

# PARTICIPATION IN WORK-RELATED EDUCATION: VARIATIONS IN SKILL ENHANCEMENT AMONG WORKERS, EMPLOYERS, AND OCCUPATIONAL CLOSURE<sup>☆</sup>

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## ABSTRACT

*Work-related education plays an increasingly important role in the lives of Americans as labor markets, technology, and organizations change, requiring of them more lifelong acquisition of skill. This paper examines how the behaviors of workers, employers, and occupational closure jointly influence the participation of workers in job-related coursework. Together, these actors construct training markets. I use the Adult Education Interview of the 1995 National Household Education Survey (NHES: 95) to examine the role of workers, employers, and closure processes. The*

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*findings show persistent patterns of inequality in access to job-related instruction originating in all the three domains of influence.*

Labor market analysts recognize that individuals acquire many, even most, of their skills on the job (Thurow, 1975; Collins, 1979). Most accounts of skill acquisition posit that formal schooling provides people with the “general” skills that they need later to master the “specific” skills of the workplace. Even analysts who challenge this assumption still assume that schooling takes place primarily (if not exclusively) before the beginning of one’s work life (Blau & Duncan, 1967), before the opportunity costs of schooling become prohibitively high. After one has begun full-time employment and served some time in a low-wage “probation” in which the employer invests in the site-specific training of the new worker, most accounts of skill acquisition hold that people learn the job on the fly, primarily through learning by doing or emulation (Darrah, 1994).

In his benchmark statement of the human capital perspective on skill acquisition, Becker (1964, p. 8) characterized on-the-job training (OJT) as “the effect of the productive process itself on worker productivity.” Internal labor market theorists add that seniority provisions permit senior workers to train less experienced workers on-the-job without putting the value of their own skills at risk (Doeringer & Piore, 1971). Recent ethnographies too emphasize the extent to which the learning of skills is embedded in the nature of the workplace (Orr, 1996).

OJT is important (Barron, Berger, & Black, 1997), and in many segments of the labor market it appears to be increasingly so (Frenkel, Korczynski, Shire, & Tam, 1999, p. 169). Still, it is difficult to square a strict human capital account of the acquisition of front-loaded general skills and workplace-embedded specific skills with the rapid change of the workplace over the past two decades. Cappelli et al. (1997), Murnane and Levy (1996), and others have observed the evident growth in skill requirements as technology, restructuring, and globalization have transformed the American workplace. Bowers and Swaim (1994), using the 1983 and 1991 Current Population Survey (CPS), observed that “Skill demands appear to have shifted toward general and cognitive skills – best taught in formal training programs – and away from specific and manual skills acquired through informal on-the-job training” (1994, p. 79). There seems broad agreement now that ‘lifelong learning,’ beyond that provided prior to workplace entry, is going to be the norm for ever larger shares of the workforce (Bishop, 1998).

An implication of this is that an increasing amount of post-entry skill acquisition is now acquired “off-the job” (Darkenwald, Kim, & Stowe,

1998). That is, workers gain skills not only through such “situated learning” modes as imitation, practice, and trial and error, but through formally structured courses and programs that may take them off the immediate work site. These activities may be sought out by workers; required, offered, and supported by employers; or may be a condition of employment because of certification or licensure requirements. Certainly there is less formal than informal training. Frazis et al. (1997, p. 48) showed using the 1995 Survey of Employer Provided Training (SEPT) that about 30% of training is formal (see also Barron, Berger, & Black, 1997, p. 507). Still, this is an enormous amount of activity, and has received insufficient attention from labor market analysts (Knoke & Kalleberg, 1996; Useem, 1993).

There has been compellingly expressed doubt about the inevitability of “the learning society” and the “skills solution” to economic and technological change (Crouch, Finegold, & Sako, 1999), as well as about the nature of many of the structural changes in which skill enhancement is embedded (Vallas, 1999). Still, participation in work-related education in the United States (and elsewhere) is growing.<sup>1</sup> Kim, Collins, Stowe, and Chandler (1995) reported that 21% of adults participated in work-related courses in 1995, a substantial increase from 1991. If one adds instruction pursued for work-related reasons (Kopka, Chan, & Peng, 1993) to more narrowly defined job-related coursework, the volume of instruction that people pursue to develop or advance their work lives is enormous.

To phrase the issue as the “instruction that people pursue,” however, is to prejudge the determinants of participation in work-related education. Workers are but one player in the provision and receipt of work-related education. An examination of work-related education must also consider the characteristics of employers who provide instruction and the occupational closure processes external to the employee-employer relationship. My purpose is to examine the determinants of participation in work-related education based in the three domains of influence of workers, employers, and occupational closure.

## **WHAT IS WORK-RELATED EDUCATION?**

Barron, Berger, and Black’s review of the training literature concluded that “there is a great deal of error in measures of training” (1997, p. 526; see also Collins, Brick, Kim, & Stowe, 1997; Zemsky & Shapiro, 1994). As prevalent as error is ambiguity (Bishop, 1997; Lynch, 1998). Analysts have reached little consensus on the conceptualization and measurement of either narrowly

defined job training or any of the components of the broad array of means by which adults acquire skills.

Surveys with data on training provide very different estimates of its extent and intensity. There are many reasons for this. Measures of training differ across surveys, sample delineations (particularly by the age of respondents and the size of firm) vary, the difference between formal training and OJT is often unexamined, and the distinction between the training employees get and the training employers provide is not always kept clear. Barron et al. (1997) reported that employers and employees often give different reports of the commitment to training (although the variations are wider for volume of training than incidence of training).

Difficulties in conceptualization and measurement are not limited to OJT. Knoke (1997, p. 128) observed that “reliable information on formal training programs, which presumably have identifiable participants and well-defined starting and ending points, is also difficult to obtain.” Further, what employers or employees construe as training may vary. Whitfield (2000, p. 10) noted that “what constitutes training in some firms is regarded as either an essential by-product of production or a perk in others” (see also Hollenbeck, 1996; Scott & Meyer, 1991).

In brief, every major data series with information on adult education or training supports distinctive understandings and interpretations of what is being conceptualized, observed, and measured, and there is no convincing a priori case for any one of them. I resolve this here by conceptualizing *work-related education* as activity identified by the employee who reported such participation, either on or off the work site. I exclude participation in vocational or academic credential programs and apprenticeships. I also exclude participation in basic skills or personal development education, even if respondents reported that their primary reason for pursuing this education was work.<sup>2</sup> I discuss measurement below after I have described the sample, but note here that my working definition of work-related education is broader than strictly interpreted training, but narrower than the full range of adult educational activities.

## **THEORETICAL BACKGROUND: LABOR MARKET ACTORS AND SKILL ACQUISITION**

Variations in participation in work-related instruction derive from the three domains of workers, employers, and closure. Despite virtually

obligatory reservations among sociologists about the adequacy of human capital theory, sociologists have yet to integrate these domains into a coherent theory of skill acquisition (Knoke & Kalleberg, 1996).<sup>3</sup> This is in part because of the ambiguity of this aspect of the U.S. labor and training markets. As Crouch et al. (1999, p. 205) observed, "The most obvious characteristic of skill creation in the USA is the absence of any generalizable system." One consequence of this is that conventional models of neither occupational attainment or earnings nor participation in OJT are straightforwardly applicable to participation in work-related instruction.

Theories of training, whether human capital or any number of sociological alternatives, typically emphasize either the supply side (the characteristics of workers most likely to invest in their human capital) or the demand-side (the characteristics of employers most likely to invest in their human capital of their workers). Knoke and Kalleberg used the National Organizations Survey (NOS) to examine organizational influences on participation in job training, asking the demand-side question, "Which firms provide job training to their employees" (1996, p. 165).<sup>4</sup> Hodson, Hooks, and Rieble (1994) directed attention toward the kinds of jobs in which training is invested rather than toward individual workers. Veum (1996, p. 34) commented about his analyses of NLYS that "It is assumed that the provision of on-the-job training reflects decisions made by the employer rather than human capital decisions made by the worker."<sup>5</sup>

In contrast to this emphasis on the demand side (which is a helpful corrective to a longer tradition of supply side studies of training), I assess the determinants of participation in work-related education emanating from three domains of influence. I draw on several strands of labor market theory to organize my empirical analysis of participation in work-related education. I take most of my material on the worker domain from the economic literature on job training. For the employer domain, I add the concept of occupational internal labor markets. Finally, I examine closure processes by building on such concepts as open and closed employment relationships and occupational hoarding. The boundaries between these three domains are contentious and in some measure arbitrary. Occupations, for instance, are properties of both workers and organizations. My purpose is less to derive precise estimates of the contribution of each domain to work-related education than to offer a fuller account of the market for this mode of skill enhancement.

## WORKERS

There is evidence that a significant share of job-related instruction is instigated by workers. Ospina's (1996) case study of "Public Services Agency" (PSA) is pertinent. Ospina estimated a regression equation to predict the number of training programs in which individuals had participated. Her independent variables included seniority, organizational level, education, and civil service status. She reported that her model had relatively weak explanatory power (accounting for about 30% of the variance), and that "Participation in training programs is largely a function of individual choice, a contingency factor that was not included in the analysis" (1996, p. 81). She added that "Everything else being equal, either by preference or for other reasons, clerical and analyst participation in training programs was significantly lower than operator participation" (1996, p. 81). Both educational background and seniority had positive effects on participation. Ospina's research was limited to a single organization, but her finding that employees were the primary instigators of training is important. Krueger and Rouse (1998, p. 64) also reported in a study of two organizations that most worker participation in training programs was voluntary.

Clearly, not all employees have the same opportunity to volunteer. While there is a large literature on the determinants of participation in OJT (Bishop, 1997), there is little reason to anticipate that the determinants of participation in formal programs will replicate these. Similarly, research on the re-entry of adults into vocational (Elman & O'Rand, 1998) or academic (Carr & Sheridan, 1999) degree programs is a step removed from job-related coursework. Li, Konig, Buchmann, and Sacchi (1995) reported that the determinants of further education differed across the type of education pursued. The training literature provides a guide, but an uncertain one, in identifying the determinants of participation in job-related coursework.

Both human capital and sociological theory predict that women will receive less work-related education than men, although their reasons for this vary. Human capital theorists point to women's presumed weaker attachment to the labor force and employers' resultant reluctance to invest in them. Sociological theories posit the crowding of women into jobs that lack provisions for skill enhancement.

In a review of the research on young workers, Lynch (1991) found that men are more likely than women to be trained on the job. The evidence for this across the full age distribution is less conclusive. Brown (1990, p. 104) observed that "The most surprising result is the lack of consensus on whether men or women acquire more training." He added that any

advantages accruing to men have probably diminished over time. Some have reported that women sometimes have more access to job-related training than do men (net of other factors; Boyle, 1997; Veum, 1996), while others have reported that they receive less (Knoke & Kalleberg, 1994). Barron et al. (1997) found little effect of gender on OJT, although their data only pertained to the first 3 months of employment. Frazis, Gittleman, Horrigan, and Joyce (1998) found that women got a bit more formal training than men (73 vs. 67%), but that men received more hours of training. Neither difference was statistically significant. Most of these findings pertain to OJT, which may differ from formal instruction. Further, many analysts suggest that gender effects are suppressed by or interact with other variables (Crook, 1997; Knoke, 1997) or that they indicate selection effects (Li et al., 2000, p. 59). In particular, it is unclear how much of the gender difference is attributable to occupational differences between men and women.

The empirical literature on the effects of age on participation in work-related education is equally inconclusive. Probably the largest share of research on job training has examined younger workers, precluding a systematic assessment of age effects. Moreover, the interpretation of age coefficients can be problematic in cross-sectional data. Age effects on participation in work-related education might indicate life course transitions through which all cohorts pass, broader economic conditions at the time of the survey, or the greater propensities of a particular cohort to pursue educational opportunities (Jacobs & Stoner-Eby, 1998). The plausibility of a particular interpretation rests in part on whether employees or employers are the primary initiators of instruction. Presumably, individuals will pursue education to enhance their prospects for mobility or security, with the balance between these probably shifting as workers age. If we assume no broad changes in the economic opportunity structure available to workers (clearly an unrealistic assumption at the time of the survey in 1995) and a training market driven by workers,<sup>6</sup> age might be negatively associated with participation in formal instruction. This is because the greatest incentive to pursue training would be with younger workers, whose foregone wages would be lowest and whose length of time to recoup these lost wages would be longest. As Light (1995, p. 472, 473) observed, "By making schooling investments early in life, individuals not only minimize the opportunity cost (since foregone earnings invariably rise with age), but they also ensure that the return will be received for as many years as possible. These life course changes in costs and benefits lead to the prediction that individuals grow increasingly less likely to opt for additional schooling investments as they age."<sup>7</sup>

In contrast, and still assuming that workers are the primary initiators of training, older workers may feel more threatened by economic or technological change than do younger workers. If so, their perceived need to defend their own tenuous positions might increase their rates of job-related instruction. On this argument, we would anticipate a positive relationship between age and participation.

On the other hand, employers may be the primary force in determining who does and does not receive training (Veum, 1996). Employers can be expected to invest most where the perceived returns will be repaid over the longest period, which will typically be with younger workers. Alternatively, employers may choose to invest most in older, more skilled and experienced workers where the immediate return on their investment is perhaps higher. This would lead to the opposite prediction of a positive association between age and training.

The empirical literature offers limited guidance in reconciling these positions. While human capital theory would predict employer investments in training to be greatest for younger workers (when opportunity costs are lowest), data from the CPS and NLSY show generally low training rates for young workers (Bowers & Swaim, 1994; Lynch, 1991). Frazis et al. (1998) analyzed the 1995 SEPT and looked at respondents from a wider age range. He reported the highest rates of formal training for those between 25 and 44 years of age. Older and younger workers participated less. Similar to the decreasing income returns to age often reported in the literature, the effect of age on participation in job-related education appears to be nonlinear.

Racial and ethnic differences in participation in work-related education is another unsettled question. Lynch (1991) concluded from her review of the research on young workers that nonwhites receive less training than whites. Knoke and Kalleberg (1994, p. 539) summarized the research as revealing that minorities receive less formal and informal training than whites. On the other hand, Frazis et al. (1998) found few race or ethnic effects, other than some tendency of Blacks to get fewer hours of formal training (see also Veum, 1996). Krueger and Rouse (1998, p. 71), studying two companies, reported that "Trainees tended to be younger and are more likely to be male, nonwhite and better educated than the nontrainees." Their study only pertained to basic education, however, and it is not clear how generalizable their findings are. The same might be said about Barron et al. (1997) finding of few race differences in training in the first 3 months of employment.

Perhaps the most secure finding in the training literature is that more educated workers get more OJT (Barron et al., 1997) and formal training (Krueger & Rouse, 1998; Ospina, 1996) than do less educated workers.<sup>8</sup> This



relationship has evidently increased over the past 15 years (Bowers & Swaim, 1994). Frazis et al. (1996) reported that "some variables, such as education, that affect formal training have similar effects on informal training" (1996, p. 21; see also Frazis et al., 1998). MacDuffie, Paul, and Pil (1996, p. 2, 3; see also Holzer & Reaser, 1996, p. 1) found higher levels of employee education to be associated with higher levels of training, and concluded that "Higher levels of formal education are believed to provide a greater ability to absorb and effectively put to use training provided by organizations."<sup>9</sup>

The effects of educational level on participation in training do not appear to be linear, although research has not established all of the nonlinearities and the conditions under which they apply. Lynch (1991) reported that among young workers, both high school and college dropouts receive less employer training than do high school and college graduates, respectively.

Occupational inequalities in job-related education are also large, and may be becoming more important as the premium to skills grows. Knoke (1997, p. 128) summarized Lynch's (1991) review of the research on young workers as demonstrating that "Despite measurement inconsistencies across surveys, ... managers, professional, and technical employees are most likely to receive company training." He added that "One conclusion from these surveys is that more advantaged workers in better jobs also seem to get more training" (1997, p. 129). Frazis et al. (1998) reported similar findings from the SEPT. In general, workers in occupations with higher pay, prestige, and remuneration get more training than do those in less privileged occupations.

This need not be related in any direct way to the marginal productivity of the favored workers. Ospina's case study of "PSA" reported that its "Division of Human Development" allocated disproportionate training opportunities to some occupational groups. For example, PSA invested most heavily in its operators, whose work it saw as core. Ospina described the provision of training to analysts and clerical employees as "sporadic and less systematic" (1996, p. 62). She added, however, that the provision of training to operators involved supervisors in political maneuvering and positioning unrelated to any obvious need to enhance their skills. Similarly, Hollenbeck (1996, p. 2) observed that "training comprises many different types of activities that are undertaken for many different reasons, only some of which are meant to enhance individual worker productivity and thus might be expected to influence wages."

Finally, Frazis, Gittleman, and Joyce (2000, p. 449) noted that "The human capital model predicts a negative relationship between training and tenure on the job, as the earlier an employee receives training, the longer the

period available to receive returns for the training investment.” They acknowledge, however, [Loewenstein and Spletzer’s \(1997\)](#) concept of “belated” training, which maintains that “Employers may want to wait until a worker proves himself to be satisfactory before investing in costly training.” Again, the empirical literature is inconclusive.

## EMPLOYERS

U.S. firms provide a great deal of education and training, an effort that is by most accounts increasing. Large employers tend to provide more. [Frazis et al. \(2000, p. 445\)](#), using the 1995 SEPT, reported that 93% of establishments of 50 or more employees provided formal training in the previous 12 months and that 70% of employees in those establishments got some formal training. Estimates from other surveys are broadly similar. In the 1994 Educational Quality of the Workforce Employers Survey (EQW-ES), 81% of establishments with 20 or more employees provided training while in the 1992 Small Business Administration (SBA) Training survey 42% of establishments of 100 or more employees did so. Frazis et al. pointed out that the differences across surveys are partly because of the different thresholds for firm size and partly because the SBA used a measurement of training program rather than episode.<sup>10</sup>

The observed effects of size are probably best conceptualized as economy of scale effects, although researchers typically lack good measures of this ([Black, Noel, & Wang, 1999](#)), making straightforward inferences suspect ([Crouch et al., 1999, p. 7](#)). [Frazis, Herz, and Horrigan \(1995\)](#) suggested that large firms are more likely than small firms to have internal labor markets (FILMs) or more sophisticated technology, both of which would engender greater efforts to enhance skills. While analysts usually conceptualize FILMs as administrative arrangements that encourage OJT rather than more formal instruction, there is evidence that FILMs foster structured education as well. [Li et al. \(2000, p. 46\)](#) observed that in Switzerland, “Firm-financed further training, such as occupational updating, is most common in the firm internal labor market (e.g. the public sector, banks, insurance companies, and core industries)... [and] much less common in the craft-specific labor market, and workers in this market often seek credential-oriented further training outside the firm and finance the training themselves.” [Lynch and Black \(1998, p. 69\)](#) reported differences across industries in the United States that largely corroborate this.

The increase in training coupled with the evident rise of occupational internal labor markets (OILMs) at the expense of FILMS (Frenkel et al., 1999) complicates the issue of employer effects. Frazis et al. (2000, p. 448) hypothesized that firms with either ILMs or some version of the “high performance model” that is supposedly replacing FILMs will be concerned to retain workers in long-term employee relationships and will design systems, including skill enhancement, to do so. They note that neither their data (SEPT95) nor anyone else’s have direct measures of firms’ efforts to maintain worker commitment, but cite research showing that the provision of fringe benefits, a reasonable indicator of employer commitment, is often associated with size, training, and reduced turnover. This relationship holds in SEPT.

## OCUPATIONAL CLOSURE

Much work-related instruction is beyond the control of either workers or employers. Professions, occupational associations, labor unions, or state regulatory agencies often require ongoing education or training not tied to the demands of a given workplace (Darkenwald et al., 1998; MacDonald, 1985; Rottenberg, 1987; Weeden, 1998). This often entails licensure, certification, or other credentialing in order for incumbents to continue to practice. Such occupational closure has been largely neglected among labor market analysts.

There are many forms of closure that vary across societies and historical periods. Educational credentials, the preeminent one in the post-industrial workplace, permit their holders to claim jurisdictional monopolies over skills and positions (Collins, 1979; Murphy, 1988; Parkin, 1979). Most accounts of educational credentials as mechanisms of closure examine their role at job entry (see MacDonald, 1985). That is, they ask how occupational groups, in conflict or collusion with employers, use educational credentials to open the door for some, while closing it for others. Less acknowledged is that post-entry instruction can operate as a form of closure. Tilly’s (1998) concept of “opportunity hoarding” directs attention to the processes by which occupational groups seek control over such resources.

Weeden (1998, p. 3), drawing on Parkin (1979), conceptualized occupational closure as “the process by which a group of individuals who share a position in the division of labor maximizes its rewards ‘by restricting access to rewards and opportunities to a limited circle of eligibles’” (see also

Manza, 1992). She identified four strategies of occupational closure. These are representation by occupational associations, unionization, credentialing, and licensing.

Closure is usually thought of in relation to professional occupations, reflecting processes in which groups are able to engage in the exclusion of less favored groups (Parkin, 1979). Nonprofessional groups too, however, can engage in closure. The main example here is the possibility that labor unions might hoard opportunities for training. Crouch et al. (1999, p. 18) have noted the closure implications of this activity:

The most immediate [contradiction] questions that [trade unions] can influence within-firm or within-industry measures for upskilling existing employees. This will be valuable, but it might be argued that such policies increase the gaps between insiders and outsiders, as those already in work increase their value to employers relative to those seeking employment.

Opportunities for skill enhancement are likely to be hoarded only if they have tangible payoff to those who pursue them. There is evidence that the benefits to workers of formal training are increasing relative to those of OJT (Bishop, 1998). Frazis et al. (1998) showed that about 90% of American workers get some sort of informal training, a figure that varies little across socioeconomic categories. Being relatively scarcer, formally structured programs potentially infuse more training variation into the labor force. This suggests that their value has become greater (Constantine & Neumark, 1994; Marcotte, 1999).

The empirical evidence on unionization and training, however, is unclear. Frazis et al. (2000, p. 449) noted that human capital reasoning can lead to predictions of either more or less training in unionized workplaces. While the authors reported a negative effect in SEPT95, the empirical issue is unsettled.<sup>11</sup>

## SUMMARY

The literature provides considerable grounds for predicting effects on participation in work-related instruction of each of the three domains of workers, employers, and closure. It provides little guidance as to which might predominate, or about the interplay of these factors. After describing my data and measurement, I will present an analysis of the empirical impacts of each of these domains.

## DATA AND MEASUREMENT

### *Sample*

The National Household Education Survey (NHES) was developed by the National Center for Education Statistics (NCES) as an attempt to go beyond its traditional, school-based data collection systems. [Collins and Chandler \(1996, p. 11\)](#) observed that “There are no other current national data available on the participation of adults in the broad range of adult education activities.” [Olson \(1996, p. 1\)](#) noted that “this survey provides the best available data on the determinants of the amount of firm sponsored training in the U.S. provided over a fixed time interval.”

NCES designed NHES:95 to “measure participation in adult education activities (of noninstitutionalized, civilian adults aged 16 and above), to describe these activities, to provide data on the characteristics of participants and nonparticipants, and to determine why some adults participate while others do not” ([Collins and Chandler, 1996, p. 1–3](#)). NHES:95 consists of 19,722 completed adult education interviews. Of these, 11,713 are participants in some form of adult education and 8,009 are nonparticipants.

Household surveys provide an advantage in any analysis of work-related education. Individuals obtain much of their job-related instruction from providers other than their employers, often without their employer even being aware that they are doing so. Organization-based surveys thus miss much of the total volume of job-related coursework. Even when employers require workers to take instruction, an organization-based survey will underestimate the extent of training when there are outside providers.

### *Measuring Work-Related Education*

NHES defines work-related courses as “those related to a job or career, whether or not respondents had a job when they took the courses. Some examples are courses taken at work, courses taken elsewhere that relate to a job or career, or courses for a license or certification for a job.” This definition is at once restrictive and expansive. It is restrictive in its focus on courses rather than OJT. [Veum \(1996\)](#) estimated that about 70% of workplace learning is via OJT. My focus here is the 30% that represents formally structured learning. There is no evidence that either is measured more accurately than the other in standard data sets ([Barron et al., 1997](#)). The definition is expansive in that it still covers an enormous range of activities,

many of which take place outside of the worksite. These courses run from “Abnormal Movement in Stroke Victims” and “Accounting” to “Maintenance Programming” and “Making Educational Toys” to “Yes You Can” and “Youth Development.”

NHES:95 asked respondents if they had participated in job-related instruction in the 12-month period preceding the survey, and if so, how many times they had done so. Collins and Chandler (1996, p. 11, 12) compared the NHES with two major data sets, the CPS and the NLSY. They concluded that NHES provides the overall best estimates of the extent of participation in adult education.

### *Measurement of Variables*

My worker variables are coded straightforwardly. I coded *age* into the categories 16–24, 25–34, 35–44, 45–54, 55–64, and 65 and above. This coding has the advantage of capturing nonlinearities while being substantively more interpretable than a combination of a linear and a squared age term. In the logit models, I use repeated contrasts, so the coefficients can be read as the difference between the category and the adjacent younger category.

*Race/ethnicity* is coded as White/Non-Hispanic (the reference category), Black/Non-Hispanic, Hispanic, and Other (primarily Asian/Pacific Islander). For *schooling*, I use a standard detailed set of categories with repeated contrasts. These are less than high school, high school, some postsecondary vocational, some college, vocational degree, associate degree, bachelors degree, some post graduate, and advanced degree. *Experience with employer* is coded in years as 1–1.9, 2–2.9, 3–3.9, 4–4.9, 5–9.9, 10–19.9, and more than 20, again with repeated contrasts.

I use the 22-way classification of *occupations* available in NHES:95. These are aggregated categories coded according to the rules of the *Standard Occupational Classification Manual* (1980). Because closure processes are often tightly tied to specific occupations, I retain as detailed an occupational categorization as possible, at the cost of some parsimony in the presentation. For the logit analysis, I assign the category of “administrative support, including clerical” as the reference category. In addition to providing a conceptually interesting contrast, the mean for the dependent variable of participation in work-related education for the administrative support category is very close to the overall mean, thus providing interpretable occupational coefficients. Further, the category has enough cases to provide stable coefficients.<sup>12</sup>

As a household survey, NHES:95 lacks detailed data on the characteristics of employers. In particular, it lacks measures of firm size or internal labor markets. I use two indicators of employer influence on work-related education.<sup>13</sup> The first is industrial sector. According to material available from NCES, “In general, the NHES:95 *industry categories* are at the highest level of aggregation used in the *Standard Industrial Classification Manual* (1987), called *divisions*. In a few cases, categories below the division level are broken out separately. These are at the level of *Major Groups*” (NCES nd:E1). For the logit analysis, the reference industry category is “services.” I use the same reasoning here as for the occupational specification.

Following the lead of Frazis et al. (2000), I include four measures of workplace benefits as indicators of employer commitment to workers. These are the respondent’s eligibility for medical or hospital insurance, sick leave with full pay, vacation with full pay, and pension plan or retirement program. The correlations between these items range from 0.504 to 0.639.

Because of omitted variables, I am undoubtedly underestimating the effects of employers on participation in work-related education. It is encouraging though that Frazis et al. (2000:460) reported from the matched employer – employee SEPT that omitting employer characteristics did not bias the estimates of employee effects.

NHES:95 offers two useful indicators of occupational closure.<sup>14</sup> These are taken from the following items: Does your occupation have legal or professional requirements for continuing training or education? Are you currently a member of a labor union or of a labor organization? I take positive responses to indicate occupational closure.

## PLAN OF ANALYSIS

I begin with descriptive statistics, presenting both bivariate relationships and some combinations of educational, occupational, and closure variables. I then estimate a series of binary logistic regression models to predict the odds of participation in work-related education.<sup>15</sup> I confine my attention to the 13,634 respondents who held a job sometime in the 12 months preceding the survey. I exclude those who were solely self-employed. About 88.8% were working at the time of the survey, 3.7% were unemployed but still in the labor force, and 7.5% were out of the labor force. Other characteristics of the sample are presented in Column 1 of Table 1.

**Table 1.** Participation in Work-Related Coursework in the 12 Months Preceding the Survey.

	% of Sample	Participation Rate	Number of Courses
Total		29.7	2.45
Gender			
Men	51.2	28.2	2.37
Women	48.8	31.4	2.53
Age			
16–24	16.0	16.5	2.04
25–34	26.5	30.4	2.42
35–44	26.9	36.0	2.54
45–54	18.8	36.5	2.57
55–64	9.0	24.4	2.31
65+	2.9	11.2	2.31
Race/Ethnicity			
White/NonHispanic	76.6	32.1	2.47
Black/NonHispanic	10.8	24.6	2.51
Hispanic	8.2	16.7	2.11
Other	4.3	26.2	2.35
Education			
Less than high school	12.3	11.1	1.85
HS diploma/eq	29.1	20.5	2.09
Some voc-tech	0.9	26.7	2.23
Voc-tech diploma	2.4	32.2	2.70
Some college	20.9	27.9	2.40
Associates	6.4	40.0	2.56
Bachelors	16.5	44.8	2.60
Some graduate	2.4	42.6	2.62
Graduate	9.2	49.7	2.80
Occupation			
Executive, administrative, and managerial occupations	8.4	47.4	2.78
Engineers, surveyors, and architects	1.4	47.0	2.44
Natural scientists and mathematicians	1.5	58.8	2.90
Social scientists, social workers, religious workers, and lawyers	1.7	59.0	2.98
Teachers: College, university, and other postsecondary institution; counselors, librarians, archivists	1.1	40.5	2.43
Teachers, except postsecondary institution	4.5	52.7	2.71



**Table 1.** (Continued)

	% of Sample	Participation Rate	Number of Courses
Health diagnosing and treating practitioners	0.4	57.0	2.59
Registered nurses, pharmacists, dietitians, therapists, and physician's assistants	1.9	72.5	3.05
Writers, artists, entertainers, and athletes	1.1	23.7	1.96
Health technologists and technicians	1.4	48.2	2.81
Technologists and technicians, except health	2.9	42.4	2.55
Marketing and sales occupations	13.5	21.7	2.06
Administrative support occupations, including clerical	18.8	29.3	2.20
Service occupations	15.4	20.9	2.61
Agricultural, forestry, and fishing occupations	1.1	14.6	2.09
Mechanics and repairers	3.6	28.3	2.51
Construction and extractive occupations	4.0	20.6	1.80
Precision production occupations	1.5	23.8	2.31
Production working occupations	7.8	14.7	1.81
Transportation and material-moving occupations	4.2	16.0	1.66
Handlers, equipment cleaners, helpers, and laborers	2.1	11.4	1.84
Industry			
Agriculture, forestry and fishing	1.7	18.2	1.71
Mining	0.4	30.4	1.42
Construction	4.5	19.4	1.64
Manufacturing	16.1	23.0	2.27
Transportation and public utilities	6.9	32.7	2.40
Wholesale trade	1.9	13.9	1.90
Retail trade	15.8	13.4	2.01
Finance, insurance, and real estate	5.4	45.0	2.37
Services	16.9	29.9	2.49
Health services	8.9	44.7	2.92
Education	9.8	41.9	2.58
Public administration	6.6	45.6	2.76
Years with employer			
1-2	11.3	23.9	2.40
2-3	11.0	24.7	2.41
3-4	10.7	26.5	2.30

**Table 1.** *(Continued)*

	% of Sample	Participation Rate	Number of Courses
4-5	8.1	29.7	2.45
5-10	30.3	29.8	2.44
10-20	18.9	35.1	2.51
20+	9.6	36.4	2.59
Legal or professional requirement	25.2		
Yes		49.0	2.79
No		23.3	2.21
Medical/hospital Insurance	74.8		
Yes		36.7	2.51
No		17.2	2.24
Leave with pay	62.2		
Yes		39.8	2.52
No		18.7	2.31
Vacation with pay	73.6		
Yes		35.5	2.52
No		21.5	2.29
Pension	63.1		
Yes		39.5	2.53
No		18.7	2.28
Union member	14.6		
Yes		35.2	2.46
No		28.9	2.45

## RESULTS

### *Variations in Participation Rates*

Of those who had held a job and had an employer in the previous 12 months, 29.7% participated in job-related coursework. This indicates an enormous volume of formal instruction (again, not strictly training), representing nearly 35 million participants. Still, given concerns about skill obsolescence brought about by globalized markets and increased competition, seven of ten employees received no job-related instruction in the previous 12 months.

Column 2 of [Table 1](#) shows variations in participation in job-related coursework.<sup>16</sup> Women (31.4%) participate at higher rates than men (28.2%). Participation rates by age follow the U-shaped curve adduced by human capital theorists to account for declining employer investments in workers (or workers in themselves) as they age. Most job-related coursework accrues to those in their prime working ages. Whites participate more often than any other racial/ethnic group, while Hispanics participate the least.

There are substantial educational differences. Workers with less than high school education rarely participate in work-related instruction. With two exceptions, the relationship between educational credentials and participation in work-related instruction is linear. First, those with some coursework but no degree beyond the bachelors get somewhat less work-related instruction than those with bachelor's degrees and no more. Second, those with masters degrees participate more often than those with Ph.Ds, and those with advanced professional degrees participate at far higher rates than anyone.

Occupational differences in rates of participation are large. The highest rate (72.5%) is for the category "registered nurses, pharmacists, dieticians, therapists, and physician's assistants."<sup>17</sup> The majority of respondents were participants in four other occupational categories (natural scientists and mathematicians; social scientists, social workers, religious workers, and lawyers; teachers, except postsecondary institution; and health diagnosing and treating practitioners). Participation rates were very low among "handlers, equipment cleaners, helpers, and laborers," "agricultural, forestry, and fishing occupations," and "production working occupations." The largest category of participants, "administrative support, including clerical," participates at about the overall mean level (29.3%). Industry differences are also large, if somewhat narrower than those for occupations. Participation rates are low in retail trade and wholesale trade and especially high in "finance, insurance, and real estate," "health services," and "public administration."

The pattern for years with employer is quite different than that for age. Most notably, seniority is positively related to the receipt of training. New workers participate at the lowest rates, and declines do not appear among workers with the most experience in the organization.<sup>18</sup>

Workers with continuing education requirements are over twice as likely to participate in work-related instruction in the previous 12 months as are those without this requirement. All of the job benefit measures are positively associated with participation, usually by an approximately 2:1 ratio. Union

members participated more often than nonunion members, although this difference was not as dramatic.

Column 3 presents information on the number of episodes of job-related instruction in which respondents participated in the 12 months preceding the survey.<sup>19</sup> Overall, participants in work-related instruction had about two and a half episodes of instruction. The patterns across the categories that were observed in Column 2 are generally replicated in Column 3, although the differences are usually narrower. For instance, in addition to being more likely than men to participate in job-related coursework, women participate more often once they are through the training gate. The difference is not large (2.53 vs. 2.37), but indicates no disadvantage for women. The only notable exceptions to the trend is that Blacks who receive any work-related instruction participate about as often as White participants.<sup>20</sup> At least on the bivariate level, inequalities in participation in job-related training arise both from variations in getting in the training door in the first place and in the number of opportunities afforded to those who do get through.<sup>21</sup>

#### *Closure Rates by Education, Occupation, and Industry*

Table 2 shows the proportion of workers subject to occupational closure across education, occupation, and industry. Closure processes vary a great deal across occupations, industries, and (perhaps derivatively) educational levels. About one in four workers is subject to legal or professional requirements for continuing postsecondary education. The relationship of this with educational level is broadly linear, with some apparent credential effects (shown by the lower rate of those who attended college without earning a degree).

Nine of ten "health diagnosing and treating practitioners" have continuing education requirements. This is also common for "health technologists and technicians," "teachers, except postsecondary institution," and "social scientists, social workers, religious workers, and lawyers." Continuing education requirements are less common in several occupational categories. These are generally less prestigious and remunerative positions, and include "handlers, equipment cleaners, helpers, and laborers," "writers, artists, entertainers, and athletes," "agricultural, forestry, and fishing occupations," "marketing and sales occupations," and "administrative support occupations, including clerical." Differences across industries are also wide. Health services and education are especially subject to continuing education requirements, and wholesale and retail trade far less so.

**Table 2.** Rate of Closure By Education, Occupation, and Industry.

	Legal/Professional Requirements for Postsecondary Education	Union Member
Total	25.2	14.2
Education		
Less than high school	16.1	13.6
HS diploma/eq	16.6	16.6
Some voc-tech	23.0	13.3
Voc-tech diploma	30.1	15.3
Some college	22.1	10.9
Associates	31.5	14.9
Bachelors	33.2	11.6
Some graduate	43.5	20.3
Advanced	47.1	21.2
Occupation		
Executive, administrative, and managerial occupations	28.9	5.0
Engineers, surveyors, and architects	24.1	3.4
Natural scientists and mathematicians	26.9	4.8
Social scientists, social workers, religious workers and lawyers	55.9	14.8
Teachers: College, university, and other postsecondary institution; counselors, librarians, archivists	42.4	25.1
Teachers, except postsecondary institution	66.4	46.8
Health diagnosing and treating practitioners	90.3	7.0
Registered nurses, pharmacists, dieticians, therapists, and physician's assistants	78.1	13.5
Writers, artists, entertainers, and athletes	14.8	11.0
Health technologists and technicians	67.6	9.1
Technologists and technicians, except health	23.9	16.4
Marketing and sales occupations	14.5	5.1
Administrative support occupations, including clerical	14.7	11.0
Service occupations	27.3	12.6
Agricultural, forestry, and fishing occupations	12.9	5.4
Mechanics and repairers	25.4	24.3
Construction and extractive occupations	22.2	25.0
Precision production occupations	18.2	20.2
Production working occupations	13.2	19.5
Transportation and material-moving occupations	24.9	29.0

*Table 2. (Continued)*

	Legal/Professional Requirements for Postsecondary Education	Union Member
Handlers, equipment cleaners, helpers, and laborers	10.1	23.5
Industry		
Agriculture, forestry, and fishing	12.1	3.9
Mining	16.0	12.8
Construction	19.4	21.1
Manufacturing	14.3	16.3
Transportation and public utilities	25.7	35.3
Wholesale trade	8.3	5.6
Retail trade	10.0	5.6
Finance, insurance, and real estate	28.2	1.8
Services	22.4	4.9
Health services	52.2	8.3
Education	46.9	35.3
Public administration	39.2	29.0

Some 14.6% of the respondents are members of labor unions. The highest rates are among those with Master's degrees, reflecting the dominance of school teachers in this category. There are obviously wide occupational differences, ranging from nearly half of "teachers, except postsecondary institution" to virtually no "engineers, surveyors, and architects." Not surprisingly, differences across industries are wide.<sup>22</sup>

#### *A Model of Participation in Work-Related Education*

Bivariate associations are suggestive but not definitive. I thus estimated a series of logistic regressions to predict the determinants of the probabilities of participation in work-related education. Table 3 presents results pertinent to each of the domains of influence described above. I characterize Eq. (1), which includes age, gender, education, and race-ethnicity, as a "worker" model. Because of the dual nature of occupation and job tenure as properties of both workers and employers, I label Eq. (2) as a "worker/employer" model. Eq. (3) includes industry dummies and job benefits and is characterized as an "employer" model. Eq. (4), the "closure" model, includes

**Table 3.** Exponentiated Logistic Regression Coefficients Predicting Participation in Work-Related Education.

Independent Variables	(1)	(2)	(3)	(4)	(5)
Male	0.8170***				0.8022***
Age					
25–34	1.9128***				1.1363
35–44	1.2765***				1.2000*
45–54	0.9802				1.0219
55–64	0.6420***				0.6840***
65 +	0.3664***				0.5478*
Race/Ethnicity					
White/Black	1.2762***				1.4872***
White/Hispanic	1.6685***				1.6979***
White/Other	1.4195***				1.5966***
Education					
High school 9th to 11th	1.8517***				1.5445**
Some voc-tech	1.2892				1.2612
Some college	1.2680				1.1332
Voc-tech diploma	1.0643				1.0517
Associates	1.3728*				1.0581
Bachelors	1.2505*				1.1034
Some graduate	0.9057				0.8915
Advanced	1.3265				1.1269
Occupation					
Executive, administrative, and managerial occupations		1.7286***			1.204*
Engineers, surveyors, and architects		1.7072***			1.0891
Natural scientists and mathematicians		2.8183***			2.0777***
Social scientists, social workers, religious workers and lawyers		2.8558***			1.4512**
Teachers: College, university, and other postsecondary institution; counselors, librarians, archivists		1.2677*			0.9695
Teachers, except postsecondary institution		2.1079***			1.2623

*Table 3. (Continued)*

Independent Variables	(1)	(2)	(3)	(4)	(5)
Health diagnosing and treating practitioners		2.7394**			1.2910
Registered nurses, pharmacists, dieticians, Therapists, and physician's assistants		5.2161***			2.2936***
Writers, artists, entertainers, and athletes		0.6267			0.6650
Health technologists and technicians		1.8126***			1.1889
Technologists and technicians, except health		1.4312***			1.3399**
Marketing and sales occupations		0.5641***			1.0927
Administrative support occupations, including clerical service occupations		0.5349***			0.7841
Agricultural, forestry, and fishing occupations		0.3335*			0.7019
Mechanics and repairers		0.7616			1.0308
Construction and extractive occupations		0.5254*			0.9505
Precision production occupations		0.6176			0.8664
Production working occupations		0.3379***			0.5293***
Transportation and material-moving occupations		0.3774***			0.5115**
Handlers, equipment cleaners, helpers, and laborers		0.2618***			0.5236
Years with employer					
2–2.9		0.9660			0.9462
3–3.9		0.9446			1.1308
4–4.9		0.8250			1.1308
5–9.9		1.0659			0.8595
10–19.9		0.8411*			1.0114
20+		1.0278			1.0274



**Table 3.** (Continued)

Independent Variables	(1)	(2)	(3)	(4)	(5)
Industry					
Agriculture, forestry and fishing			0.7155		1.1164
Mining			1.1067		1.7775
Construction			0.7649***		0.8707
Manufacturing			0.7063***		0.9811*
Transportation and public utilities			1.0855*		1.1779
Wholesale trade			0.3378***		0.3953***
Retail trade			0.5084***		0.5260***
Finance, insurance, and real estate			1.7870*		1.4209
Health services			1.9963***		1.1660
Education			1.4875		0.8497***
Public administration			1.6591		1.3589
Job benefits					
Medical			1.3906***		1.3275***
Retirement			1.7782***		1.4949***
Sick pay			1.6184***		1.3481***
Vacation			0.9036		0.9767
Professional requirements				3.1436***	2.2461***
Union member				1.1528*	1.0069
−2 log likelihood/10,000	13080	12898	11290	13566	10264
Pseudo $R^2$	0.084	0.076	0.087	0.047	0.158
% correctly classified	62.4	62.4	60.1	62.2	60.3

\*significant at 0.05; \*\*significant at 0.01; \*\*\*significant at 0.001.

professional requirements for continuing postsecondary education and union membership. Eq. (5) uses all of these measures to predict participation.

Because there is little in Eqs. (1)–(4) that departs significantly from the bivariate results, the results can be summarized fairly concisely. The worker model (Eq. (1)) shows a strong inverted U pattern of age effects, and women and whites are more likely to participate than are men and minorities. While the overall effect of education is quite large, relatively few of the educational transitions are themselves statistically significant. High school graduates receive more work-related instruction than do those who did not finish high school, those with associate's degrees get more than those with vocational

degrees, and those with bachelor's degrees get more than those with associates degrees.

The worker-employer model (Eq. (2)) shows that few occupations cluster around the overall mean. For the most part, incumbents of occupations that require higher levels of schooling-acquired skills (or that are credentialed as if that were the case) and those that are more highly rewarded are more likely to participate in work-related education. Those in blue-collar and lower status white-collar occupations are less likely. With the exception of a decline in the likelihood of participation for those with 10–20 years with the employer (as opposed to those with 5–10 years), there is no obvious trend of employer tenure. This lack of a tenure effect differs from the bivariate findings.

Industry differences show up quite clearly in the employer model (Eq. (3)). These resemble the occupational effects. Those in high-wage/high-skill industries are more likely to participate in work-related education. Three of the four measures of employer commitment to workers are significantly related to the probability of participation, providing support for the expectations put forward by Frazis et al. (2000) about the importance of employers seeing workers as long-term commitments.<sup>23</sup>

Eq. (4) gives evidence for closure among both professional occupations and for unionized ones. Workers with requirements for continuing post-secondary education were far more likely to participate in work-related education than were those without this requirement. The effect of union membership is less strong, but significant nonetheless.

Most but not all of these results hold up quite well in the full model (Eq. (5)). Two of the three significant education effects wash out, with the disadvantage to high school noncompleters remaining. Evidently, schooling operates by giving its holders access to occupations in which opportunities for work-related education are more common.

The race-ethnicity and gender effects are surprisingly persistent in the full model. Whites and women are more likely to participate in work-related education, and this is not attributable to other measured employer or closure characteristics. In contrast, the estimate for union membership is driven to virtually zero by the inclusion of other variables.

Overall, variables representing each of the domains of influence that motivated this analysis have significant effects on the log odds of participation in work-related education. Focusing on the characteristics of workers, employers, or occupational closure to the neglect of either of the other domains misrepresents the ways in which adult workers acquire their skills.<sup>24</sup>

## DISCUSSION AND CONCLUSIONS

The market for work-related education is constructed from the joint participation of workers, employers, and closure processes. While employers often require work-related instruction, workers evidently have considerable latitude to initiate their own episodes of instruction. Still more instruction is a response to demands imposed by external institutional actors. Supply and demand do articulate into a training market, but only in a specific context of normatively invoked rules and regulations based in the practices and histories of particular professions and trades and their relationships to various external governing bodies.

Beyond demonstrating that there are multiple determinants of participation in work-related education, how might these findings help us conceptualize skill enhancement among American workers and employers? Clearly, an adequate sociological theory of the acquisition of skills is going to have to move beyond the preoccupations of both human capital theory and most sociological theory to grapple with the question of how the variables represented in these three domains operate together to produce the patterns reported here. I mentioned earlier that part of the difficulty in doing so rests with both the ambiguity of the American training “system” and limitations of available data on training. None of the standard data series on training (e.g. CPS, SEPT, NLSY, and others) permit analysts to determine “who moves first” in training episodes. The cost of this is that these data can be interpreted arbitrarily as reflecting the primacy of either the supply side or the demand side. Thus, even such careful analysts as [Veum \(1996\)](#) can with some reluctance assume away any agency on the part of workers.

I suggest here a small set of concepts that might help organize future investigations of work-related education and its role in the skill enhancement of American workers. The first of these pertains to the behavior of employees seeking to acquire (or invest in) valued skills. As the American employment relation continues its trend toward a regime in which the responsibility for skill acquisition and career development increasingly devolves to workers, we need a greater understanding of how workers negotiate these self-investment decisions.

There is little reason to expect that the skill acquisition calculus adopted by mid-career workers will mirror those of 18 year olds just entering the workforce. As [Breen and Goldthorpe \(1997\)](#) showed, the educational decisions faced by young people can be modeled using general decision-tree logic. That is, young people confront, within a set of constraints, a generally straightforward set of “stay or leave” decisions. These decisions are subject

to three factors – the costs of staying in school, the likelihood of success if one continues in school, and the value attached to different educational outcomes. Experienced workers, in contrast, are faced with more ambiguous decisions about upgrading their skills. That is, the pull of family responsibilities, one's aversion to risk, the costs already sunk in one's career, and the projected benefits of skill acquisition all shift in importance throughout the life course.

It may be that younger and more experienced workers too pursue work-related education for different purposes. Although there is considerable evidence for substantial economic returns to skill enhancement (at least in the form of job training; see Bassi, Ludwig, McMurrer, & Buren, 2000), it is likely that the increasing instability of middle-class careers in the post-industrial labor market has disrupted this. That is, work-related education may be becoming for many less a long-term investment in one's human capital than a short-term defense against downward mobility.

The decisions of adults to pursue educational opportunities are not subject only to the contingencies of their own lives, but are embedded in the characteristics of organizations in which education is provided and the jobs in which corporate dollars are invested. Because of the recent development of nationally representative surveys of employers (Knoke & Kalleberg, 1994), this may be the area in which our empirical base is most secure. We have typically thought of these factors in terms of the operation of internal labor markets (particularly FILMs), but there is increasing evidence that the social context of skill acquisition is changing as firms continue to restructure and as the pressures of tight labor markets on employers increase the demand for skills. Our findings, for instance, indicated that employers who are committed to their workers tend to provide them with more training, but this commitment is not based on any important way on workers' longevity with the firm. We need a fuller understanding of how employers faced with changing technologies and skill needs adapt their training policies and practices.

Similarly, the self-investment decisions of workers will often not be real decisions in any serious sense at all. It is difficult, for instance, to explain the persistent and large race/ethnic effects in the current study with a model of unconstrained worker choice. The genesis of the lower likelihood of skill enhancement among African Americans and Hispanics cannot be settled with the sort of survey data at hand here, and probably resides more proximately in the functioning of local and regional patterns of racial and ethnic labor markets.

Employers too face difficult balancing acts. They need to seek solutions to balance the costs of providing or failing to provide skills, their commitment

to induce some workers, and others less so, to remain with them, and the level of rewards that they must disperse to bring the first two factors into line (Bills, 1987). None of this appears to be terribly tightly calibrated among typical American employers. As Breen and Goldthorpe (1997) argued about students, the parameters of employer decision making index subjective beliefs as much as they do calculations about sensible investments. No employer escapes the pressure of balancing costs, commitments, and rewards as they construct and maintain systems of skill enhancement.

Much as the self-investment decisions of workers are conditioned by the decisions of their employers, the investment decisions of employers are conditioned by a range of processes external to their own preferences and strategies. I have characterized these here as “closure,” and presented evidence that these processes are important determinants of participation in work-related education. What we cannot know from the present analysis, however, is the extent to which workers, whose “closed” positions lead them to enhanced opportunities for work-related education, are then able to translate their enhanced skills into tangible economic rewards. In other words, do such mechanisms of closure as licensure or certification “pay?” An adequate answer to this sort of question will need to draw on a broader range of data than that afforded by household or worker surveys. The strategies pursued to achieve social closure, unlike those pursued to enhance one’s human capital, are collective strategies conducted by professional associations and (perhaps less successfully) labor unions. As postindustrial labor markets continue to move toward a regime in which skill shortages are coupled with skill obsolescence, the ways in which such collective action interacts with the decisions made by individual workers and employers will take on increased theoretical and empirical urgency.

## NOTES

1. The evidence that training has increased is strong, but there are countervailing trends. Cappelli et al. (1997) observed that some employers are divesting themselves of the training responsibilities that have traditionally been under their purview. Commenting on the mutually weakened commitment between firms and workers as companies look for ways to restructure for greater efficiency, they noted that “the new ways of organizing work require more employer training, but the incentives for employers to provide that training are reduced” (Cappelli et al., 1997, p. 9). Knoke (1997) added that “the erosion of training efforts threatens not only to worsen employee well-being and morale but also to imperil the very supply of workforce skills on which companies depend for improving their productivity, quality, and profitability” (Knoke, 1997, p. 123).

2. Excluding this activity lowers the estimates of the amount of training, but has no appreciable effect on the relationship of work-related education to other variables.

3. Sociological critiques of human capital theory are readily available and need not be repeated here. [Fevre, Rees, and Gorard \(1999\)](#) offered a lucid critique along with a justification for a sociological approach.

4. [Knoke \(1997, p. 125–128\)](#) presented four theories of company training, noting that all address the question “When do businesses provide their employees with job training?” These theories (human capital, credential and screening, social structural, and institutional) are primarily demand-side theories, and provide little guidance to the question of either individual-level or closure-based determinants of participation in training.

5. Veum’s comment applies more to OJT than to formal instruction, but the point applies to both. He acknowledges that “it may also be true that the association between training and tenure reflects choices made by workers” (1996, p. 36).

6. Much of the impetus in a “training market driven by workers” will of course come from occupational or professional licensure or certification requirements. My point here is to posit training efforts that are not initiated by employers.

7. [Monks \(1997\)](#) demonstrated that the returns to schooling achieved later in life are lower than those to schooling completed earlier. Other economists have developed models of interrupted schooling in which all educational self-investments need not preclude full-time labor force participation ([Griliches, 1980](#); [Marcus, 1984, 1986](#); [Wallace & Ihnen, 1975](#)).

8. This is a common finding in other nations as well ([Crouch et al., 1999](#)).

9. In contrast, [Marcotte \(1999\)](#) reported that the returns to training are as high for less schooled workers as they are for those with more schooling.

10. Again, if workers pursue off-site work-related instruction, establishment surveys will underestimate its volume.

11. I am necessarily treating the concept of closure here as more static than it is. Closure is inherently conflictual and contested ([Sorensen & Kalleberg, 1981](#)). The relative bargaining power of workers, employers, and external actors party to a given employment relationship is variable. My goal is the more modest one of examining the effects of indicators of closure on access to a specific scarce organizational resource.

12. The reference category “mechanics and repairers” also meets these criteria, though slightly less well.

13. NHES:95 has measures of whether employers required employee participation and whether they provided support for it. Because these were asked only of participants in work-related education, these measures are unfortunately not suitable for predicting participation.

14. NHES also asked about certification or licensure for current job and certification or licensure to practice a trade or profession. Because these pertain to occupational entry; they are of no use here. Also, the NHES data do not distinguish legal (state) requirements and professional ones.

15. NHES:95 entails such techniques as clustering, stratification, and unequal probabilities of selection. Treating it as a simple random sample will result in underestimates of standard errors. This necessitates the use of both sample weights and

replicate weights to obtain accurate standard errors (Collins and Chandler 1997, p. 45). Most of the analysis reported here was conducted with SPSS 9.0, but when standard errors needed to be calculated I used WesVar 3.0. I used the 50 replicate weights supplied by NHES and the jackknife replication method recommended by Collins and Chandler (1997).

16. Because I am not testing hypotheses at this point, I do not indicate significance levels. Even with conservative adjustments virtually every contrast in the table is statistically significant.

17. Althausen and Appel (1996) provide a useful analysis of the role of educational credentials in allied health occupations.

18. This is a measure of experience with the employer and not a measure of total workforce experience, which might show a pattern similar to that for age.

19. This column pertains only to those who participated in work-related instruction in the previous 12 months. Including nonparticipants in these calculations (i.e. counting them as zeros) produces the same general trends as Column 2.

20. Consistent with this, Hight (2000, p. 2) reported that while blacks participated in training less often than whites, "among those who participate at all, ... the mean hours of participation was greater for black participants than it was for white participants in both 1991 and 1995."

21. There are wide variations around these means. About one-third of participants had only one episode, and almost 80% had fewer than four. A few had more than ten.

22. An appreciable number of respondents (6.2%) report that they are both subject to continuing education requirements and are union members. This largely reflects the work experience of K-12 teachers, 36.4% of whom are subject to both forms of closure.

23. These effects are probably capturing at least some of the effect of employer size.

24. I estimated two additional series of equations. First, because the gender effect was so persistent and because gender-based labor market inequality is so prevalent, I estimated the models in Table 3 separately for men and women. The numerical results are available on request. I recoded several variables to accommodate diminished cell sizes (details available on request.) These comparisons of men and women showed surprisingly similar patterns of effects. In fact, there are really no notable gender differences. Overall, women are more likely than men to participate in work-related education, but the processes by which they get there are remarkably similar. Second, I estimated the equations separately for each ten-year age cohort, on the reasoning that the labor markets for young workers and older workers probably differ from those for mid-career workers. This again required considerable recoding. The results are complex and merit a much more sustained analysis than I can offer here, but some findings are noteworthy. First, the closure effects described above differ little across cohorts. In contrast, the employer commitment effects (as measured by job benefits) accrue far more to mid-career workers than to younger workers. There is some indication that tenure with current employer for workers aged 45-54 increases their likelihood of participation in work-related education, even though this is not true for the full sample. Finally, women participate at higher net rates than do men at all ages, although the difference is more pronounced for mid-career women than for younger women.

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## REFERENCES

- Althausen, R. P., & Appel, T. (1996). Education and credentialing systems, labor market structure and the work of allied health occupations. In: A. C. Kerckhoff (Ed.), *Generating social stratification: Toward a new research agenda* (pp. 223–255). Boulder: Westview Press.
- Barron, J. M., Berger, M. C., & Black, D. A. (1997). How well do we measure training? *Journal of Labor Economics*, 15, 507–528.
- Bassi, L. J., Ludwig, J., McMurrer, D. P., & Buren, M. V. (2000). *Profiting from learning: Do firms' investments in education and training pay off?* Research White Paper. American Society for Training and Development, Washington, DC.
- Becker, G. S. (1964). *Human capital*. National Bureau of Economic Research.
- Bills, D. B. (1987). Costs, commitment and rewards: Factors influencing the design and implementation of internal labor markets. *Administrative Science Quarterly*, 32, 202–221.
- Bishop, J. (1998). Occupation-specific versus general education and training. *Annals, AAPSS*, 559 (September), 24–38.
- Bishop, J. H. (1997). What we know about employer-provided training: A review of the literature. In: S. W. Polachek (Ed.), *Research in labor economics*, (Vol. 11, pp. 19–87). Greenwich, CT: JAI Press.
- Black, D. A., Noel, B. J., & Wang, Z. (1999). On-the-job training establishment size, and firm size: Evidence for economies of scale in the production of human capital. *Southern Economic Journal*, 66, 82–100.
- Blau, P., & Duncan, O. D. (1967). *The American occupational structure*. New York: Wiley.
- Bowers, N., & Swaim, P. (1994). Recent trends in job training. *Contemporary Economic Policy*, 12, 79–88.
- Boyle, M.-E. (1997). No Guarantees – Education and the new employment contract. Paper presented at the annual meetings of the American sociological association, Toronto.
- Breen, R., & Goldthorpe, J. W. (1997). Explaining educational differentials: Towards a formal rational action theory. *Rationality and Society*, 9, 275–306.
- Brown, C. (1990). Empirical evidence on private training. In: R. C. Ehrenberg (Ed.), *Research in labor economics*, (Vol. 11, pp. 97–113). Greenwich, CT: JAI Press.
- Cappelli, P., Bassi, L., Katz, H., Knoke, D., Osterman, P., & Useem, M. (1997). *Change at work*. Oxford: Oxford University Press.



- Carr, D., & Sheridan, J. (1999). *Back to school: A life course approach to understanding men's and women's college attendance in adulthood*. Report #99-437, University of Michigan Population Studies Center.
- Collins, M. A., Brick, J. M., Kim, K., & Stowe, P. (1997). *Measuring participation in adult education*. U.S. Department of Education, NCES Technical Report 97-341.
- Collins, M. A., & Chandler, K. (1996). *A guide to using data from the national household education survey (NHES)*. NCES 96-891, U.S. Department of Education, Office of Educational Research and Improvement.
- Collins, R. (1979). *The credential society: An historical sociology of education and stratification*. New York: Academic Press.
- Constantine, J. M., & Neumark, D. (1994). Training and the growth of wage inequality. EQW Working Paper WP31. National Center of the Educational Quality of the Workforce, University of Pennsylvania.
- Crook, D. B. (1997). The effects of adult role configurations on re-enrollment in college. Paper presented at the annual meetings of the American educational research association, Chicago.
- Crouch, C., Finegold, D., & Sako, M. (1999). *Are skills the answer? The political economy of skill creation in advanced industrial countries*. Oxford: Oxford University Press.
- Darkenwald, G., Kim, K., & Stowe, P. (1998). *Adults' participation in work-related courses: 1994-95*. Report # 98-309, U.S. Department of Education, National Center for Education Statistics, Statistics in Brief.
- Darrah, C. (1994). Skill requirements at work: Rhetoric versus reality. *Work and Occupations*, 21, 64-84.
- Doeringer, P. B., & Piore, M. J. (1971). *Internal labor markets and manpower analysis*. Lexington, MA: D.C. Heath.
- Elman, C., & O'Rand, A. (1998). Midlife entry into vocational training: A mobility model. *Social Science Research*, 27, 128-158.
- Fevre, R., Rees, G., & Gorard, S. (1999). Some sociological alternatives to human capital theory and their implications for research on post-compulsory education and training. *Journal of Education and Work*, 12, 117-140.
- Frazis, H., Gittleman, M., Horrigan, M., & Joyce, M. (1996). Formal and informal training: Evidence from a matched employee-employer survey. Paper prepared for ILR-Cornell Institute for Labor Market Policies Conference, *New empirical research on employer training: Who pays? Who benefits?* Cornell University, November 15-17, 1996.
- Frazis, H., Gittleman, M., Horrigan, M., & Joyce, M. (1997). Formal and informal training: Evidence from a matched employee-employer survey. In: G. D. Libecap (Ed.), *Advances in the study of entrepreneurship, innovation, and economic growth* (Vol. 9, pp. 47-82) (Series editor: S. W. Polachek). Greenwich, CT: JAI Press.
- Frazis, H., Gittleman, M., Horrigan, M., & Joyce, M. (1998). Results from the 1995 survey of employer-provided training. *Monthly Labor Review*, 121(6), 3-13.
- Frazis, H., Gittleman, M., & Joyce, M. (2000). Correlates of training: An analysis using both employer and employee characteristics. *Industrial and Labor Relations Review*, 53, 443-462.
- Frazis, H. J., Herz, D. E., & Horrigan, M. W. (1995). Employer-provided training: Results from a new survey. *Monthly Labor Review*, 118(5), 3-17.
- Frenkel, S., Korczynski, M., Shire, K., & Tam, M. (1999). *On the front line: Organization of Work in the information economy*. Cornell University Press.

- Griliches, Z. (1980). Schooling interruption, work while in school, and the returns from schooling. *Scandinavian Journal of Economics*, 82, 291–303.
- Hight, J. E. (2000). Estimating hours of participation in adult education and training using the 1991 and 1995 National household education surveys. Paper presented at the annual meetings of the American educational research association, New Orleans.
- Hodson, R., Hooks, G., & Rieble, S. (1994). Training in the workplace: Continuity and change. *Sociological Perspectives*, 37, 97–118.
- Hollenbeck, K. (1996). Employer motives for investing in training. Paper prepared for ILR-Cornell Institute for labor market policies conference on New empirical research on employer training: Who pays? Who benefits? Cornell University, November 15–17, 1996.
- Holzer, H. J., & Reaser, J. (1996). Firm-level training for newly hired workers: Its determinants and effects. Paper prepared for ILR-Cornell Institute for labor market policies conference on New empirical research on employer training: Who pays? Who benefits? Cornell University, November 15–17, 1996.
- Jacobs, J. A., & Stoner-Eby, S. (1998). Adult enrollment and educational attainment. *Annals, AAPSS*, 559, 91–108.
- Kim, K., Collins, M., Stowe, P., & Chandler, K. (1995). *Forty percent of adults participate in adult education activities: 1994–95*. NCES 95-823, U.S. Department of Education, National Center for Education Statistics.
- Knoke, D. (1997). Job training programs and practices. In: P. Cappelli, L. Bassi, H. Katz, D. Knoke, P. Osterman & M. Useem (Eds), *Change at work (Chapter 4)* (pp. 22–153). Oxford: Oxford University Press.
- Knoke, D., & Kalleberg, A. L. (1994). Job training in U.S. organizations. *American Sociological Review*, 59, 537–546.
- Knoke, D., & Kalleberg, A. L. (1996). Job training in U.S. organizations. In: *Organizations in America: Analyzing their structures and human resource practices* (pp. 157–179). Beverly Hills, CA: Sage.
- Kopka, T. L., Chan, L., & Peng, S. S. (1993). Adult education: Main reasons for participating. U.S. Department of Education, Office of Educational Research and Improvement, NCES 93-451.
- Krueger, A., & Rouse, C. (1998). The effect of workplace education on earnings turnover and job performance. *Journal of Labor Economics*, 16, 61–94.
- Li, J. H., Konig, M., Buchmann, M., & Sacchi, S. (1995). Individual and structural determinants of participation in further education after labor force entry. Paper presented at the Research Committee 28 of the International Sociological Association on Dynamics of Social Stratification: Macro and Micro Approaches, Zurich.
- Li, J. H., Konig, M., Buchmann, M., & Sacchi, S. (2000). The influence of further education on occupational mobility in Switzerland. *European Sociological Review*, 16, 43–65.
- Light, A. (1995). The effects of interrupted schooling on wages. *Journal of Human Resources*, 30, 472–502.
- Loewenstein, M. A., & Spletzer, J. R. (1997). Delayed formal on-the-job training. *Industrial and Labor Relations Review*, 51, 82–99.
- Lynch, L., & Black, S. E. (1998). Beyond the incidence of employer-provided training. *Industrial and Labor Relations Review*, 52, 64–81.
- Lynch, L. M. (1991). The private sector and skill formation in the United States. *Advances in the Study of Entrepreneurship, Innovation, and Economic Growth*, 5, 115–144.

- Lynch, L. M. (1998). A needs analysis of training data: What do we want, what do we have, can we ever get it? In: J. Haltiwanger, E. Marilyn & R. Topel (Eds), *Labor statistics measurement issues* (pp. 405–429). Chicago: University of Chicago Press.
- MacDonald, K. M. (1985). Social closure and occupational registration. *Sociology*, 19, 541–556.
- MacDuffie, Paul, J., & Pil, F. K. (1996). Training in the world auto industry: New evidence from the international assembly plant study. Paper prepared for ILR-Cornell Institute for labor market policies conference on *New empirical research on employer training: Who pays? Who benefits?* Cornell University, November 15–17, 1996.
- Manza, J. (1992). Classes, status groups, and social closure: A critique of neo-Weberian social theory. *Current Perspectives in Social Theory*, 12, 275–302.
- Marcotte, D. E. (1999). Learning in the labor market: The changing importance of education and training after 'formal' schooling ends. National Center for Research in Vocational Education, University of California-Berkeley, MDS.
- Marcus, R. D. (1984). Measuring the rate of return to interrupted schooling. *Journal of Educational Statistics*, 9, 295–310.
- Marcus, R. D. (1986). Earnings and the decision to return to school. *Economics of Education Review*, 5, 309–317.
- Monks, J. (1997). The impact of college timing on earnings. *Economics of Education Review*, 16, 419–423.
- Murnane, R. J., & Levy, F. (1996). *Teaching the new basic skills*. New York: The Free Press.
- Murphy, R. (1988). *Social closure: The theory of monopolization and exclusion*. London: Cambridge Press.
- NCES. Nd. Unpublished NHES technical material. National Center for Educational Statistics.
- Olson, C. A. (1996). *Who receives formal firm sponsored training in the U.S.?* Institute of Industrial Relations, University of California, Berkeley. <http://violet.lib.berkeley.edu>.
- Orr, J. E. (1996). *Talking about machines: An ethnography of a modern job*. Ithaca, NY: Cornell University Press.
- Ospina, S. (1996). *Illusions of opportunity: Employee expectations and workplace inequality*. Ithaca, NY: Cornell University Press.
- Parkin, F. (1979). *Marxism and class theory: A bourgeois critique*. Columbia University Press.
- Rottenberg, S. (1987). Occupational licensing and education. In: G. Psacharopoulos (Ed.), *Economics of education: Research and studies* (pp. 300–302). Oxford: Pergamon Press.
- Scott, W. R., & Meyer, J. W. (1991). The rise of training programs in firms and agencies: An institutional perspective. *Research in Organizational Behavior*, 13, 297–326.
- Sorensen, A. B., & Kalleberg, A. L. (1981). An outline of a theory of the matching of persons to jobs. In: I. Berg (Ed.), *Sociological perspectives on labor markets*. New York: Academic Press.
- Thurow, L. (1975). *Generating inequality: Mechanisms of distribution in the U.S. economy*. New York: Basic.
- Tilly, C. (1998). *Durable inequality*. University of California Press.
- Useem, M. (1993). Company politics on education and training. In: P. Mirvis (Ed.), *Building a competitive workforce: Investing in human capital for corporate success* (pp. 95–112). New York: Wiley.
- Vallas, S. P. (1999). Rethinking post-fordism: The meaning of workplace flexibility. *Sociological Theory*, 17, 68–101.
- Veum, J. R. (1996). Gender and race differences in company training. *Industrial Relations*, 35, 32–44.

- Wallace, T. D., & Ihnen, L. A. (1975). Full-time schooling in life-cycle models of human capital accumulation. *Journal of Political Economy*, 83, 137–155.
- Weeden, K. (1998). From borders to Barriers: Strategies of occupational closure and the structure of occupational rewards. Paper presented at the annual meetings of the American sociological association, San Francisco.
- Whitfield, K. (2000). High-performance workplaces, training, and the distribution of skills. *Industrial Relations*, 39, 1–25.
- Zemsky, R., & Shapiro, D. (1994). *On measuring a mirage: Why U.S. training numbers don't add up*. EQW Working Paper WP20. National center on the educational quality of the workforce. University of Pennsylvania.