

Vocational Education and At-Risk Youth in the United States

John Bishop

Working Paper 95 – 19



Vocational Education and At-Risk Youth in the United States

John Bishop
Cornell University
Center for Advanced Human Resource Studies
New York State School of Industrial and Labor Relations
Cornell University
Ithaca, NY 14853-0952
607/255-2742

with

Center on the Educational Quality of the Workforce
and
Cornell's Program on Youth and Work

Working Paper #95-19

www.ilr.cornell.edu/cahrs

This short paper summarizes research that received support from many sources. Included in the list are grants to Cornell's Program on Youth and Work from the Pew Charitable Trust, grants to the Center on the Educational Quality of the Workforce, agreement number R117Q00011-91, as administered by the Office of Educational Research and Improvement, U.S. Department of Education, grants to the National Center for Research in Vocational Education at Ohio State University from the U.S. Department of Education, grants from Cornell's Center for Advanced Human Resource Studies and by a grant to Cornell from National Association of State Directors of Vocational Technical Education Consortium. The findings and opinions expressed in this report do not reflect the position or policies of the Office of Educational Research and Improvement or the U.S. Department of Education. This paper has not undergone formal review or approval of the faculty of the ILR school. It is intended to make results of research, conferences, and projects available to others interested in human resource management in preliminary form to encourage discussion and suggestions.

Educationally disadvantaged youth in the United States have great difficulty finding steady jobs providing real training and advancement opportunities. In October 1994 only 43 percent of the young people who had dropped out of high school the previous year were employed. Of recent (previous spring) graduates who had not gone college, only 64 percent were employed (BLS 1995). Those who obtained employment accepted jobs paying 10 to 15 percent less than in 1980.

Greater investments in the human capital of these workers are needed. But what kind of education/training should get priority-- generic academic skills or occupation specific skills? The Economist (March 12 1994) argues that occupation specific education should be dropped and generic skills should be taught instead:

Economists have long argued that the returns on general education are higher than those on specific training, because education is transferable whereas many skills tend to be job-specific. Today this case is becoming more compelling still as jobs become less secure, the service sector expands and the life-cycle of vocational skills diminishes and the market puts an even greater premium on the ability to deal with people and process information.

This policy recommendation, however, is based on three false premises—

- **academic skills are good substitutes for occupation specific skills.**
- **accelerating skill obsolescence has reduced the payoff to occupational training.**
- **rising job turnover has reduced payoffs to occupational training by schools.**

Let us examine what research tells about each of these issues.

1. Evidence that Occupational Skills are Essential

In most jobs productivity derives directly from social abilities (such as good work habits and people skills) and cognitive skills that are specific to the job, the occupation and the occupational cluster: not from reading, writing and mathematics skills. When the small and medium size employers who provide most of the new jobs in the American economy are asked which skills they look for when hiring, they cite work habits and occupational skills ahead of reading and mathematics skills. In 1987 the owners of small and medium size businesses who were members of the National Federation of Independent Business were asked "Which abilities influence hiring selections the most? " **Forty percent ranked 'occupational skills (already has them)' number 1 and another 14 percent ranked them number 2** (see table 1). By contrast, only 6 percent of these American employers ranked 'reading, writing, math and reasoning ability' number 1 and another 13 percent ranked them number 2. Leadership and

people skills were also seldom ranked at the top. The trait that most directly rivaled occupational skills was work habits. 'Work habits' were ranked most important 29 percent of the time and ranked number two 36 percent of the time. Only 3 percent of the employers ranked them #5 or #6. Clearly, good work habits are an important hiring criterion for just about every job.

Table 1
Abilities Sought When Hiring

	<u>Percent Ranked</u>			<u>Mean Rank by Skill</u>	
	#1	#2	#5,#6	High	Low
Occupational/job skills (already has them)	40	14	20	2.36	3.01
Ability to learn new occupational and job skills	15	26	13	2.96	2.84
Work habits and attitude (trying hard, enthusiasm, punctuality)	29	36	3	2.30	2.20
People skills (teamwork, appearance, getting along with others)	9	15	33	3.79	3.49
Leadership ability (organize, teach & motivate others/solve problems)	1	2	54	5.16	5.33
Reading, writing, math and reasoning ability	6	13	39	5.65	3.83

There is more disagreement about the importance of already developed occupational skills. For 20 percent of the jobs, previous occupational skills ranked #5 or #6. This tended to be the jobs requiring less skill-- service and clerical workers, operatives and sales clerks. In these lower wage jobs, work habits were the number one consideration, 'ability to learn new occupational and job skills' was number 2 and already developed occupational skills was number 3. The ranking of 'reading, writing, math and reasoning' was last in the more highly skilled jobs and second from last in the less skilled jobs (Bishop 1995).

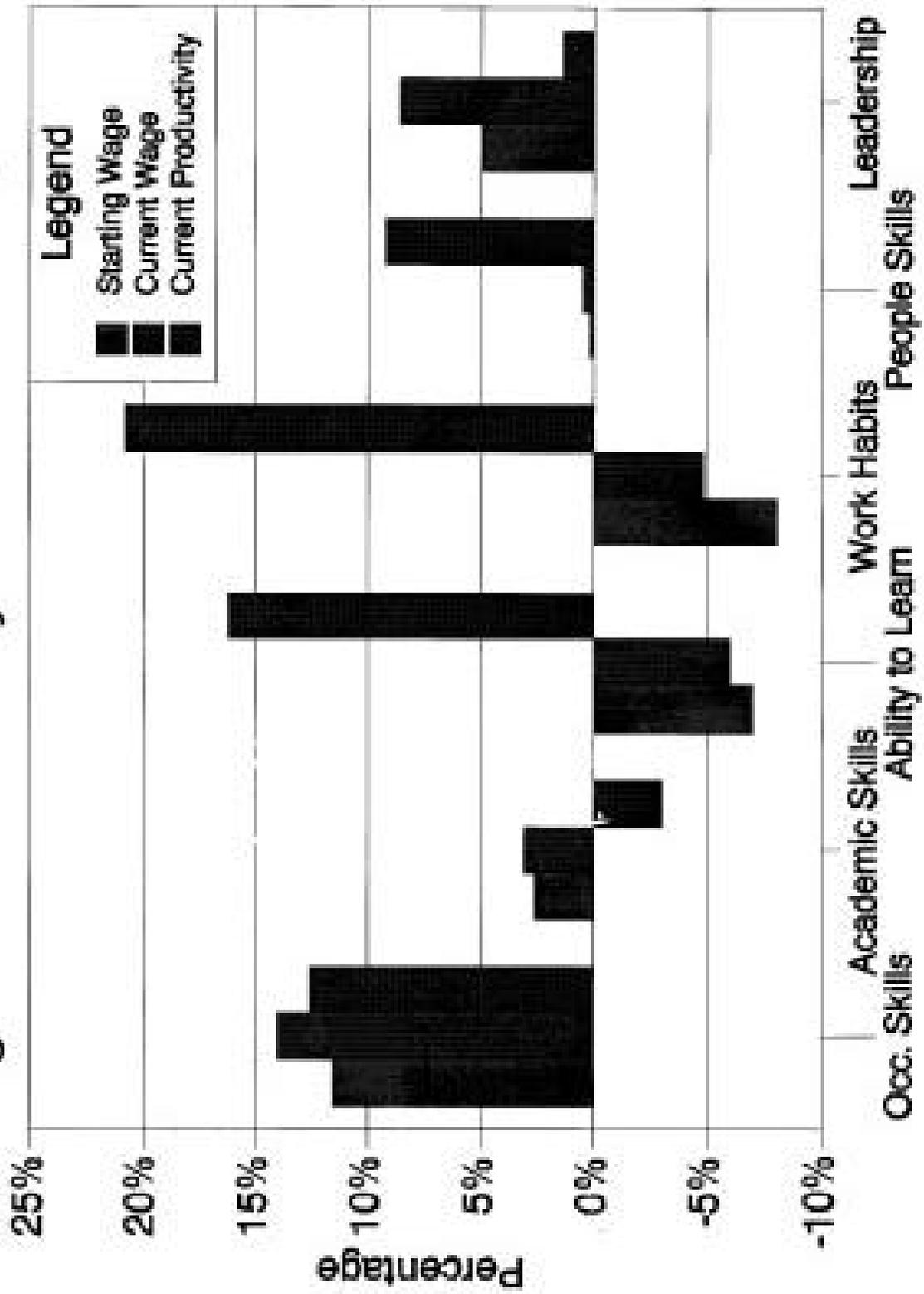
As a result, American high school graduates who are good at reading and mathematics do not get better jobs than their less accomplished peers in the years immediately after graduation (Bishop 1992). The best jobs tend to go to the graduates who took vocational courses and/or worked part-time during the school year (Bishop 1995).

Success on the Job

Once hired, which abilities predict success on the job? The NFIB survey also provides insight into this question. The owners supplied information on the background and on-the-job success of two employees (A and B) who had recently occupied the same job.' After the two employees had been at the firm for a year or more, the employers were asked "Which of the two employees (A or B) proved better on each of the following: 'occupational and job skills', 'ability to learn new occupational and job skills', 'work habits and attitudes', 'people skills (teamwork, appearance, getting along)', 'leadership ability (organize, teach and motivate others)' and as a group 'reading, writing, math and reasoning ability.' " They were asked to evaluate whether A was "much better", "better" or "no different" than B or whether B was "better" or "much better" than A. Since the firms were so small, the owners had contact with each worker, so judgements were probably quite well informed. In most cases owners perceived important differences in ability between their employees. In 78 percent of the cases the occupational skills of one of the two workers were judged to be "better" or "much better" than the other. Reading, writing, math and reasoning skills were judged different 58 percent of the time. Generally those who were strong along one dimension of ability were strong along other dimensions as well.

Which trait contributes most to overall job performance was determined by regressing relative starting wage rate, current (or most recent) wage rate and global ratings of relative productivity of worker A and B on their ranking on each of the six different worker abilities while controlling gender, ethnicity and marital status. Current wage and productivity reports for the date of the interview which was an average of about one year after hiring. For separated employees the productivity report is for "two weeks before leaving the firm" and the wage report is for "at the time of separation. " The results for all three labor market outcomes are presented in Figure 1. The bars in figure 1 represent the percentage differential in wage rates or productivity that results from one worker being 'much better' than another along one of the six ability dimensions while holding other abilities, tenure, ethnicity, gender, and marital status constant.

Figure 1
Wage and Productivity Effects of Abilities



Ex-post assessments of relative occupational skill, learning ability, work habits and people skills all had significant positive relationships with relative global productivity ratings at approximately one year of tenure (the black bar in figure 1). Employer assessments of a worker's academic skills and leadership ability, by contrast, had no relationship with current overall job performance ratings. Holding demographics and employer evaluations of other traits constant, workers thought to have 'much better' occupational skills were judged to be 10.7 percent more productive after about a year on the job.

The impacts of occupational skills on relative wage rates are even more striking. **Occupational skills were the only ability that had large positive effects on relative wage rates.** Workers thought to be 'much better' in occupational skills started with a 12 percent better wage and were making 14 percent extra after a year or so on the job.

Academic skills had no significant effects on wage rates. People skills also had no effects on wage rates. Leadership had modest positive effects on wage rates and initial productivity but not on productivity a year later. The two abilities with the largest impacts on productivity a year later— ex-post assessments of work habits and the ability to learn new occupational and job skills-- had significant negative relationships with wage rates (Bishop 1995).

Correlations between Job Knowledge and Job Performance

A third way to assess the importance of occupational skills is to measure them directly and then examine their correlation with ratings of overall job performance. Meta-analyses of the hundreds of empirical validity studies have found that content valid paper and pencil job knowledge tests are good predictors of job performance. Dunnette's (1972) meta-analysis of 262 studies of occupational competency tests found that their average correlation with supervisory ratings was .51, higher than any other predictor including tests of generic reading and mathematics skills. Vineberg and Joyner's (1982) meta-analysis of studies done in the military came to similar conclusions. Tests assessing job knowledge are also considerably better predictors of ratings of overall job performance than measures of the personality constructs associated with good work habits (Leatta Hough 1988)

When paper and pencil tests of occupational knowledge appropriate for the job compete with reading and mathematics tests to predict supervisor ratings of job performance, the job knowledge tests carry all of the explanatory power, the reading and mathematics tests none. When judged performance on a sample of critical job tasks is the measure of job performance, the beta coefficient on the job knowledge test is 2 to 4 times larger than the beta coefficient on a basic skills composite (Hunter, 1983).

To summarize, in almost all jobs productivity derives directly from social abilities (such as good work habits and people skills) that are generic and cognitive skills that are specific to the job, occupation or industry: not from reading, writing and mathematics skills. **Reading and math skills contribute to productivity by helping the individual learn the occupation and job specific skills that are directly productive. Since large improvements in job knowledge are easier to achieve than equivalent (in proportions of a standard deviation) improvements in verbal and mathematical skills, occupationally specific training is highly desirable, if the student is likely to put the knowledge to use by working in the occupation or a closely related one.**

2. Skill Obsolescence and the Demand for Training

Skills are becoming obsolescent more rapidly than in the past. But those who argue that this implies a reduced need for occupation specific skill development have it exactly backwards. Obsolescent occupational skills must be replaced by new occupational skills. If old skills become obsolete more rapidly, then new skills must be learned more frequently. This implies a greater overall need for occupational training, not a reduced need.

Skill obsolescence is greatest in fast changing fields close to the frontier of knowledge such as computers. It is in precisely these fields where the payoff to skill development is the greatest. People who use a computer at work are paid 10 percent more per hour than those who do not, even when industry and occupation are held constant. Alan Kruger's (1993) survey of temporary help agencies firms found that most provide free training in word processing to people seeking temporary clerical jobs through the agency. He concluded that, "The fact that temporary help agencies find it profitable to provide computer training to the workers they place suggests there is a substantial return to computer skills (1993, p. 47)."

While high rates of obsolescence mean the payoff period is short, they also mean that the supply of workers with the new skills is small because previous generations of trainees did not learn them. Thus graduates of training programs which impart the latest skills have something which is in short supply and which will therefore be well rewarded. The labor market responds to high rates of skill obsolescence by paying a higher premium for the skill.

3. Job Turnover and Incentives to Provide Training

Has the need for expanded recurrent training been fully met by employers? Probably not. High rates of job turnover are a major disincentive for employers considering training investments. The job turnover of American workers has increased over the last 25 years, making it more costly for firms to provide training. The proportion of the work force with fewer than 25 months of tenure at their company rose from 28 percent in 1968 to 40 percent in 1978

and has remained high since. Average tenure of male workers fell 5 percent between 1963 and 1981 (holding age composition constant) and then fell another 8 percent between 1983 and 1987 (Bishop 1995).

The Economist cites the high rates of job turnover as justification for scaling back school based occupational training. Here again they have it exactly backwards. The social returns to occupational training are influenced by **occupational turnover**, not job turnover. Occupational mobility rates in the United States have moved in the opposite direction from job mobility. Occupational mobility fell by 13 to 20 percent between 1978 and 1987 (Markey and Parks 1989) and this has raised the social returns to occupational skill development. Since the rise in job turnover rates has reduced employer willingness to finance training, the need for school based occupational training has never been greater.

4. Should Schools Stop Offering Training in Occupation Specific Skills?

A good case can be made that American workers would be better off if employers took over from schools a greater share of the responsibility for providing occupational training. When employers provide training, trainee time costs tend to be minimal and productivity increases tend to be large and immediate. There is a high probability that the trainee will use the training in her job and be rewarded for doing so. Incentives to keep costs (including trainee time costs) down, to select effective trainers and training strategies and to learn the new material are strong and well aligned.

Most of the costs of employer sponsored training are paid by employers; not by employees in the form of lower wages during training (Bishop 1994). Nevertheless, trainees receive substantial wage increases after such training. This training is a super deal for the worker. The sum of the benefits of training accruing to employers, employees and others in society (e.g. the social benefits) are quite large compared to social costs (Bishop 1995).

The problem with employer training is there is too little of it. The major beneficiary of training-- the worker-- is often poorly informed about costs and benefits and lacks the resources and access to capital markets necessary to pay for it. Employers pay most of the costs of the training provided at work places; but many of the benefits accrue to others-- the worker and future employers of the worker (Bishop 1994). Because trainees are generally paid while receiving training and trainers frequently interact with trainees one-on-one, hourly costs are very high. High costs also result from most employers being too small to achieve economies of scale and specialization in providing training. Finally, public subsidies are generally not available when occupational training is provided by an employer.

Since the hourly costs of providing training in occupational skills are very high for employers, they quite naturally seek to have others-- schools or other employers-- do it for them. They prefer to hire already trained and experienced workers. When such workers are unavailable, they select relatives and family friends for trainee positions to reduce turnover and fulfill family obligations. This, of course, means that young people who are not part of social networks that include small business owners and managers are unable to get their foot in the door. Since costs are high and turnover substantial, most American employers pursue a "just-in-time" training strategy where training is only in the skills needed in the current job. Training is undertaken only when it is expected to quickly yield very high returns.

When making training investment decisions, employers are comparing the costs they incur to the increase in productivity (net of resulting wage increases) of the workers expected to remain at the firm. Benefits received by other employers or the worker will have zero weight in their calculation. The result inevitably is underinvestment (from society's point of view) in employer training that develops general skills.

If School-Based Training were Eliminated: What would Happen?

If schools were to withdraw from the occupational training market, employers would become the sole provider of occupation specific training. Since separation rates are high for most American companies, employers would not be willing to take over this task without some inducement. Government could offer employers training subsidies, but such a scheme would be difficult to administer and would probably cost more than the current school-based occupational training system. In the absence of massive subsidies of employer training, shortages of skilled labor would develop and wage premiums for occupational skills formerly learned in school would rise. Lacking immediately useful skills, school leavers would find it more difficult to get work and have to accept lower wage rates. Some employers would substitute less skilled workers for the now more expensive skilled workers and let the quality of the service they provide deteriorate. Others would find ways to substitute machines for people or arrange for workers located in other countries to do it (e.g. many American companies now have software writing subsidiaries in Bulgaria, Russia and India). Eventually, the scarcity of skilled workers would become so severe and the wage differential between unskilled and skilled workers so large, that employers would find it has now become profitable to provide occupational skills training. In the new equilibrium, however, the society would have fewer skilled workers, a lower standard of living and a more unequal distribution of earnings.

Summary: The Economist made its case for general rather than occupation specific education on a *priori* grounds. The *a priori* argument is unconvincing, however. In societies with high rates of job turnover such as the United States, employers cannot be expected to pick up the entire burden of teaching occupational skills. Schools and colleges need to be a part of the occupational training picture.

But, mounting effective occupational training programs is not an easy task. The rapid obsolescence of occupational skills makes it more difficult to keep curricula, equipment and teaching staff up to date. Graduates of vocational programs are often unable (or choose not) to get jobs in the occupation for which they prepared. This is apparently the price one pays for allowing students to select the occupation for which they will prepare, rather than having employers select who will receive training as occurs in apprenticeship systems. Is the price paid too high? How successful are American vocational technical education programs in preparing young people for skilled work? In particular, how well do they serve at-risk youth?

5. How Effective are American Vocational-Technical Schools/Colleges?

What has research taught us about the effectiveness of vocational education in the United States? This summary of that research is organized around 8 questions. The questions and corresponding findings are listed below:

a) Does high school vocational education lower dropout rates of at-risk youth?

YES. Kulik's (1994) review of the literature concludes that the option of participating in vocational education lowers drop out rates.

b) How large are the economic benefits of post-secondary vocational education?

In 1992 25 to 34 year old full-time full-year workers with two-year associates degrees earned 21 to 28 percent more than high school graduates. Those with some college but no degree earned 14 to 15 percent more than high school graduates (U.S. Bureau of the Census 1993, Table 30). Percentage impacts were generally larger for blacks and females than for white males. Seventy percent of associates degrees and 98 percent of other non-baccalaureate diplomas are awarded in vocational lines of study (NCES 1993 p. 245). Workers who report that training from a two year college helped them qualify for their current job earned 13 percent more in 1991 than other workers with the same amount of schooling, tenure and potential work experience Bowers and Swaim 1992).

c) How large are the benefits of government sponsored vocational training programs targeted on high school dropouts and other economically disadvantaged youth?

Solid evidence on the impact of government training programs on dropouts under the age of 22 comes from studies with strong randomized designs. During the 2.5 year

follow up period, young men with arrest records prior to entering JTPA training earned 6800 less than arrestees who were randomly assigned to not receive JTPA training. Subsidized on-the-job training lowered the earnings of those without an arrest record by \$578 for women and \$3012 for men. The only positive finding for JTPA youth was a 9 percent increase in the earnings of women receiving classroom training. The stigmatizing character of the programs may be one of the reasons for their failure. While JTPA training fails to help young people, adults benefit substantially. For adults payback periods were generally less than two years. The second-chance government training programs that work the best are the ones that focus on teaching occupation specific skills (integrating any basic skills teaching with the occupational training) and which are well connected to the labor market.

d) How large are the economic benefits of secondary vocational education?

Graduates of vocational training programs in secondary schools are not as well paid as those who have completed post-secondary diplomas and associates degrees. Nevertheless, they earn substantially more than other high school graduates who do not go to college. Altonji (1988) found that four trade and technical courses substituted for a mix of academic courses raised wage rates by 5 to 10 percent depending on specification. Kang and Bishop (1989) found that in 1981, one year after graduation, males who completed four trade and technical courses earned 21 to 35 percent more than those who took academic courses only. Young women with four credits of business and office courses earned 40 percent extra. The benefits of high school vocational education diminish with time. Hispanics receive larger benefits from the vocational education they receive than Blacks and non-Hispanic whites (Campbell et al. 1986). The fact that high school vocational education is successful with an age group that second chance programs are unable to help suggests that priority needs to be given to keeping educationally disadvantaged youth in school where they can benefit from mainstream vocational training programs.

e) Do the benefits of getting a vocational education depend on getting a training related job?

YES. Both of the studies (Campbell, et al. 1986; Rumberger and Daymont 1982) that have examined this issue found that economic benefits were zero if a training-related job was not obtained. Effect were particularly positive for those who enter the field they trained for and stay in that field. Campbell et al (1987) found that graduates of high school vocational programs who spend 100 percent of their time after high school in the

field for which they trained earned 31 percent more than those who never had a training related job. Training programs for sales clerk jobs were the exception. Graduates of distributive education programs earned less if they obtained training-related sales jobs. Much of the benefit of vocational education comes from the access it confers to higher wage occupations. This suggests that school based vocational education programs should avoid training young people for low-wage low-skill jobs even when high training-related placement rates can be guaranteed.

f) To what extent are occupationally specific skills learned in school being used in the labor market?

Forty-three percent of the employed graduates who completed two or more vocational courses in a specific field had jobs at the time they were interviewed in 1985 that matched his/her field of training (Campbell *et al.*, 1987). Using a similar procedure of matching training fields against jobs, Mangum and Ball (1986) found post-secondary institutions do only slightly better. The proportion of male (female) graduates who had at least one job in a related field was 52 (61) percent for vocational-technical institutes, 22 (55) percent for proprietary business colleges, (59) percent for nursing schools, and 47 percent for military trainees who completed their tour of duty. Employer sponsored training had higher rates of utilization: 85 (82) percent for company training and 71 percent for apprenticeship. German apprenticeship training is also more likely to lead to relevant jobs. Six months after completing their training, 68 percent of those with civilian jobs were employed in the occupation for which they were trained (much more narrowly defined) (Federal Institute for Vocational Training, 1986). These results suggest that one way to increase training related placement rates is to have employers cooperate with schools in the delivery of training. Other ways to increase the proportion who work in the occupation for which they train is to improve career guidance, offer training in expanding occupations and upgrade the quality and relevance of the training.

g) Does studying occupationally specific skills in school lower achievement in the academic arena?

At the end of high school the gap between vocational and academic students is about one standard deviation or about 3.5 grade level equivalents. Much of this gap, however, preexisted the student's entry into vocational education (Kulik 1994). Indeed students who have difficulty with academic subjects often seek out vocational courses precisely because they offer a different setting and different modes of learning. Kulik (1994) concluded that "80% of the difference in test scores of academic and vocational students

at the end of high school is due to the difference in aptitude of the students who enter the programs (p. 47)." The key determinant of learning is the rigor of the courses taken, not the total number of academic courses or the total number of hours spent in a school building during a year. Thus, vocational students learn less mathematics and science than many academic students primarily because they take less demanding academic courses, not because they take fewer academic courses.

h) How many occupationally specific courses should high school students not planning to attend a four-year college take?

Vocational education in the United States is modular. In high schools the basic modular unit is typically a one year course containing about 150 hours of classroom or shop time. Students need not complete a full program of four or more vocational courses to benefit from the occupation specific education. Among graduates not attending college, those who took just two vocational courses in upper secondary school earned 36 percent more in the year following graduation than those who took no such courses. Those who took 4 vocational courses earned 16 percent more than those who took 2 courses and those who took 6 or more vocational courses earned 6 percent more than those who took 4 such courses (Kang and Bishop 1989). These results suggest that (a) just about every student without definite plans to attend college full time should take at least 2 (4 appears to be best) vocational courses before graduating and (b) that vocational students should be counseled against taking an excessive number of vocational courses in high school. For occupations which require more than 600 hours of classroom/shop time to attain desired levels of proficiency, tech-prep programs integrating high school instruction into a post secondary program will generally be necessary.

Summary

Knowledge is exploding and new skills emerge every day. We have become completely dependent on the expertise of others. Because of this dependence, we are willing to pay good wages to people who have skills and expertise that we lack. Rewards for specific skills are determined by the law of supply and demand. Abundant skills tend to be poorly rewarded. Scarce skills tend to be well rewarded. New skills in growing demand receive the highest compensation.

Most of one's educational career is spent learning generic skills such as reading, writing and arithmetic that are in abundant supply. Success in developing these skills does not, however, make one a highly competent worker or ensure a well paid job. As Emerson tells us: ***The things taught in colleges and schools are not an education, but a means of***

education. These generic skills are tools for developing the scarcer skills and expertise that determine productivity in particular jobs and which are, therefore, well rewarded by the labor market. **It is unwise to devote one's entire education to learning things that everyone else already knows. One must select a vocation for which one has talent and for which there is market demand and then pursue expertise and excellence within this niche. Expertise and excellence are impossible without specialization.**

Since individuals cannot achieve excellence without specialization, an education system that does not accommodate and indeed encourage specialization becomes a barrier to real excellence. People have diverse interests, diverse talents and diverse learning styles. The labor market is similarly diverse in the skills and talents that are sought. A "one size fits all" upper secondary education is bound to fail the majority of students.

Occupational knowledge is cumulative and hierarchical in much the same way that mathematics and science is cumulative and hierarchical. Everyone must start at the bottom of the ladder of occupational knowledge and work their way up. The spread of information technology and of high performance work systems is forcing workers to learn new skills, but the new skills are generally additions to, not replacements for, old skills. While learning a new skill is easier when the worker has good basic skills, a foundation of job knowledge and occupational skills is more essential. At some point every individual must start building his/her foundation of occupational skills. For the great majority of youth who do not have an uncle willing to take them on as an apprentice for a well paid occupation, the foundation building should begin at least two years before the individual plans to leave school

At-risk students who dislike and do poorly in academic classes should not be forced or advised to load their schedule up with academic classes during their final years in high school. Since they are unlikely to pursue a bachelors degree and are at risk of dropping out of school before graduating, at-risk students should be advised to start building their foundation of occupational skills and knowledge while they are still in school

References

- Altonji, Joseph. (1988) "The Effects of High School Curriculum on Education and Labor Market Outcomes." Chapter 3 of a report to the Department of Education from the National Center on Education and Employment, Department of Economics, Northwestern University, December 1988.
- Bishop, John H. (1992) "The Impact of Academic Competencies on Wages, Unemployment and Job Performance. " Carnegie-Rochester Conference Series on Public Policy, North Holland, Vol. 37, December 1992, 127-194.
- Bishop, John H. (1994) "The Incidence and Payoff to Employer Training," Center for Advanced Human Resource Studies Working Paper 94-17, 1-95.
- Bishop, John H. (1995) "Expertise and Excellence," Center for Advanced Human Resource Studies Working Paper 95-13, 1-105.
- Bowers, Norman and Swaim, Paul. (1992) "Probing (Some of) the Issues of employment related Training: Evidence from the CPS." Washington D.C.: Economic Research Service, U.S. Department of Agriculture, 1-36.
- Campbell, Paul B.; Elliot, Jack; Hotchkiss, Larry; Laughlin, Suzanne and Seusy, Ellen. (1987a) "Antecedents of Training-Related Placement. " Columbus: The National Center for Research in Vocational Education, The Ohio State University.
- Campbell, Paul B.; Basinger, Karen S.; Dauner, Mary Beth; and Parks, Marie A. (1986) "Outcomes of Vocational Education for Women, Minorities, the Handicapped, and the Poor. " Columbus: The National Center for Research in Vocational Education, The Ohio State University.
- Dunnette, Marvin D. Validity Study Results for Jobs Relevant to the Petroleum Refining Industry. Washington, DC: American Petroleum Institute, 1972.
- The Economist, March 12 1994.
- Federal Institute for Vocational Training. "The Transition of Young People into Employment after Completion of Apprenticeship in the 'Dual System'." West Germany: The Federal Institute for Vocational Training, 1986.
- Hough, Leaetta M. Personality Assessment for Selection and Placement Decisions. Minnesota: Personnel Decisions Research Institute, April 1988.
- Hunter, J.E. (1983) "Causal Analysis, Cognitive Ability, Job Knowledge, Job Performance, and Supervisor Ratings." In Performance Measure and Theory, edited by S. Lundy, F. Zedeck, and S. Cleveland. Hillsdale, NJ: Lawrence Erlbaum.
- Kane, Thomas and Rouse, Cecilia. (1995) "Labor Market Returns to Two and Four-Year College: Is Credit a Credit and Do Degrees Matter?" American Economic Review, June 1995, Vol 85, No. 3, 600-615.

- Kang, Suk and Bishop, John. (1989) "Vocational and Academic Education in High School: Complements or Substitutes. " Economics of Education Review. Vol. 8, No. 2, pp. 133-148.
- Krueger, Alan. (1993) "How Computers Have Changed the Wage Structure: Evidence from Micro Data, 1984-1989." Quarterly Journal of Economics, Feb. 1993, 33-60.
- Kulik, James A. (1994) High School Vocational Education and Curricular Tracking. Ann Arbor, Mich: University of Michigan, January, 1-84.
- Markey, James and Parks, William. (1989) "Occupational Change: Pursuing a different kind of work." Months Labor Review, September, 3-12.
- Rumberger, R. W. and Daymont, T. N., (1982) "The Impact of High School Curriculum on the Earnings and Employability of Youth. " In Job Training for Youth, edited by R. Taylor, H. Rosen, and F. Pratzner. Columbus: The National Center for Research in Vocational Education, The Ohio State University.
- U.S. Bureau of the Census. (1993) Money Income of Households, Families and Persons in the United States: 1992. Current Population Reports, Series P60-184, U.S. Department of Commerce, September 1993.
- U.S. Bureau of Labor Statistics. (1995) "College Enrollment and Work Activity of 1994 High school Graduates." USDL 95-190, June 1, 1995, 1-4.
- Vineberg, Robert and Joyner, John N. (1982) Prediction of Job Performance: Review of Military Studies. Alexandria, Va: Human Resources Organization.

End Notes

- 1 . The 500,000 members of the National Federation of Independent Business (NFIB) were stratified by employment and large firms over sampled. Salaried managers in charge of subunits of large publicly owned corporations are not eligible for membership in NFIB, so the sample does not contain data on employment outcomes at large multi-establishment firms. A four page questionnaire was mailed to approximately 11,000 firms, and after 3 follow up waves, 2599 response were obtained. The survey focused on a single job--the job "for which ...you hired the most people over the last two or three years."

- 2 . After a series of general questions about the character of the job and the worker qualities that were sought when filling that job, the manager was asked to select two individuals who had been hired for this job and answer all future questions specifically with reference to those two workers. The selection was made in response to the following question:

"Please think of the last person hired for this job (job X) by your **firm prior** to August 1986 **regardless of whether that person is still employed by your firm**. Call this individual person A. The individual hired for job X immediately before person A is called person B. Do not include rehires of former employees." Information of varying degrees of completeness was obtained on 1624 person A's and 1403 person B's.