laws and operating a voltmeter; and studying the thermal properties of solids and examining the structure of an integrated circuit chip.

Competency in science and technology includes the ability to apply the scientific method, whether or not it is labeled as such; that is, the ability to formulate and state hypotheses, and then to evaluate them by experimentation or observation. That competency will serve all graduates, whether they work in technical occupations or not. It serves, for instance, in localizing a problem in a word-processing system, in repairing mechanical systems, or in identifying the source of a recurring error in computation.

Further, the well-educated high school graduate will be able to apply the basic principles of the physical, chemical, and biological sciences to work. Thus, high school graduates competent in the basic sciences will be able to evaluate risks better, understand the rationale for industrial processes, and even suggest how they might be improved. The particulars are less important than the generality: that knowledge of science and technology dissipates unknowns and enhances confidence in one's ability to analyze and solve a problem.

Finally, education in science and technology should include acquaintance with computers. That does not necessarily mean learning programming languages and the like, but it does mean acquiring knowledge of the basic functions of computers; knowing what they can and cannot do; some familiarity with the basic components of a computing system; and an understanding of the possibilities and limits of frequently used software packages such as word processors, data-base management systems, and electronic spreadsheets.

Oral Communication Success in any job requires, among other things, the aptitude to communicate thought, knowledge, and information through speech, whether with supervisors, coworkers, customers, or the general public. Competent oral communication includes the ability to:

- Communicate in standard English
- Understand the intent and details of oral communications
- Understand and give instructions
- Identify and summarize correctly principal and subsidiary ideas in discussions
- Obtain, clarify, and verify information through questioning
- Participate effectively in discussions.

Interpersonal Relationships Success in a career depends on the capacity to deal constructively and effectively with others. In turn, this depends on a knowledge of behavior appropriate to and customary in the workplace. Young people must understand that the standards of behavior, speech, and dress expected of employees often differ markedly from those acceptable in student circles. They also must realize that conflicting interests and opinions are inherent in many social interactions, but that such conflicts can and should be resolved through constructive means. Finally, they must recognize that employers cannot tolerate behavior, even if innocently intended, that offends customers, colleagues, other employees, or members of the general public. Effective interpersonal relations require the ability to:

- Interact in a socially appropriate manner
- Demonstrate respect for the opinions, customs, and individual differences of others
- Appreciate the importance and value of humor
- Offer and accept criticism constructively
- Handle conflict maturely
- Participate in reaching group decisions.

Social and Economic Studies Understanding how employees and employers fit into the economic structure of the community and country is essential to an appreciation of one's own contributions and responsibilities. Young people should realize that private employers purchase services in order to provide a product or service at a profit so that they can stay in business, while public employers must adhere to rules of public accountability. Only employees who contribute to these goals are likely to keep their jobs or advance in them. Students can gain this understanding best through a knowledge of how the American society and economy function, how various groups and interests interact, and what they can

expect of one another. Adequate social and economic knowledge requires an understanding of:

- The history of present-day American society
- The political, economic, and social systems of the United States and other countries
- The fundamentals of economics, including a basic understanding of the roles of money, capital investment, product pricing, cost, profit, and productivity, and market forces such as supply and demand
- The concept of "trade-offs" and the differences between economic principles, facts, and value judgments
- The roles of industry and labor in creating wealth, maintaining employment, and raising the standard of living
- The forms and functions of local, state, and federal governments
- The rights and responsibilities of citizens
- Civil rights and justice in a free society.

Personal Work Habits and Attitudes Personal work habits indicate the level of responsibility one is capable of assuming. Positive habits and attitudes contribute significantly to success in performing tasks, dealing with others, and gaining employment. They are also vital to success in school and should be cultivated long before a student enters the work force.[5] Constructive work habits and attitudes require:

- A realistic positive attitude toward one's self
- A positive attitude toward work and pride in accomplishment
- A willingness to learn
- Self-discipline, including regular and punctual attendance and dependability
- The ability to set goals and allocate time to achieve them
- The capacity to accept responsibility
- The ability to work with or without supervision
- Appropriate dress and grooming
- An understanding of the need for organization, supervision, rules, policies, and procedures
- Freedom from substance abuse
- Appropriate personal hygiene.

The panel emphasizes again that these competencies are goals, by no means universally achievable to the same level by all, but nevertheless

important for all to strive toward. The panel also emphasizes that they are incomplete goals, limited to those believed necessary for preparing high school graduates for satisfying careers. These goals must be supplemented by others if high school graduates are to participate fully in the cultural and civic life of this country.

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[2] Report submitted to the panel by panel member Frederick A. Roesch (available from the Committee on Science, Engineering, and Public Policy).

[3] Report submitted to the panel by panel member Loretta Cornelius (available from the Committee on Science, Engineering, and Public Policy).

[4] For a state perspective, see Wellford W. Wilms, "The Limited Utility of Vocational Education: California Employers' Views," *Public Affairs Report*, Vol. 24, No. 14, August 1983.

[5] Employee attitudes and their relation to job performance will be treated in a forthcoming report by the Committee for Economic Development, *Business and the Schools: Identification of Employer Needs*, to be published in the fall of 1984.

Producing High-Quality Graduates

THE PREVIOUS CHAPTER DESCRIBES THE basic competencies that the panel believes to be essential for high school graduates to compete successfully in the changing job market. In the panel's opinion, education that falls significantly short of these competencies does not provide an adequate foundation for successful and satisfying careers.

These competencies are not new ideas. They are familiar, even old fashioned; indeed, many educators may feel that they form the core of high school curricula already. In many schools, that is true. However, from the employers' perspective, the fact is that too many graduates leave high school without an adequate command of these competencies—an assertion that has been amply documented by the numerous reports on American education issued in the past two years.[1]

If these core competencies already are the central objectives of many high school curricula, then something is slipping through the educational process. The panel has not identified the precise causes of such shortcomings, but does emphasize that they do not lie simply with educators. The problems, and the responsibility for their solution, must be shared by parents, students, school boards, legislators, governmental administrators, employers, and the community.

Unfortunately, shared responsibility and authority in the typical school district make it difficult to achieve and to maintain constructive change. Too often, no one has the final responsibility. Constructive change, on the scale dictated by the vast size of the nation's educational system, will not come easily, but the necessary improvements can be made eventually if all of those concerned with education, including parents, governments, and employers, make a concerted, dedicated, and coherent effort.

The panel did not delineate the specific actions to be taken by different groups to improve education. But it did agree on the basic goals and attitudes that must inform those actions if high school graduates entering the work force are to be well prepared.

Employers

Employers, large and small, can play several roles.

First, and perhaps most important, they can make a continuing effort to convince teachers and school administrators that the standards and expectations of private and public employers are reasonable, necessary, attainable, and, in fact, essential to the health of the national economy and the financial security and living standards of every citizen.

Further, employers should assist schools in the critically important task of advising young people about the possibilities available to them in their future careers. Career guidance programs can be more successful if employers and counselors will work together to deliver sound information to students. In short, employers should convey to high school faculties and to students more complete information about job opportunities that are and will be available in their communities and about the expectations of employers.

Employers also should assist students in navigating the passage between school and work. A study by the Colorado Department of Education found, for example, that a number of employers rejected 60 percent of young job applicants because of the latter's unfamiliarity with the mechanics of job-seeking. They filled out applications incorrectly, acted awkwardly or inappropriately at interviews, and misinterpreted or misunderstood employer needs. That finding confirms the experience of the employer members of the panel. In an important sense, work is a foreign culture to many young people. Concrete advice from those responsible for hiring should help students to become familiar with hiring procedures before they spoil their chances of getting a job. It is the responsibility of employers to help reduce the mystery of job-seeking.

Summer and after-school jobs offer an excellent opportunity for employers to impart their standards and expectations to students. While technological changes have eliminated some of these jobs, in numerous communities there are renewed efforts by schools and employers to provide part-time work experiences for more students. Such programs can be both socially and economically beneficial.

Other productive roles for employers include:

- Working closely with local and state school boards to increase community support and involvement
- Providing effective business management techniques to assist the school system and to support locally established programs and activities
- Working with teachers and administrators to develop new programs and learning materials that demonstrate the application of classroom subjects to a working environment
- Donating equipment, instructional materials, and the time of knowledgeable personnel.

Finally, employers can help school systems to meet higher standards (including employer expectations) through financial assistance and political support for adequate budgets. Local people can determine best what form local partnerships should take; again, the panel has not sought to suggest specific methods for implementing its findings. It believes that the most fruitful approaches emerge when various elements of the community talk to one another.*

School Boards

Citizens who serve on school boards are the protectors of the public's interest in the preparation of young people for citizenship, work, and further study. Boards, and the senior administrators they employ, should determine the environments in which children learn best, and

*The panel is aware of many vigorous school-business programs under way. For example, the California Roundtable, an organization of the chief executive officers of 88 major corporations in the state, has made education a priority issue and has been extremely vigorous both in its analysis of existing problems and in its programs for improving community involvement in the school system.[2] A similar activity by the Washington State Roundtable is also taking place.

The educational community has moved to strengthen its communications with business. For example, the National Association of Secondary School Principals has outlined the basic elements of school-business partnerships.[3]

Comparable examinations have been made by the Education Commission of the States, the National Commission for Employment Policy, the U.S. Chamber of Commerce, and by many local groups, such as the Greater Wilmington Development Council in Delaware. The list is long and growing. The panel supports vigorously the expansion of these efforts.

work to create and maintain them in their schools. The school boards' responsibilities are to determine the policy, governance, personnel, financial resources, and facilities needed to implement a successful educational program. Of primary importance is the need to set achievement standards for students. Administrators and teachers must be held accountable for providing programs that can bring students to such standards.

In some systems, staying within the budget and satisfying governmental requirements become the prime measures of administrators' performances, with effective curricula and their implementation third. These, the panel suggests, are misplaced emphases.

Finally, board members should insist that programs of study include exposure to the world of work. The boards should enforce high standards of accountability when schools offer programs intended to prepare students for specific jobs or kinds of jobs. Such programs should be reviewed collaboratively by school leaders and representatives of the industries that are expected to hire graduates. Programs ought to come into being only when documented needs exist, and their leaders should justify their continuation regularly by showing that graduates gain jobs in their fields of preparation. In all instances, board members ought to insist that occupational programs meet standards similar to those for college preparatory programs or the core competencies.

Schools

The panel believes that the basic responsibility of schools is to equip students with the core competencies requisite to lifelong learning. A second important responsibility of the schools is to make young people aware of the possibilities and challenges of their future careers. Career guidance should go beyond merely providing information on specific jobs or industries quite late in a student's school career. Guidance should include academic, social, and personal concerns as well as the cultivation of attitudes and habits conducive to success in the world of work. Students need to understand the work ethic—that work is a central reality of life—one that, in addition to providing income, can pay well in satisfaction and self-esteem.

Schools also ought to teach students that mature citizenship entails responsible choices and that not all choices are easy or fun. Choices imply commitments and "trade-offs." Students who have learned to choose with an awareness of the implications involved are on their way to mastering the essential skills required for success in most work.

Parents

Parents, who shape young people's motivations and values, must reassert their convictions that education and productive work are central components of a satisfying life. They must insist upon, and support fully, efforts to achieve high-quality education for their children. They need to help their children to develop ambitious and realistic career aspirations and work with them in exploring opportunities for achieving those ambitions.

In the course of its study, the panel has been reminded more than once that successful school systems invariably are parts of successful communities; that is, communities in which parents contribute positive expectations, values, personal standards, and a sense of discipline both to their children and to the local school system.

Students

Students must prepare for a lifetime of learning by mastering the core competencies to the best of their ability. Young people are ultimately responsible for realizing their aspirations. By that token, they must investigate career possibilities actively, make full use of their school years, and strive to develop habits of self-reliance, self-respect, and self-discipline that are basic to success in work as well as in all aspects of their future lives.

Government

Government at all levels must support adequately the efforts suggested herein. Although public funds for education have not been abundant in recent years, the panel believes that the American people will pay for high-quality education when and if they are convinced that their children are receiving it.

The federal government can contribute by supporting teacher training, curricula development, and experimental teaching programs. State and local governments can be powerful forces in facilitating cooperative efforts within communities. Elected officials at all levels can spark citizen involvement in better education, assess local needs and the financial resources needed, and provide the political support that is necessary to raise the quality of high school graduates.

Community Cooperation

No element of our society can attain by itself the goal of better preparation of high school graduates for work. This country is a patchwork of urban, suburban, and rural communities, each with its own particular

resources and economic realities. Therefore, the fostering of educational excellence that will provide the foundation for successful, satisfying careers must come from optimum community cooperation. The panel urges that educators, school boards, employers, parents, students, community groups, and governmental officials work together to strengthen the bridges between school and the workplace. These partnerships, together with clear goals, are essential.

Summing Up

Finally, the panel comes back to its goals and its conclusion. Its purpose was to provide employers' views of the education needed by high school graduates seeking rewarding and upwardly mobile careers. It concluded that core competencies are the indispensable elements of such education—a set of knowledge, skills, attitudes, and habits that will prepare high school graduates to continue learning throughout their lifetimes, to adapt to inexorable changes in the workplace, and, if desired, to further their formal education.

References

[1] See, for example, the National Science Board Commission on Precollege Education in Mathematics, Science and Technology, *Educating Americans for the 21st Century,* Washington, D.C.: National Science Foundation, September 1983; Hon. James B. Hunt, Jr. *et al., Action for Excellence,* Denver: Task Force on Education for Economic Growth, Education Commission of the States, June 1983; and the National Academy of Sciences/National Academy of Engineering National Convocation on Precollege Education in Mathematics and Science, *Science and Mathematics in the Schools: Report of a Convocation,* Washington, D.C.: National Academy Press, 1982.

[2] The California Roundtable. *Improving Student Performance in California.* 1984.

[3] Santee C. Ruffin, Jr. *School-Business Partnerships: Why Not?* Reston, Virginia: National Association of Secondary School Principals, 1983.

Education and Employment of U.S. Workers

What do 18- and 19-year-olds do with their time? (See table.)

In 1982, 48 percent of these persons were still attending school, either college or high school, either full time or part time. Of the 18- and 19-year-olds enrolled in school, over one third both attended school and worked.

Status of 18- and 19-Year-Olds, October 1982 (Thousands)

Category	Total	Enrolled in School	Not Enrolled in School	
			Non-High School Graduate	High School Graduate
Total civilian population	8,021	3,837	1,336	2,850
Number in labor force	5,020	1,745	896	2,380
Employed	*3,864*	*1,430*	*558*	*1,877*
Unemployed	*1,156*	*315*	*338*	*503*
Not in labor force	3,001	2,092	440	470
Armed forces	242	NA	NA	NA

NA = Not available.

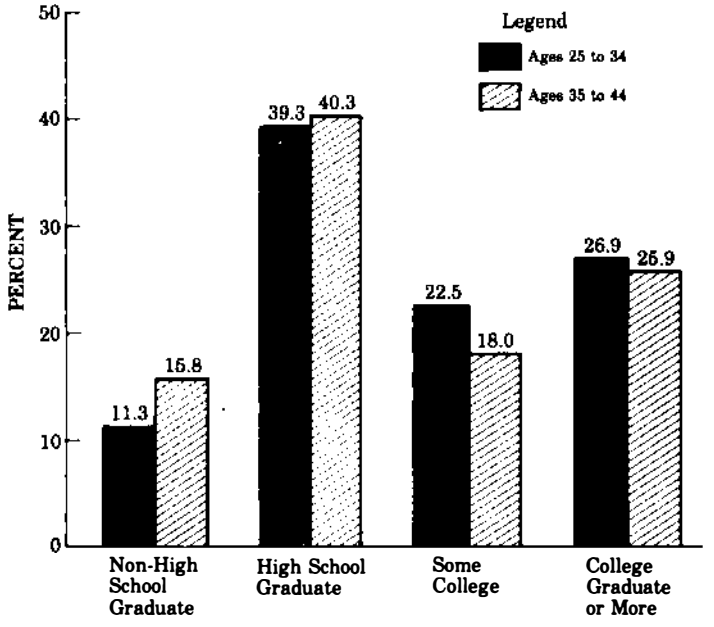
Source: Table compiled from Bureau of Labor Statistics, Bulletin 2192, *Students, Graduates, and Dropouts, October 1980-1982*. Washington, D.C.: U.S. Government Printing Office, December 1983.

Of all 18- and 19-year-olds, 36 percent were high school graduates who were not attending school. Of these, about two thirds were employed. The other third were either unemployed or not seeking work. About 3 percent of all 18- and 19-year-olds were in the armed forces.

What is the educational profile of the labor force? (See figure.)

In 1983, about 40 percent of those in the labor force 25 to 44 years old had ended their formal education with a high school diploma. About 40 to 45 percent had some college training, and many of them eventually graduated from college. Of course, many individuals receive on-the-job training that is not counted as formal education.

Educational Attainment of Persons in the Labor Force, Ages 25 to 44, Percent Distribution, March 1983



Source: Figure compiled from Anne McDougall Young and Howard Hayghe, "More U.S. Workers Are College Graduates," *Monthly Labor Review,* Vol. 107, No. 3, March 1983, pp. 44-49.

The panel thanks John Tschetter, of the U.S. Bureau of Labor Statistics, for his help in preparing this appendix.

Cognitive Skills and Job Performance

Over the past four decades, thousands of studies have explored the relationship between job performance and tests of cognitive skills and abilities. Recent summaries of these studies have made clear the central result that basic cognitive skills and abilities are directly related to job performance. (The interested reader should see Ghiselli, 1973;[1] Hunter, 1980;[2] Pearlman, Schmidt, and Hunter, 1980;[3] Schmidt and Hunter, 1981;[4] and Hunter and Hunter, 1982.[5]) In particular, these studies have shown that cognitive skills and abilities are more important determinants of productivity in complex jobs than in simple jobs. Furthermore, cognitive skills and abilities are more important for job success than many other attributes of job performance. For example, Hunter and Hunter summarized hundreds of studies and showed that basic cognitive and psychomotor abilities were nearly three times more important than the amount of experience or class rank/grade point average for predicting job success, and four times more important than behavior in employment interviews or scores on measures of interest.

An example of this type of study is one recently completed at the American Telephone and Telegraph Company (AT&T) (Kehoe, 1983[6]). It involved over 2,500 persons and 4 entry-level jobs that often have been used as career-initiating jobs by noncollege persons. Nine out of ten distinct cognitive skills and abilities were found to be related to job proficiency and turnover. These included such educable skills as numerical computation, reading comprehension, vocabulary, attention to detail, and attention-sharing. As a result of selecting job applicants with these skills and abilities, AT&T reports that work force productivity was higher and turnover lower than they would have been if these skills and abilities had been ignored.

Submitted by panel member Mary L. Tenopyr.

The research summarized above indicates that measured cognitive skills and abilities may account for as much as one third of the productivity differences between workers. Other characteristics, such as motivation to succeed, also may play substantial roles, but currently are less well understood and require considerably more research focused on work productivity.

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[4] F. L. Schmidt and J. E. Hunter. "Employment Testing: Old Theories and New Research Findings," *American Psychologist*, Vol. 36, No. 10, October 1981, pp. 1128-1137.

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[6] J. F. Kehoe. *The Validity Generalization of Telephone Ability Battery Tests*. New York: American Telephone and Telegraph Company, Employment Systems, 1983.

Biographies of Panel Members

RICHARD E. HECKERT, Vice Chairman and Chief Operating Officer—Dupont Operations, E. I. du Pont de Nemours and Company, Wilmington, Delaware *(Chairman)*

Dr. Heckert assumed his current position as Vice Chairman and Chief Operating Officer of du Pont in 1981 following its merger with Conoco, Inc. He is the senior executive of the company's chemical operations, which have approximately 100,000 domestic employees, two thirds of whom are nondegreed. He joined the company in 1949. Dr. Heckert holds a B.A. degree from Miami University in Oxford, Ohio, and M.A. and Ph.D. degrees in organic chemistry from the University of Illinois.

JOHN T. CASTEEN III, Secretary of Education, Commonwealth of Virginia, Richmond, Virginia

Appointed by Virginia's Governor Charles Robb in 1982, Dr. Casteen advises the Governor on educational policy matters, prepares and oversees the state's education budget, and serves as chief spokesman on educational subjects before the Virginia General Assembly. He is also responsible for elementary, secondary, and higher education and the state's museums and libraries, as well as programs supporting cultural activities and basic research efforts. His B.A., M.A., and Ph.D. degrees are in English from the University of Virginia, where he has worked as Associate Professor of English and Dean of Admissions.

LORETTA CORNELIUS, Deputy Director, U.S. Office of Personnel Management, Washington, D.C.

Ms. Cornelius was appointed by President Reagan and confirmed by the Senate in September 1981. She is the second-ranking official at the Office of Personnel Management (OPM), where her responsibilities

include civil service pay, retirement and insurance programs, senior executive personnel development, staffing programs, work force effectiveness, agency relations, ethics in government, and OPM's personnel and equal employment opportunity efforts. She holds an M.A. degree in human resources development from The George Washington University.

WILLIAM J. DENNIS, JR., Director of Research, National Federation of Independent Business, Washington, D.C.
Mr. Dennis heads the research efforts of the National Federation of Independent Business, the nation's largest small business trade association. He is engaged in a variety of research projects involving small business, its relationship to the economy, and the impact of public policy on it. His most recent publication was *Small Business Problems and Priorities*. Mr. Dennis has an M.A. degree from the University of Florida.

ROSALYN FRANTA, Vice President—Director, Quality and Nutrition, Kellogg Company, Battle Creek, Michigan
Ms. Franta is responsible for the company's worldwide activities in quality and nutrition. She is a registered dietitian as well as a graduate of Purdue University, holding a bachelor's degree with distinction in home economics education and a master's degree in food and nutrition. She joined Kellogg in June 1974, and has worked in research, public affairs, marketing, executive offices, analytical laboratories, and as the director of quality and nutrition in the science and quality areas.

RONALD KUTSCHER, Associate Commissioner, Office of Economic Growth and Employment Projects, Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C.
Mr. Kutscher directs the program in the Bureau of Labor Statistics (BLS) that develops medium-term (5-10 year) projections of the U.S. economy covering gross national product, industry output, and productivity and employment by industry and occupation. He prepares career guidance and training materials such as the *Occupational Outlook Handbook* and analyzes the implication of government programs or shifts in demand as they might affect employment or skill shortages. An economist by profession, he has been with BLS for 27 years.

HENRY M. LEVIN, Director, Institute for Research on Educational Finance and Governance, Stanford University, Stanford, California
Under the directorship of Dr. Levin, the Institute for Research on Educational Finance and Governance has been engaged in a number of studies on education and productivity and on education and high technology. It is the largest research institute of its kind, focused on economics, finance, politics, law, and organizational issues in education. Dr. Levin is also a professor in the Stanford University School of Education and Department of Economics. He holds M.S. and Ph.D. degrees in economics from Rutgers University and a B.S. degree in economics from New York University.

AUBREY C. LEWIS, Corporate Vice President, Corporate Liaison, F. W. Woolworth Company, New York, New York
Mr. Lewis is responsible for public affairs programs at all levels of the Woolworth Company, its subsidiaries, and the community at large. F. W. Woolworth employs approximately 125,000 people, a large number of whom are high school graduates. He joined the company in 1967, holding administrative, personnel, and security positions, most recently Personnel Management Planning Director. Mr. Lewis is a graduate of the University of Notre Dame.

SHERMAN MCCOY, Deputy Executive Director and Chief Operating Officer, D.C. General Hospital, Washington, D.C.
Mr. McCoy is responsible for the operation of a 500-bed hospital in the District of Columbia. Before coming to Washington, he was Executive Director of the Woodside Receiving Hospital in Youngstown, Ohio. He has a bachelor's degree in economics and a master's degree in public administration, both from Cornell University.

RICHARD H. NEUMANN, Deputy Manager of Personnel, Bechtel Group, Inc., San Francisco, California
Mr. Neumann's responsibilities include the formulation, recommendation, and functional direction of plans, policies, and programs in personnel management for the worldwide operations of Bechtel. Additional duties include establishing standards for the performance of the personnel organization, monitoring the effectiveness of personnel programs, and arranging and managing employee benefit programs. He is an active member of the National Constructors Association and the

Construction Personnel Executives Group. He has a degree in labor economics from the University of Wisconsin at Madison.

MARGARET A. ROBERTS, Director, Research Planning and Services Office, Research Staff, Ford Motor Company, Dearborn, Michigan
Dr. Roberts joined the Ford Motor Company in 1965 and became Director of the Research Planning and Services Office in 1979. During her career at Ford, she has worked in research and engineering; among her current duties is responsibility for identifying new and current research programs for cost savings and product improvement. Dr. Roberts' B.S., M.S., and Ph.D. degrees are from Wayne State University in Michigan.

MARKLEY ROBERTS, Economist, Department of Economic Research, AFL-CIO, Washington, D.C.
Dr. Roberts has been involved in employment and training and related issues of education and vocational education. He has been a member of The Newspaper Guild trade union for 32 years and has worked in the AFL-CIO's Legislative and Economic Research Departments for 23 years. Dr. Roberts is a Princeton graduate and has M.A. and Ph.D. degrees in economics from The American University.

FRED S. RODRIGUEZ, Assistant Group Manager of Human Resources, Hughes Aircraft Company, Fullerton, California
Hughes Aircraft Company has over 64,000 employees in the high-technology electronics industry. Mr. Rodriguez has more than 28 years' experience in technical and management capacities. His responsibilities include employee benefits, foreign programs, affirmative action, staffing programs, college relations, health and safety programs, and data-processing systems programs for human resources planning. He has a B.A. degree in business from California State University at Fullerton and an M.B.A. degree from Pepperdine University; he is working toward an M.S. degree in systems management from the University of Southern California.

FREDERICK A. ROESCH, Senior Vice President for Personnel, Citibank, N.A., New York, New York
Mr. Roesch is in charge of worldwide personnel planning and development for Citicorp and Citibank, a company with 60,000 employees, 30,000 of whom are in the United States. He joined Citibank in 1964.

He is a graduate of Dartmouth College and the University of California at Berkeley. Mr. Roesch has spent a large portion of his career in the Far East.

G. THOMAS SICILIA, Director, Accession Policy, Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics, U.S. Department of Defense, Washington, D.C.
Dr. Sicilia is charged with bringing enlisted personnel into military service and with the overall quality of the All Volunteer Force. This task includes advertising, recruiting, testing, and placement of the 300,000 individuals recruited annually. Dr. Sicilia's duties involve policy and statistical analysis, program administration, research and development, and data management. He has a B.E.S. degree from Johns Hopkins University and M.E.S. and Ph.D. degrees in operations research from the University of Florida.

WILLIAM P. STEINBERGER, Vice President, Vocational Education Services, Control Data Corporation, Minneapolis, Minnesota
Control Data, a company of 65,000 employees, provides computer equipment for school systems in vocational as well as traditional educational programs. Mr. Steinberger's duties involve the planning of proprietary vocational institutes and government training. His background is in data processing.

MARY L. TENOPYR, Division Manager, Human Resources, Employment Research and Development, American Telephone and Telegraph Company, New York, New York
Dr. Tenopyr's primary responsibilities are to improve and maintain the quality of the nonmanagement work force in the American Telephone and Telegraph Company. She is concerned with developing further criteria for hiring at the high school level. She holds a Ph.D. degree in psychology from the University of Southern California. She is past president of the Division of Industrial and Organizational Psychology of the American Psychological Association and is licensed as a psychologist in three states.

DAVID C. THOMAS, Chairman of the Management Committee and Director of Member Services, Milk Marketing Inc., Cleveland, Ohio
Milk Marketing Inc. is a dairy marketing cooperative operating in an eight-state area. The $900 million marketing organization is head-

quartered in Cleveland, Ohio. Dr. Thomas's professional career includes radio, agriculture, and sports broadcasting, teaching vocational education, the vice presidency of a billion-dollar agricultural supply organization, being associate vice provost of extension-continuing education at the University of Missouri-Columbia, and being a member of the faculty at the College of Agriculture and College of Business and Public Administration at the University of Missouri-Columbia. His undergraduate studies were in vocational education with emphasis on agriculture; his Ph.D degree was in educational administration. Both degrees are from the University of Missouri-Columbia. He is a professional public speaker and has served on many state and national vocational education advisory councils.

RITA WALTERS, Los Angeles Board of Education, Los Angeles, California
Ms. Walters was elected to the Los Angeles Board of Education in 1979, where she has been a strong advocate of equal education opportunity for all children. She recognizes the need to improve relations between the business community and the public school system. Her school district, with an enrollment of approximately 665,000 students including 100,000 adults, occupies an area of 710 square miles. It had an annual budget of $2.2 billion for 1983-84. Before becoming a member of the School Board, Ms. Walters was a teacher of English as a second language as well as a teacher of basic education subjects to illiterate adults. She holds a B.S. degree from Shaw University and is a candidate for an M.B.A. degree from the University of California at Los Angeles in June 1984.

CHARLES WILSON, Superintendent, Community School District No. 2, New York, New York
Mr. Wilson is the superintendent of a New York City school district in a system employing some 60,000 teachers where, at one time, a million students were in attendance. He has had 30 years' experience in education and has taught at all levels, from kindergarten through college. He began his career as a science teacher and then moved into the administrative side of education. Mr. Wilson holds a B.A. degree in chemistry.

Summaries of Commissioned Papers

WALTER HANEY. "In and Out of High School: Trends in Secondary School Enrollment, Graduation, and Postsecondary Experience." September 1983.

This paper reviews trends in enrollment, graduation, and postsecondary experience of students in American high schools; the focus is on secondary education, especially programs with vocational education. A brief history of federal involvement in vocational education beginning with the Smith-Hughes Act of 1917 is provided. Recent experiences relating to course selection, graduation rate, and post-high school choices are presented. Since the employment rate of students graduating from vocational education programs is shown to be higher, and their attrition rate lower, the retention of vocational education programs is recommended.

E. GARETH HOACHLANDER. "Vocational Education in the Nation's Secondary Schools." August 1983.

The questions of what is vocational education, who is served, what is accomplished, and what it costs are explored in this paper. Federal encouragement of vocational education has been undertaken at least since the early part of this century to prepare "individuals for paid or unpaid employment." By 1978-79, 17 million students were enrolled in such programs, studying agriculture, distribution and marketing, health, consumer protection, home economics, industrial arts, office occupations, technical specialties, and various other trades and industries. Vocational students tend to have lower standardized test scores than those in academic courses; their parents have less formal education. Statistically grouped, 52 percent of them are female, 75 percent white, 16 percent black, 6 percent Hispanic, and 3 percent other.

Students graduating from vocational education programs seem to experience less unemployment. In 1978-79, the annual federal contribution to these programs was $6.7 billion, $446 for each secondary student enrolled. In its conclusion, the paper discusses federal policy on secondary vocational education and recommends the approach taken in the Job Training Partnership Act of 1982. That measure contains a "permissive planning" clause prescribing certain end results (number of students graduating, those with jobs following graduation, etc.) while also permitting a practically limitless variety of procedures and processes for attaining these objectives.

The paper comments that "researchers have generally been unable to establish significant differences between the employment and earning histories of students enrolled in vocational education and those enrolled in the general curriculum." However, "the absence of positive findings does not mean that they do not exist."

DENNIS HOULIHAN. "Selected Statistics for Recent High School Graduates." October 1983.

In this paper, the general characteristics of young people after high school are examined. Statistical analyses include the characteristics of graduates terminating their education with high school, those who enter military service, and those seeking education beyond high school. Employment opportunities also are summarized. The Bureau of the Census' 1982 *Current Population Survey* and the National Center for Education Statistics' survey, *High School and Beyond: First Senior Follow-up*, were used as source material.

STUART A. ROSENFELD. "The Future of Work for the High School Graduate." August 1983.

The changing nature of employment is described. The workplace itself is expected to undergo major changes in the next two decades, based on current trends. There will be differences in the availability of jobs, the content of work, and how work will be managed. Demographic shifts will take place; the work force will be older and include proportionally more women and minorities. Service occupations—finance, insurance, real estate, transportation, communications, utilities, and government—will increase while jobs in the manufacturing sector are

expected to decline because of automation and the growing number of imports. High-growth industries such as health, computers, and energy will require technical training beyond the high school level. High-demand occupations, however, will be of a low-skill, nontechnical nature.

FRANK L. SCHMIDT, JOHN E. HUNTER, and LOIS C. NORTHROP. "Cognitive Skill Correlates of Success in the World of Work for Noncollege Graduates." October 1983.

The authors write that the nation's educational system should prepare students, particularly those who do not go on to college, for useful, productive, and personally rewarding experiences in the workplace. Citing thousands of studies, they report that certain skills and abilities learned in school are directly related to success in job-training programs and later success on the job. Several broad occupational areas—clerical occupations, computer programming, retail sales, law enforcement, foremen, and supervisory positions—are used as illustrations, supported by the results of numerous studies. The research findings show that cognitive skills of various kinds typically correlate in the .50 to .60 range with success in job-training programs and in the .35 to .50 range with later performance on the job; this appears to be true of other skills as well. If schools can improve students' knowledge of specific areas—chemistry, physics, mathematics, or electronics—as well as verbal skills—vocabulary, reading comprehension, or other cognitive skills—improved performance on the job and reduced attrition may be expected to follow.

Speakers

The following speakers addressed the panel members on September 13, 1983:

1 BILL ALDRIDGE, Executive Director, National Science Teachers Association, Washington, D.C.

2 GENE BOTTOMS, Executive Director, American Vocational Association, Arlington, Virginia

3 ROBERT L. CRAIG, Vice President, American Society for Training and Development, Washington, D.C.

4 DENIS DOYLE, Director, Education Policy Studies, American Enterprise Institute, Washington, D.C.

5 RICHARD HULSART, Consultant, Colorado Department of Education, Denver, Colorado

6 ALLAN I. LESHNER, Deputy Executive Director, National Science Board Commission on Precollege Education in Mathematics, Science and Technology, Washington, D.C.

7 MARSHA LEVINE, Education Consultant, American Enterprise Institute, Washington, D.C.

Selected Readings

National Research Council, Committee on Vocational Education and Economic Development in Depressed Areas, Commission on Behavioral and Social Sciences and Education. *Education for Tomorrow's Jobs*. Washington, D.C.: National Academy Press, 1983. A 116-page report containing an analysis of youth unemployment and recommendations for schools and industry to improve vocational education.

Basic Skills in the U.S. Workforce. New York: Center for Public Resources, February 1983. This report outlines the fundamental skill competencies and learning deficiencies that exist today, as well as the danger of neglect. Solutions are offered for business, labor, and the schools. It contains 51 pages plus appendixes.

Thomas R. Donahue *et al*. "The Future of Work," A Report by the AFL-CIO Committee on the Evolution of Work, August 1983. A 20-page report with appendixes, analyzing the impact of technology on employment in the future.

Lynn Grover Gisi and Roy H. Forbes. "The Information Society: Are High School Graduates Ready?" Denver: Education Commission of the States, September 1982. An analysis of recent and projected changes in the U.S. economy and the impact on the labor force. It poses the question, "Are students prepared?"

Richard Hulsart and Paul Bauman. *Report of Results: Colorado Employability Skills Survey*. Denver: Colorado Department of Education, November 1983. Results of an extensive survey of employers to determine which skills are in the most demand for entry-level jobs.

Hon. James B. Hunt, Jr. *et al. Action for Excellence.* Denver: Task Force on Education for Economic Growth, Education Commission of the States, June 1983. A 50-page booklet containing eight recommendations for improving the quality of education.

Leonard Lund and E. Patrick McGuire. *The Role of Business in Precollege Education.* New York: The Conference Board, Inc., to be published in 1984. It describes the secondary school educational background that best suits business.

Conference on Goals for Science and Technology Education Grades K-12. "A Revised and Intensified Science and Technology Curriculum Grades K-12 Urgently Needed for Our Future." Washington, D.C.: National Science Board Commission on Precollege Education in Mathematics, Science and Technology, March, 1983. Recommendations for implementing a stronger mathematics and science curriculum.