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Participation in Adult Education for Work-Related Reasons: 2002–03

Statistical Analysis Report

U.S. Department of Education
Institute of Education Sciences
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November 2005

Brian Kleiner
Priscilla Carver
Mary Hagedorn
Westat

Christopher Chapman
National Center for Education Statistics

U.S. Department of Education
Margaret Spellings
Secretary

Institute of Education Sciences
Grover J. Whitehurst
Director

National Center for Education Statistics
Mark Schneider
Commissioner

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Content Contact

Christopher Chapman
(202) 502-7414
nhes@ed.gov
http://nces.ed.gov/nhes

EXECUTIVE SUMMARY

This report provides general findings from the Adult Education for Work-Related Reasons (AEWR) survey of the 2003 National Household Education Surveys Program (NHES). The survey was conducted by random-digit-dial telephone interviewing of the civilian, noninstitutionalized population ages 16 and older who were not enrolled in elementary or secondary school at the time of the survey. NHES is a system of surveys developed to address important educational issues, and surveys on a variety of educational topics have been administered from 1991 through 2003.

Adults were asked about their work-related educational activities and experiences over the previous 12-month period. The survey defined work-related activities in terms of formal and informal learning activities that are done for reasons related to work. Formal types of work-related adult education are defined by the presence of an instructor, whereas informal adult learning activities are defined by the absence of an instructor. The tests of significance used in this report are based on Student's *t* statistic for the comparison of individual estimates and for bivariate relationships, as well as multivariate analysis using logistic regression. An alpha level of .05 was employed for all tests of significance.[1]

Findings from the survey reveal that 40 percent of adults in the nation participated in some type of **formal** adult education for work-related reasons during a 12-month period in 2002–03 (table 1). Thirty-three percent participated in work-related courses, 9 percent were in a college degree program, 2 percent were in a vocational degree/diploma program, and 1 percent had an apprenticeship.[2]

Fifty-eight percent of adults participated in **informal** work-related learning activities (table 6). Among adults who were employed in the past year, 56 percent participated in on-the-job demonstrations, and 43 percent received supervised training or mentoring. Among all adults (i.e., employed or not in the past year), 31 percent did self-paced study using books, manuals, audiotapes, or videos; 23 percent attended conferences, trade shows, or conventions; 21 percent attended brown-bag or informal presentations; and 21 percent did self-paced study using computer-based software tutorials.[3] Seventy-five percent of adults who were employed in the past year participated in some type of informal learning activity; and across each of the informal activities measured, those adults who were employed in the past year were more likely to participate than those who were unemployed in the past year (table 7).

[1] See the Technical Notes section for more information on the statistical tests used for this report.
[2] See the Technical Notes section for more information on the statistical tests used for this report.
[3] Adults could have participated in more than one type of informal work-related activity.

Research on adult education participation rates during the 1990s (Creighton and Hudson 2002) found that participation in adult education during this period varied by level of education, race/ethnicity, occupational group, and employment status. For example, adults with lower education levels, Hispanics, adults in trade occupations, and part-time employees had lower rates of participation in work-related coursetaking. Darkenwald, Kim, and Stowe (1998) reported that adults with higher education levels were more likely to participate in work-related courses than adults with lower education levels.

The findings of this report show similar patterns of participation. Adults with lower education levels were generally less likely than those with more education to participate in various types of formal and informal work-related educational activities. This may be related to the fact that adults with a bachelor's degree or more education are more likely than those with less education to be in professional or managerial occupations, which require higher levels of continuing education (Frazis et al. 1998). The data show that among adults employed in the past year, those in professional or managerial occupations were most likely, and those in the trades[4] were least likely, to have participated in formal or informal work-related learning activities. In addition, younger adults were generally more likely than older adults to participate in formal and informal work-related adult education.

Both bivariate and multivariate analyses conducted for this report showed that younger adults were more likely than older adults to participate in formal and informal work-related adult education. Both types of analyses also suggested that among employed adults, professionals and managers were more likely than those in service, sales, or support occupations and those in the trades to have participated in some type of formal work-related adult education and informal work-related learning activities. Also, while the bivariate analyses indicated that female adults were more likely than male adults to participate in work-related informal learning, this difference was not detected when controlling for other adult characteristics in the multivariate analyses.

The bivariate and multivariate analyses conducted for this report revealed that the various participation rates in formal and informal work-related adult education were affected by a complex interplay of factors, including age, education level, and types of occupation. Regression analyses are one relatively simple approach to teasing out these factors. Future analyses could use AEWR data to expand upon this analysis, focusing in greater detail on how participation in various types of work-related adult education is related to other factors, such as region and specific occupations (e.g., health professionals or educators).

[4] Trades include mechanics, construction workers, transportation workers, etc. See the Technical Notes section of this report for a more complete definition of occupational groups.

ACKNOWLEDGMENTS

We wish to thank the thousands of adults who participated in the Adult Education for Work-Related Reasons survey that was fielded as part of the 2003 National Household Education Surveys Program. Without their cooperation, this analysis would not have been possible. Special thanks go to Shelley Burns, Robert Lerner, Val Plisko, Marilyn Seastrom, Jim Griffith, and Lisa Hudson of NCES, and Rachel Dinkes and Gerard Rainville of the Education Statistics Services Institute, American Institutes for Research, for their technical and substantive comments on drafts of this report. Jerry West reviewed the report while at NCES. He is now at Mathematic Policy Research, Inc. This report was also reviewed by Duc-Le To of the Institute of Education Sciences.

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INTRODUCTION

Work-related adult education has become increasingly important in our nation's economy and the lives of individuals in the workforce. The confluence of an aging workforce, declining job stability, and continuing industry demands for a more flexible workforce have resulted in considerable emphasis on the importance of the training of workers already in the labor force (Dougherty 2003). Many economists studying the labor market believe that new technology has had a very significant effect on the demand for highly educated workers (Bassi 1999). Out of necessity, workers are adapting their skills and knowledge to meet the needs of today's changing workplace. The growth of knowledge and technology has meant that much of what adults learned 5 years ago is now obsolete or at least modified in content or meaning (McDonald 2001). These workers require training and education to achieve and maintain success in their career fields. Consequently, adult education for work-related reasons is a fast growing area of practice in the field of adult education.

Examination of work-related learning has recently become an important component of several educational studies and increasingly the focus of important public policy, both in the United States and abroad (Lengermann 1996; Imel 1998). For example, data have been collected, examined, and reported on from the National Household Education Survey (NHES) of the United States, the Adult Education and Training Survey (AETS) of Canada, and Great Britain's National Child Development Survey, addressing individual participation in work-related adult education and training.

According to the report, *Participation Trends and Patterns in Adult Education: 1991 to 1999* (Creighton and Hudson 2002), several factors have led to an increased demand for work-related adult learning, including the shift in the labor market from a manufacturing economy to a service- and information-based economy, the growth of technology, and a general increase in job-skills requirements. The same report documented the trend towards greater participation in any adult education throughout the 1990s and for virtually all subgroups of adults identified by age, sex, race/ethnicity, education level, and income level. Findings from that report generally confirmed conclusions of previous research (e.g., Kay 1982; Valentine 1997; Darkenwald, Kim, and Stowe 1998) that more highly educated adults and those in higher status occupational groups were more likely to participate in adult education activities, including those that are related to work.

This report extends this body of research, focusing on work-related adult education that took place from early 2002 through early 2003. The report provides general findings from the Adult Education for Work-Related Reasons (AEWR) survey of the 2003 National Household Education Surveys Program

(NHES:2003). The survey was conducted by random-digit-dial telephone interviewing of the civilian, noninstitutionalized population ages 16 and older who were not enrolled in elementary or secondary school at the time of the survey.[1] For the NHES:2003, Screeners were completed with 32,049 households, with a weighted Screener unit response rate of 65 percent. For AEWR, 12,725 of the 16,004 sampled adults completed the AEWR survey, a weighted unit response rate of 76 percent. Thus, the overall unit response rate for the AEWR survey was 49 percent (the product of the Screener unit response rate and the AEWR unit response rate).[2]

Adults were asked about their work-related educational activities and experiences over the previous 12-month period. The survey divided work-related activities into two categories, formal and informal participation. Formal types of work-related adult education were defined by the presence of an instructor, whereas informal adult learning activities were defined by the absence of an instructor.

For the purposes of the survey, formal adult education included:

- A college degree or post-degree certificate program for work-related reasons;
- A postsecondary vocational degree/diploma program for work-related reasons;
- An apprenticeship program leading to journeyman status in a skilled trade or craft; and
- Work-related courses (training, workshops, seminars, courses, or classes taken for work-related reasons).

Informal adult learning activities included:

- On-the-job demonstrations of equipment, techniques, or procedures by a supervisor or coworker;
- Receipt of other supervised training or mentoring on the job;
- Self-paced study using books, procedures manuals, audiotapes, or videos;
- Self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet;
- Attendance at brown-bag or informal presentations; and

[1] For the purposes of this report, people ages 16 and 17 are referred to as "adults."
[2] Due to this relatively low overall unit response rate, estimates from the NHES:2003 AEWR survey are subject to potential bias. However, previous nonresponse bias analyses conducted for NHES:1999, which had similar response rates for the same population covered by NHES:2003, did not reveal significant bias (Nolin et al. 2000). A nonresponse bias analysis was also conducted for NHES:2003 (Hagedorn et al., forthcoming), which showed no evidence of bias in estimates from the AEWR survey.

- Attendance at conferences, trade shows, or conventions related to one's work or career.

This report addresses the following questions:

To what extent do adults participate in work-related *formal* adult education?

- In what types of work-related formal adult education are adults engaged?
- How does participation in formal work-related adult education vary by adult characteristics, employment status, and occupation?
- How many total hours do adults spend participating in formal adult education for work-related reasons?
- From what types of providers do adults take formal adult education for work-related reasons?

To what extent do adults participate in work-related *informal* learning activities?

- In what types of work-related informal learning activities are adults engaged?
- How does participation in work-related informal learning activities vary by adult characteristics, employment status, and occupation?

The next sections of the report focus on these questions and present survey findings related to participation in formal and informal adult education for work-related reasons. The Technical Notes section that follows describes the survey methodology, and appendixes A and B provide logistic regression tables.

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FINDINGS

Two types of analysis are presented in the sections that follow: bivariate analysis of crosstabulations and multivariate analysis using logistic regression. As a general guideline in this report, only statistically significant differences are discussed. Significance was determined using Student's *t* statistic. An alpha level of .05 was employed for all tests of significance. In addition, effect sizes were calculated for the logistic regression parameters using a method suggested by Chinn (2000). The purpose of presenting the effect size parameters is to provide readers with a sense of the magnitude of the relationship between variables in the regression results (Cohen 1988). See the Technical Notes section of this report for more detail on the statistical tests.

Work-Related Formal Learning

Adults were asked whether they had participated in various types of formal adult education for work-related reasons in the previous 12 months. In this study, formal work-related adult education includes college degree or post-degree certificate programs, postsecondary vocational degree/diploma programs, apprenticeship programs leading to journeyman status in a skilled trade or craft, and work-related courses that have an instructor. Respondents who indicated that they participated in college or vocational programs were then asked whether those programs were taken for work-related reasons. Apprenticeships were assumed to be work-related based on the question asked in the survey (i.e., "…a formal apprenticeship program leading to journeyman status in a skilled trade or craft?"). Work-related courses were defined as training, workshops, seminars, courses, or classes that had an instructor and were taken for work-related reasons. Adults were also asked about the intensity of their adult education experiences, expressed in terms of number of credit hours or classroom hours, and about the instructional providers of their work-related courses. Findings related to these aspects of formal adult education for work-related reasons are presented in this section.

Participation in Work-Related Formal Adult Education, by Adult Characteristics

Forty percent of all adults participated in any formal adult education for work-related reasons (table 1). In terms of participation in specific activities, 33 percent of adults participated in work-related courses, 9 percent participated in a college degree or certificate program for work-related reasons,

Table 1. Participation in formal adult education for work-related reasons, by type of educational activity and adult characteristics: 2002–03

Adult characteristic	Number of adults (thousands)	Any formal adult education for work-related reasons[1]		Specific type of formal educational activity							
				College degree program for work-related reasons		Vocational degree/diploma program for work-related reasons		Apprenticeship		Work-related courses	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Total	206,533	40	0.5	9	0.3	2	0.1	1	0.1	33	0.5
Age											
24 years or younger	24,053	59	2.1	37	1.9	3	0.6	2	0.5	31	1.9
25 to 44 years	82,223	48	1.0	10	0.5	3	0.3	1	0.2	41	1.0
45 to 64 years	66,447	39	1.0	2	0.2	1	0.2	#	#	37	1.0
65 years or older	33,810	7	0.4	#	#	#	#	#	#	7	0.4
Sex											
Male	98,793	40	0.8	8	0.4	2	0.2	1	0.2	33	0.9
Female	107,740	40	0.7	10	0.4	2	0.2	#	#	33	0.6
Race/ethnicity											
White, non-Hispanic	149,135	41	0.6	9	0.3	2	0.2	1	0.1	35	0.6
Black, non-Hispanic	23,145	39	1.8	10	1.0	3	0.5	1	0.2	31	1.6
Hispanic	24,248	31	2.0	6	0.8	2	0.4	1	0.3	25	1.7
Asian or Pacific Islander, non-Hispanic	6,330	49	3.4	16	2.6	1	0.4	#	#	38	3.2
Other race, non-Hispanic	3,675	43	5.0	15	3.2	3	1.0	2	1.2	31	3.9
Highest education completed											
Less than a high school diploma/equivalent	32,357	10	1.1	#	#	#	#	1	0.4	9	1.1
High school diploma/ equivalent	61,194	28	0.9	5	0.4	2	0.3	1	0.2	23	0.9
Some college/vocational/ associate's degree	58,055	49	1.1	16	0.8	3	0.3	1	0.2	36	1.1
Bachelor's degree	32,122	58	1.2	10	0.6	2	0.4	#	#	52	1.3
Graduate or professional degree	22,804	62	1.6	13	1.0	1	0.3	#	#	58	1.6
Household income											
$25,000 or less	53,796	21	1.0	8	0.6	1	0.2	1	0.1	14	0.8
$25,001 to $50,000	55,435	38	1.0	9	0.6	3	0.3	1	0.2	31	1.0
$50,001 to $75,000	43,189	48	1.3	10	0.7	2	0.3	1	0.3	40	1.3
$75,001 to $100,000	24,286	54	2.0	9	0.8	2	0.4	#	#	49	1.8
$100,001 or more	29,826	54	1.6	9	0.8	1	0.3	1	0.4	49	1.6

Estimate rounds to zero.

[1]Participation in any adult education for work-related reasons includes college or university degree or certificate programs, technical diploma or degree programs, apprenticeships, or work-related courses. Adults could have participated in more than one type of formal work-related adult education activity.

NOTE: s.e. is standard error. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

2 percent were seeking a vocational degree or diploma for work-related reasons, and 1 percent participated in an apprenticeship program.[3]

The percentage of adults who participated in formal adult education varied by adult characteristics. Younger adults (24 or younger) were more likely than older ones to participate: 59 percent of adults 24 or younger participated in adult education for work-related reasons, compared to 48 percent of 25- to 44-year-olds, 39 percent of 45- to 64-year-olds, and 7 percent of adults 65 years old or older.

No difference was detected between men and women in their rates of participation in formal adult education for work-related reasons (both at 40 percent). With respect to race/ethnicity, Asian and Pacific Islander, non-Hispanic adults (49 percent) were more likely than White, non-Hispanic adults (41 percent), Black, non-Hispanic adults (39 percent), and Hispanic adults (31 percent) to participate in formal adult education for work-related reasons.[4] Hispanic adults were the least likely to participate.

The data suggest that the higher an adult's level of education, the more likely he or she was to participate in adult education for work-related reasons. Sixty-two percent of adults with a graduate or professional degree participated in one or more of the formal adult education activities addressed in this study, compared to 58 percent of those with a bachelor's degree, 49 percent of those with some college or a vocational or associate's degree, 28 percent of those with a high school diploma or its equivalent, and 10 percent of adults with less than a high school diploma or its equivalent.

Adults with higher annual household incomes were more likely than those with lower incomes to participate in formal adult education for work-related reasons. Specifically, 54 percent of adults with household incomes of $75,001 to $100,000 and $100,001 or more participated, compared with 48 percent of those with incomes of $50,001 to $75,000, 38 percent of those with incomes of $25,001 to $50,000, and 21 percent of those with incomes of $25,000 or less.

Participation in Specific Types of Work-Related Formal Adult Education, by Adult Characteristics

Participation in the specific types of formal adult education for work-related reasons also varied by demographic characteristics (table 1). For example, 41 percent of 25- to 44-year-olds took work-

[3] In previous NHES reports focusing on adult education and lifelong learning, full-time participation in postsecondary programs was not considered an adult education activity and was excluded from the participation rate (e.g., Kim et al. 1995). This report is designed to document all participation for work-related reasons and includes both part-time and full-time postsecondary enrollment.

[4] Hereafter, persons of Asian and Pacific Islander, non-Hispanic origin are referred to as Asian. Persons of White, non-Hispanic origin are referred to as White, and persons of Black, non-Hispanic origin are referred to as Black.

related courses, compared to 37 percent of 45- to 64-year-olds, 31 percent of adults 24 or younger, and 7 percent of adults 65 or older.[5] Younger adults were more likely than older ones to have participated in a college degree or certificate program for work-related reasons: 37 percent of adults 24 or younger were in a college degree or certificate program, compared to 10 percent of 25- to 44-year-olds, 2 percent of 45- to 64-year-olds, and less than 1 percent of adults ages 65 or older.[6] As for race/ethnicity, White, Black, and Asian adults were more likely than Hispanic adults to participate in formal work-related courses (35 percent, 31 percent, and 38 percent, respectively, versus 25 percent). Asian adults were more likely than White, Black, and Hispanic adults to be in a college degree or certificate program (16 percent versus 9 percent, 10 percent, and 6 percent, respectively).

Adults with higher education levels were more likely than those with lower education levels to participate in formal work-related courses: 58 percent of adults with a graduate or professional degree participated in such courses, compared to 52 percent of those with a bachelor's degree, 36 percent of those with some college or a vocational or associate's degree, 23 percent of those with a high school diploma or its equivalent, and 9 percent of adults with less than a high school diploma or its equivalent. Adults with some college, a vocational diploma, or associate's degree were more likely to be in a college credential program for work-related reasons (16 percent) than adults whose highest educational attainment was a high school credential (5 percent) or less (less than 1 percent).

Income was also associated with participation in specific types of formal work-related education. Adults with higher annual household incomes were more likely than those with lower incomes to participate in work-related courses. Forty-nine percent of adults with incomes of $75,001 to $100,000 and $100,001 or more in the past year participated, compared to 40 percent of those with incomes of $50,001 to $75,000, 31 percent with incomes of $25,001 to $50,000, and 14 percent with incomes of $25,000 or less in the past year.

[5] Work-related courses were defined as training, workshops, seminars, courses, or classes that had an instructor and were taken for work-related reasons.

[6] Many of the adults 24 and younger may not yet have entered the workforce in their primary career field at the time of the survey, and one might distinguish this population from older adults already in the work force. However, since postsecondary education is noncompulsory, and since most college students consider their education to be for work-related reasons, the population of adults 24 and younger was included in these analyses.

Participation in Work-Related Formal Adult Education, by Employment Status and Occupational Group

Table 2 shows findings for participation in adult education for work-related reasons by employment status and occupational group.[7] Fifty-two percent of adults who were employed in the past year participated in formal adult education for work-related reasons, compared to 11 percent who were not employed in the past year. Adults who worked 12 months or 6 to 11 months in the past year were more likely than those who worked 1 to 5 months to have participated in any formal adult education for work-related reasons (52 percent each versus 44 percent, respectively). Professionals and managers (70 percent) were more likely to participate than those in service, sales, or support occupations (49 percent), who were in turn more likely than those employed in the trades (32 percent) to participate.

Participation in Specific Types of Work-Related Formal Adult Education, by Employment Status and Occupational Group

Differences in participation rates for specific types of formal adult education taken for work-related reasons were also detected by employment status and occupational group (table 2). For example, 44 percent of adults who were employed in the past year participated in work-related courses, compared to 7 percent who were not employed in the past year. Eleven percent of adults who were employed in the past year were in a college degree or certificate program for work-related reasons, compared to 4 percent who were not employed in the past year.

Adults who worked 12 months in the past year were more likely than those who worked 6 to 11 months to have taken work-related courses (47 percent versus 42 percent, respectively). Adults who worked 1 to 5 months were least likely among employed adults to have taken work- related courses (26 percent). In contrast, adults who were employed 1 to 5 months in the past year were more likely than those who were employed 6 to 11 months or 12 months in the past year to be in a college credential program for work-related reasons (22 percent versus 14 and 9 percent, respectively).

Adults in professional or managerial occupations were more likely to participate in work-related courses than those in service, sales, or support occupations (64 percent versus 40 percent, respectively), and those in the trades were least likely to have participated in work-related courses (26 percent). Those in trade occupations were also less likely than those in professional or managerial occupations and service, sales, or support occupations to be in a college degree program (5 percent versus 13 and 12 percent, respectively), but were more likely among employed adults to have participated in an apprenticeship (3 percent versus 1 percent).

[7] See the Technical Notes section of this report for definition of occupational groups.

Table 2. Participation in formal adult education for work-related reasons, by type of educational activity, employment status, and occupational group: 2002–03

Adult characteristic	Number of adults (thousands)	Any formal adult education for work-related reasons[1]		Specific type of formal educational activity							
				College degree program for work-related reasons		Vocational degree/diploma program for work-related reasons		Apprenticeship		Work-related courses	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Total	206,533	40	0.5	9	0.3	2	0.1	1	0.1	33	0.5
Employed in past year											
Yes	146,030	52	0.6	11	0.4	2	0.2	1	0.1	44	0.6
No	60,503	11	0.6	4	0.4	1	0.1	#	#	7	0.5
Months worked in past year[2]											
12 months	107,971	52	0.8	9	0.4	2	0.2	1	0.2	47	0.8
6 to 11 months	27,675	52	1.6	14	0.9	3	0.5	1	0.2	42	1.6
1 to 5 months	10,383	44	2.7	22	2.3	4	1.0	1	0.4	26	2.8
Occupation group[2]											
Professional or managerial	45,292	70	1.2	13	0.7	1	0.2	1	0.1	64	1.3
Service, sales, or support	65,769	49	1.1	12	0.6	3	0.3	1	0.1	40	1.0
Trades	34,969	32	1.4	5	0.6	2	0.4	3	0.5	26	1.4

Estimate rounds to zero.

[1]Participation in any adult education for work-related reasons includes college or university degree or certificate programs, technical diploma or degree programs, apprenticeships, or work-related courses. Adults could have participated in more than one type of formal work-related adult education activity.

[2]Estimates pertain only to adults who reported working in the previous 12 months.

NOTE: s.e. is standard error. Details may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Multivariate Analysis of Participation in Any Work-Related Formal Education

The preceding sections presented bivariate analyses of individual characteristics and participation in formal work-related adult education. A risk of relying exclusively on bivariate analyses is that associations may be observed that are actually due to interrelationships among the characteristics examined. For example, the fact that men are more likely than women to attend conferences, trade shows, or conventions may have more to do with the employment status and occupations of men and women and very little to do with sex per se. That is, that men are more likely than women to attend conferences, trade shows, or conventions may be better explained by the fact that men are more likely to be employed than women and are more likely to be in occupations that require such activities. In this way, logistic regression was used to examine the individual relationships between participation and adult characteristics, controlling for other adult characteristics. Table 3 provides logistic regression results that show the association of participation in any formal work-related adult education and each adult characteristic (age, sex, etc.) with all other adult characteristics held constant.[8]

The multivariate analysis of participation in any formal work-related adult education yielded findings consistent with the bivariate analysis for age, educational attainment, and occupational group. Specifically, the youngest adults (ages 24 or younger) were more likely than adults from the older age groups to participate in any formal work-related adult education. As in the bivariate analysis, adults with a graduate or professional degree were more likely than adults with less education to participate, although the effect size of the difference for adults with a bachelor's degree was less than 0.2.[9] Those in professional or managerial positions were more likely to participate than those in services, sales, or support occupations, those employed in the trades, and those who were not employed in the previous 12 months.

The multivariate analysis did not yield findings completely consistent with the bivariate analysis for household income. In the bivariate analysis, households with income of $100,001 or more were more likely than those with income of $75,000 or less to participate in any formal work-related adult education, whereas the multivariate analysis showed those in the highest income bracket only to be more likely to participate than those in the lowest income bracket ($25,000 or less), when controlling for other adult characteristics. Also, once other factors were controlled, males were less likely to participate than females, although the effect size of the difference was less than 0.1.

[8] For the sake of consistency, all of the logistic regression tables in this report used as reference categories subgroups for each adult characteristic (e.g., age, income) that had the highest participation rates in overall formal work-related adult education, with the exception of race/ethnicity. For policy-relevant reasons, White adults were used as the reference group for the race/ethnicity variable.

[9] Effect sizes of less than 0.2 are sometimes considered to be negligible (Cohen 1988). However, few analyses of meaningful effect sizes for estimates of participation in adult education have been conducted. See the technical notes for a discussion of effect size calculations.

Unlike the bivariate analysis, the multivariate analysis indicated that Asian adults were no more likely, and Hispanic adults no less likely, than White adults to participate in work-related formal adult education, when controlling for other factors (such as education level, occupation, and household income). Contrary to the bivariate analysis where no differences were detected, in the multivariate analysis White adults were more likely than Black adults to participate, although the effect size of the difference was less than 0.2.

Table 3. Results of logistic regression analysis of participation in any formal adult education for work-related reasons: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect Size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.91*	0.117	0.40	-0.506
45 to 64 years	-1.29*	0.126	0.27	-0.723
65 years or older	-2.39*	0.140	0.09	-1.330
Sex (Reference category: Female)				
Male	-0.15*	0.067	0.86	-0.083
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	-0.19*	0.096	0.82	-0.110
Hispanic	0.22	0.129	1.24	0.119
Asian or Pacific Islander, non-Hispanic	0.13	0.175	1.14	0.072
Other race, non-Hispanic	-0.33	0.240	0.72	-0.181
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.96*	0.184	0.14	-1.086
High school diploma/equivalent	-1.16*	0.108	0.31	-0.647
Some college/vocational/associate's degree	-0.47*	0.103	0.63	-0.255
Bachelor's degree	-0.29*	0.095	0.75	-0.159
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.58*	0.125	0.56	-0.320
$25,001 to $50,000	-0.17	0.099	0.84	-0.096
$50,001 to $75,000	0.03	0.105	1.03	0.016
$75,001 to $100,000	0.10	0.143	1.11	0.058
Months worked in past year (Reference category: 12 months)				
6 to 11 months	0.00	0.084	1.00	0.000
Less than 6 months[1]	-0.20	0.146	0.82	-0.110
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.47*	0.073	0.63	-0.255
Trades	-0.84*	0.098	0.43	-0.466
Not employed within past 12 months	-1.75*	0.167	0.17	-0.979

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Multivariate Analysis of Participation in Specific Types of Work-Related Formal Education

Logistic regressions were also performed individually for each type of formal work-related learning, with participation in the given type of activity as the dependent variable and adult characteristics as the independent variables in each regression. The tables appear in appendix A. This section presents the results of these regressions for participation in college and university degree programs and work-related courses. Because only 1 to 2 percent of adults participated in vocational/technical and apprenticeship programs, the results for those types of adult education are not presented here, but are given in the appendix for the reader's information.

Findings from the multivariate analyses were consistent with the bivariate findings for age and occupation. With respect to age, the multivariate tests showed that adults 24 years old or younger were more likely than older adults to participate in college or certificate programs, and they were more likely than adults 65 years old or older to participate in work-related courses. Consistent with the bivariate findings, the multivariate analysis revealed that professionals and managers were generally more likely than those in the trades to participate in college degree or certificate programs. Also, they were more likely than those in the service, sales, or support occupations and the trades to participate in work-related courses.

As in the bivariate findings, the multivariate analyses revealed that men were no more likely than women to participate in either college degree or certificate programs. Men were, however, less likely than women to participate in work-related courses, although the effect size of the difference was less than 0.1. In the bivariate analysis, White adults were less likely than Asian adults to have participated in college degree or certificate programs, whereas in the multivariate analysis no such differences were detected between these subgroups. While the bivariate analysis indicated that White adults were more likely than Hispanic adults to participate in work-related courses, the multivariate analysis showed no such difference in participation. Further, while no differences were detected in the bivariate analysis between White and Hispanic adults for participation in college degree and certificate programs, the multivariate analysis indicated that Hispanic adults were more likely than White adults to participate, when controlling for other factors.

As for education level, the findings of the multivariate analyses were mixed. Unlike in the bivariate analysis, where no differences were detected between adults with a graduate or professional degree and those with a bachelor's degree or some college, the regression showed that, when controlling for other factors, adults with a graduate or professional degree were more likely than adults at *all* other

education levels to participate in college degree or certificate programs. The bivariate finding that the most highly educated adults were most likely to participate in work-related courses held in the multivariate analyses, although the effect size of the difference for adults with a bachelor's degree was less than 0.2.

The multivariate findings were not completely consistent with the bivariate findings for household income. With respect to participation in college degree or certificate programs, the multivariate analysis showed differences between the highest income group and the two lowest income groups ($25,000 or less and $25,001 to $50,000), although the effect sizes for these were less than 0.2. In the bivariate analysis, no differences were detected between the highest income group and other income groups for participation in college degree or certificate programs. As for work-related courses, in the bivariate findings adults in the highest income bracket were more likely than adults in households making $75,000 or less to participate in work-related courses. The multivariate analysis shows that adults in the highest income bracket were more likely than those in the two lowest income brackets to participate in work-related courses, although the effect size for those households earning $25,001 to $50,000 was less than 0.2.

Time Spent in Formal Work-Related Education

Adults committed varied amounts of time to work-related educational activities.[10] Among adults who participated in a college degree or certificate program for work-related reasons, 35 percent took 12 or fewer credits hours in the previous 12 months, 33 percent took 13 to 24 credit hours, and 33 percent took 25 or more credit hours (table 4).[11]

Of those adults who took courses within a vocational degree/diploma program for work-related reasons, a majority took 12 or fewer credit hours (62 percent), whereas 27 percent took 13 to 24 credits hours, and 11 percent took 25 or more credit hours. Some adults who participated in educational activities for work-related reasons did not earn credit hours (within a semester or quarter/trimester system), but reported a total number of classroom hours. Of the adults who were in a vocational degree/diploma program and reported classroom hours, 30 percent took 8 hours or fewer, 31 percent took 9 to 24 hours, and 26 percent took 25 to 40 hours. The lowest percentage of adults (13 percent) took 41 classroom hours or more.

[10] Respondents reported either in semester hours or classroom hours, where the latter did not take place within the framework of a semester or quarter system.

[11] All instructional hours reported in quarter or trimester hours were converted to semester hours by multiplying the quarter or trimester hours by 0.67.

Table 4. Number and percent of adults indicating total credit hours or classroom instructional hours in the past 12 months, by type of educational activity: 2002–03

Instructional hours[1]	College degree program for work-related reasons[2]			Vocational degree/diploma program for work-related reasons[2]			Apprenticeship			Work-related courses		
	Number of adults (thousands)	Percent	s.e.	Number of adults (thousands)	Percent	s.e.	Number of adults (thousands)	Percent	s.e.	Number of adults (thousands)	Percent	s.e.
Semester credits[3]												
12 or fewer	5,895	35	1.7	1,040	62	4.6	†	†	†	†	†	†
13 to 24	5,556	33	1.9	456	27	4.4	†	†	†	†	†	†
25 or more	5,622	33	1.8	181	11	2.6	†	†	†	†	†	†
Classroom hours												
8 or fewer	†	†	†	350	30	6.9	295	17	4.4	18,281	27	0.9
9 to 24	†	†	†	373	31	7.1	491	28	5.7	20,460	30	0.8
25 to 40	†	†	†	310	26	4.8	408	23	7.7	12,124	18	0.8
41 or more	†	†	†	152	13	3.5	591	33	6.6	17,635	26	0.9

† Not applicable.

[1]Respondents reported either in semester hours or classroom hours, where the latter did not take place within the framework of a semester or quarter system.

[2]Estimates pertain only to time spent in the most advanced degree program in which a respondent had been enrolled.

[3]All instructional hours reported as quarter or trimester hours were converted to semester hours by multiplying the number of quarter or trimester hours by 0.67.

NOTE: Each participant reported either semester credits or classroom hours for each educational activity, but not both. s.e. is standard error. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Of the adults who participated in an apprenticeship (all of whom reported classroom hours only), 17 percent took 8 hours or fewer, 28 percent took 9 to 24 hours, 23 percent took 25 to 40 hours, and 33 percent took 41 hours or more. For adults who took work-related courses (all of whom reported classroom hours only), 27 percent took 8 hours or fewer, 30 percent took 9 to 24 hours, 18 percent took 25 to 40 hours, and 26 percent took 41 hours or more.

Providers From Whom Adults Took Formal Work-Related Courses

Work-related courses are provided by a variety of sources, and survey respondents reported taking courses from a wide range of instructional providers.[12] As shown in table 5, business or industry

[12] The reader should bear in mind that the adult, and not the course or provider, is the unit of analysis. Therefore, the data reported here reflect the percentages of adults who took courses from various providers, and not the percentage of courses provided by various organizations. Some adults took multiple courses, and these may have been taken from the same provider or different providers. The figures here and in table 5 reflect the responses given for up to four courses for each adult. Thus, the percentages sum to more than 100. Respondents were asked only about providers for work-related courses because it was presumed that the providers for college degree programs and vocational degree/diploma programs were postsecondary institutions and that the providers for apprenticeships were employers.

was the most commonly reported provider of work-related courses—51 percent of adults took formal work-related courses from a business or industry. Twenty-one percent of adults took formal work-related courses from a college/university or a vocational/technical school, and 19 percent of adults took formal work-related courses from a government agency (federal, state, or local) or from a professional or labor association/organization.

Table 5. Percent of adults taking formal work-related courses from selected types of instructional providers: 2002–03

Instructional provider	Percent	s.e.
Business or industry	51	1.1
College/university, vocational/ technical school	21	0.9
Government agency (federal, state, local)	19	0.8
Professional or labor association/organization	19	0.8
Other (religious or community organization, tutor, etc.)	8	0.5
Elementary/secondary school	6	0.3

NOTE: Percentages are based on the 68,499,000 adults participating in work-related courses. Some adults took courses from more than one type of provider; therefore, percents sum to more than 100. s.e. is standard error.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Work-Related Informal Learning

In addition to formal work-related education, adults were asked whether they had participated in a variety of informal adult education activities *for work-related reasons* in the past year. Types of informal learning asked about in the survey included the following: on-the-job demonstrations of equipment, techniques, or procedures by a supervisor or coworker; receiving other supervised training or mentoring on the job; self-paced study using books, procedures manuals, audiotapes, or videos; self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet; attendance at brown-bag or informal presentations; and attendance at conferences, trade shows, or conventions related to one's work or career. Only those adults employed in the past year were asked about on-the-job demonstrations and supervised training or mentoring on the job. All adults were asked about the other types of informal learning for work-related reasons.

Participation in Work-Related Informal Learning, by Adult Characteristics

Fifty-eight percent of adults participated in at least one type of informal learning activity related to work (table 6).[13] Some groups of adults were more likely to participate in work-related informal learning than others. Younger adults were more likely than older ones to participate. Seventy-three percent of adults 24 or younger and 70 percent of 25- to 44-year-olds participated in work-related informal learning, compared to 59 percent of 45- to 64-year-olds and 17 percent of adults 65 years old or older. Men were more likely than women to participate in informal learning related to work (62 percent versus 55 percent). With respect to race/ethnicity, Asian adults (67 percent) were more likely than White adults (59 percent), Black adults (56 percent), and Hispanic adults (57 percent) to participate in informal learning related to work.

Adults with higher education levels were more likely than those with lower education levels to participate in work-related informal learning; 78 percent of adults with a graduate or professional degree and 75 percent with a bachelor's degree participated, compared to 65 percent of those with some college or a vocational or associate's degree, 50 percent of those with a high school diploma or its equivalent, and 31 percent of adults with less than a high school diploma or its equivalent.

Similarly, adults with higher household income levels were more likely to participate in work-related informal learning than those with lower income levels. Seventy-three percent of adults with household incomes of $75,001 to $100,000 and $100,001 or more participated in such activities, compared to 64 percent of those with household incomes of $50,001 to $75,000, 58 percent of those with incomes of $25,001 to $50,000, and 40 percent of those with incomes of $25,000 or less.

[13] This rate includes participation in one or more of the activities enumerated above. In developing the measure of any participation, responses to those items asked only of adults employed in the previous 12 months (on-the-job demonstrations and supervised training or mentoring on the job) were assumed to be "no" for those who had not been employed in the previous 12 months.

Table 6. Participation in informal learning related to a job or career, by type of educational activity and adult characteristics: 2002–03

Adult characteristic	Total number of adults (thousands)	Any informal learning related to work[1]		Specific type of informal learning activity: percent of *all adults*					
				Self-paced study using books, manuals, audio/video		Attendance at conferences, trade shows, or conventions		Attendance at brown-bag or informal presentations	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.
Total	206,533	58	0.5	31	0.6	23	0.6	21	0.5
Age									
24 years or younger	24,053	73	1.7	36	1.8	20	1.7	18	1.8
25 to 44 years	82,223	70	1.1	37	1.1	28	0.9	26	0.8
45 to 64 years	66,447	59	1.0	32	0.9	27	0.9	26	1.0
65 years or older	33,810	17	0.8	10	0.6	7	0.6	5	0.4
Sex									
Male	98,793	62	0.8	33	0.8	27	0.8	23	0.8
Female	107,740	55	0.8	28	0.8	20	0.7	20	0.6
Race/ethnicity									
White, non-Hispanic	149,135	59	0.6	30	0.6	24	0.7	23	0.6
Black, non-Hispanic	23,145	56	1.8	34	1.9	21	1.6	19	1.3
Hispanic	24,248	57	2.0	33	1.9	20	1.5	14	1.3
Asian or Pacific Islander, non-Hispanic	6,330	67	3.6	44	3.6	34	3.5	32	3.2
Other race, non-Hispanic	3,675	55	4.6	29	4.3	21	3.4	18	2.7
Highest education completed									
Less than a high school diploma/equivalent	32,357	31	1.6	17	1.4	8	1.3	5	0.8
High school diploma/ equivalent	61,194	50	1.1	26	1.0	15	0.9	13	0.8
Some college/vocational/ associate's degree	58,055	65	1.0	35	1.1	24	1.1	23	0.9
Bachelor's degree	32,122	75	1.4	38	1.4	35	1.2	34	1.3
Graduate or professional degree	22,804	78	1.2	43	1.6	51	1.4	46	1.6
Household income									
$25,000 or less	53,796	40	1.4	22	1.1	12	0.9	9	0.6
$25,001 to $50,000	55,435	58	1.2	32	1.2	20	1.0	19	1.0
$50,001 to $75,000	43,189	64	1.3	32	1.2	24	1.3	24	1.1
$75,001 to $100,000	24,286	73	1.7	36	1.6	33	1.6	32	1.7
$100,001 or more	29,826	73	1.2	38	1.6	41	1.4	36	1.5

See notes at end of table.

Table 6. Participation in informal learning related to a job or career, by type of educational activity and adult characteristics: 2002–03—Continued

Adult characteristic	Number of adults (thousands)	Specific type of informal learning activity: Percent of *all adults*		Specific type of informal learning activity: Percent of *employed adults*				
		Self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet		Number of employed adults (thousands)	On-the-job demonstrations[2]		Supervised training or mentoring[2]	
		Percent	s.e.		Percent	s.e.	Percent	s.e.
Total	206,533	21	0.5	146,030	56	0.7	43	0.7
Age								
24 years or younger	24,053	19	1.8	19,945	69	2.0	58	2.2
25 to 44 years	82,223	26	0.9	70,395	57	1.2	45	1.1
45 to 64 years	66,447	24	0.7	49,955	50	1.2	37	1.1
65 years or older	33,810	6	0.5	5,735	39	2.7	21	1.9
Sex								
Male	98,793	23	0.7	76,072	55	1.0	42	1.0
Female	107,740	19	0.6	69,958	57	1.0	45	1.1
Race/ethnicity								
White, non-Hispanic	149,135	21	0.5	105,161	57	0.8	45	0.8
Black, non-Hispanic	23,145	20	1.5	15,933	57	2.2	44	2.4
Hispanic	24,248	17	1.4	17,872	46	2.3	35	2.0
Asian or Pacific Islander, non-Hispanic	6,330	39	3.3	4,607	51	4.3	40	3.9
Other race, non-Hispanic	3,675	24	3.7	2,456	44	5.6	41	6.8
Highest education completed								
Less than a high school diploma/equivalent	32,357	7	0.9	15,601	43	2.8	25	2.7
High school diploma/ equivalent	61,194	14	0.8	41,489	53	1.5	40	1.6
Some college/vocational/ associate's degree	58,055	24	1.0	44,260	58	1.3	48	1.3
Bachelor's degree	32,122	34	1.1	26,293	61	1.6	51	1.5
Graduate or professional degree	22,804	37	1.4	18,387	59	1.7	47	1.8
Household income								
$25,000 or less	53,796	10	0.7	27,407	50	1.8	35	2.0
$25,001 to $50,000	55,435	19	0.9	40,129	55	1.6	43	1.4
$50,001 to $75,000	43,189	24	1.2	34,556	56	1.4	46	1.4
$75,001 to $100,000	24,286	30	1.7	19,765	60	1.8	47	1.7
$100,001 or more	29,826	34	1.3	24,173	59	1.9	47	1.8

[1]Includes receiving on-the-job demonstrations of equipment, techniques, or procedures by a supervisor or coworker; receiving other supervised training or mentoring on the job; self-paced study using books, procedures manuals, audiotapes, or videos; self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet; attending brown-bag or informal presentations; and attending conferences, trade shows, or conventions related to one's work or career. Adults could have participated in more than one type of informal work-related adult education activity.

[2]Estimates pertain only to adults who reported working in the previous 12 months. Survey questions about on-the-job demonstrations and supervised training or mentoring were only asked of adults employed in the past year.

NOTE: s.e. is standard error. Details may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Participation in Specific Types of Work-Related Informal Learning, by Adult Characteristics

Regarding participation in specific informal learning activities, the survey found that 31 percent of all adults reported self-paced study using books, manuals, audiotapes, or videos (table 6). Fewer adults attended conferences, trade shows, or conventions (23 percent), did self-paced study using computer-based tutorials (21 percent), or attended brown-bag or informal presentations (21 percent). Among adults employed in the past year, 56 percent participated in on-the-job demonstrations and 43 percent received supervised training or mentoring.

Participation in the particular types of work-related informal learning activities varied by adult characteristics. Thirty-six percent of adults ages 24 and younger and 37 percent of 25- to 44-year-olds did self-paced study using books, manuals, audiotapes, or videos, compared to 32 percent of 45- to 64-year-olds and 10 percent of adults ages 65 or older. Adults in the mid-age ranges (25- to 44-year-olds and 45- to 64-year-olds) were more likely than younger and older adults to attend conferences, trade shows, or conventions (28 and 27 percent versus 20 and 7 percent, respectively), attend brown-bag or informal presentations (26 percent each versus 18 and 5 percent), and do self-paced study using computer-based tutorials (26 and 24 percent versus 19 and 6 percent).

Among adults employed in the past year, younger adults were more likely than older ones to have participated in on-the-job demonstrations. Sixty-nine percent of adults 24 and younger participated, compared to 57 percent of 25- to 44-year-olds, 50 percent of 45- to 64-year olds, and 39 percent of adults ages 65 and older. Similarly, 58 percent of employed adults ages 24 and younger received supervised training or mentoring on the job, compared to 45 percent of 25- to 44-year-olds, 37 percent of 45- to 64-year-olds, and 21 percent of adults ages 65 and older.

Men were more likely than women to participate in self-paced study using books, manuals, audiotapes, or videos (33 percent versus 28 percent), attend conferences, trade shows, or conventions (27 percent versus 20 percent), do self-paced study using computer-based tutorials (23 percent versus 19 percent), and attend brown-bag or informal presentations (23 versus 20 percent).

Variability in participation in some informal activities was also observed by race/ethnicity. Asian adults were more likely than White adults, Black adults, and Hispanic adults to have done self-paced study using books, manuals, audiotapes, or videos (44 percent versus 30, 34, and 33 percent, respectively), attended conferences, trade shows, or conventions (34 percent versus 24, 21, and 20 percent, respectively), done self-paced study using computer-based tutorials (39 percent versus 21, 20,

and 17 percent, respectively), and attended brown-bag or informal presentations (32 percent versus 23, 19, and 14 percent, respectively). Among adults who were employed in the past year, Hispanic adults were less likely than White and Black adults to participate in on-the-job demonstrations (46 percent versus 57 percent each) and supervised training or mentoring (35 percent versus 45 and 44 percent).

Adults with higher education levels were more likely than those with lower education levels to participate in specific work-related informal learning activities. Those with a graduate or professional degree were more likely than adults at other education levels to do self-paced study using books, manuals, audiotapes, or videos (43 percent versus 17, 26, 35, and 38 percent, respectively), attend conferences, trade shows, or conventions (51 percent versus 8, 15, 24, and 35 percent, respectively), and attend brown-bag or informal presentations (46 percent versus 5, 13, 23, and 34 percent, respectively). In addition, adults with a bachelor's degree or higher were more likely than those adults with less than a bachelor's degree to have done self-paced study using computer-based tutorials (34 and 37 percent versus 7, 14, and 24 percent, respectively).

Among adults employed in the past year, those with at least some postsecondary education (whether some college, vocational school, or associate's, bachelor's, or graduate/professional degree) were more likely than adults with a high school diploma/equivalent or less to have participated in on-the-job demonstrations (58, 61, and 59 percent versus 53 and 43 percent, respectively) and supervised training or mentoring (48, 51, and 47 percent versus 40 and 25 percent, respectively).

Adults in households with incomes of $75,001 to $100,000 and $100,001 or more annually were more likely than those in households at lower income levels to do the following: participate in self-paced study using books, manuals, audiotapes, or videos (36 and 38 percent versus 22, 32, and 32 percent, respectively), attend conferences, trade shows, or conventions (33 and 41 percent versus 12, 20, and 24 percent, respectively), do self-paced study using computer-based tutorials (30 and 34 percent versus 10, 19, and 24 percent, respectively), and attend brown bag or informal presentations (32 and 36 percent versus 9, 19, and 24 percent, respectively).

Participation in Work-Related Informal Learning, by Employment Status and Occupational Group

Findings for participation in informal work-related learning activities, by employment status and occupational group, are shown in table 7.[14] Seventy-five percent of adults who were employed in the past year participated in work-related informal learning, compared to 17 percent who were not employed in the past year. Adults who worked 12 months or 6 to 11 months in the past year were more likely than those who worked 1 to 5 months to have participated in any informal learning activities related to work (76 and 78 percent versus 63 percent). Those in professional or managerial occupations (86 percent) were more likely than those in service, sales, or support occupations (73 percent) to participate in informal learning for work-related reasons. Adults in the trades were least likely among employed adults to participate (66 percent).

Participation in Specific Types of Work-Related Informal Learning, by Employment Status and Occupational Group

Of those adults who were employed in the past year, 56 percent participated in on-the-job demonstrations, 43 percent received supervised training or mentoring, and 39 percent did self-paced study using books, manuals, audiotapes, or videos (table 7). Smaller percentages of adults who worked in the past year attended conferences, trade shows, or conventions (30 percent), attended brown-bag or informal presentations (28 percent), and did self-paced study using computer-based tutorials (26 percent).

Among employed adults, those who worked all 12 months in the past year were more likely than those who worked 6 to 11 months and 1 to 5 months to have done self-paced study using books, manuals, audiotapes, or videos (41 percent versus 36 and 30 percent), attended conferences, trade shows, or conventions (32 percent versus 28 and 16 percent), attended brown-bag or informal presentations (30 percent versus 24 and 17 percent), and done self-paced study using computer-based tutorials (28 percent versus 22 and 17 percent). Adults who worked 6 to 11 months were more likely than adults who worked 12 months or 1 to 5 months to participate in on-the-job demonstrations (60 percent versus 55 and 47 percent).

[14] See the Technical Notes section for definition of the three occupational groups described in this report.

Table 7. Participation in informal learning related to a job or career, by type of educational activity, employment status, and occupational group: 2002–03

Adult characteristic	Number of adults (thousands)	Any informal learning related to work[1]		Specific type of informal learning activity: Percent of *all adults*								Number of adults (thousands)	Specific type of informal learning activity: percent of *employed adults*			
				Self-paced study using books, manuals, audio/video		Attendance at conferences, trade shows, or conventions		Attendance at brown-bag or informal presentations		Self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet			On-the-job demonstrations[2]		Supervised training or mentoring[2]	
		Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.	Percent	s.e.		Percent	s.e.	Percent	s.e.
Total	206,533	58	0.5	31	0.6	23	0.6	21	0.5	21	0.5	146,030	56	0.7	43	0.7
Employed in past year																
Yes	146,030	75	0.7	39	0.8	30	0.7	28	0.6	26	0.7	146,030	56	0.7	43	0.7
No	60,503	17	0.8	11	0.6	7	0.5	5	0.4	9	0.7	†	†	†	†	†
Months worked in past year[2]																
12 months	107,971	76	0.7	41	0.9	32	0.9	30	0.7	28	0.8	107,971	55	0.9	43	0.9
6 to 11 months	27,675	78	1.6	36	1.5	28	1.5	24	1.4	22	1.2	27,675	60	1.8	46	1.5
1 to 5 months	10,383	63	3.0	30	2.6	16	1.9	17	2.0	17	2.1	10,383	47	2.9	37	3.0
Occupational group[2]																
Professional or managerial	45,292	86	0.8	47	1.2	49	1.1	46	1.0	39	1.2	45,292	59	1.2	48	1.2
Service, sales, or support	65,769	73	1.1	36	1.3	23	1.0	24	0.9	24	0.9	65,769	56	1.1	44	1.0
Trades	34,969	66	1.7	35	1.6	19	1.5	14	1.0	14	1.1	34,969	50	1.8	36	1.8

† Not applicable.

[1]Includes receiving on-the-job demonstrations of equipment, techniques, or procedures by a supervisor or coworker; receiving other supervised training or mentoring on the job; self-paced study using books, procedures manuals, audiotapes, or videos; self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet; attending brown-bag or informal presentations; and attending conferences, trade shows, or conventions related to one's work or career. Adults could have participated in more than one type of informal work-related adult education activity.

[2]Estimates pertain only to adults who reported working in the previous 12 months. Survey questions about on-the-job demonstrations and supervised training or mentoring were only asked of adults employed in the past year.

NOTE: s.e. is standard error. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Employed adults in professional or managerial occupations were more likely than those in service, sales, or support and trade occupations to participate in several types of informal learning related to their jobs or careers. These activities include receiving supervised training or mentoring (48 percent versus 44 and 36 percent), self-paced study using books, manuals, audiotapes, or videos (47 percent versus 36 and 35 percent), attendance at conferences, trade shows, or conventions (49 percent versus 23 and 19 percent), attendance at brown-bag or informal presentations (46 percent versus 24 and 14 percent), and self-paced study using computer-based tutorials (39 percent versus 24 and 14 percent).

Multivariate Analysis of Participation in Any Work-Related Informal Learning

A logistic regression was carried out to examine the association between participation in any informal learning activities (the dependent variable) and adult characteristics, when taking the various adult characteristics into account simultaneously (table 8). The multivariate analysis showed that consistent with bivariate findings, adults ages 24 or younger were more likely than adults ages 45 and older to participate in any work-related informal learning. As with the bivariate findings, education was associated with participation in informal learning, with highly educated adults (those with graduate or professional degrees) more likely to participate than those below the bachelor's degree level.

Some of the multivariate findings mirrored those of the bivariate analyses, but exhibited effect sizes below 0.2.[15] For example, in the bivariate analysis, adults in households that earned $100,001 or more were more likely to than adults in households that earned $75,000 or less to participate in any work-related informal learning. In the multivariate analysis, similar differences were observed, but the effect sizes associated with those in households making between $25,001 and $75,000 were about 0.14. Similarly, the bivariate analysis indicated that adults in professional and managerial occupations were more likely to participate in any work-related informal learning than adults in the service, sales, or support occupations and the trades. The multivariate analysis showed similar differences, but the effect size for the difference between those in professional and managerial occupations on the one hand and for those in service, sales, or support occupations was less than 0.2.

[15] Effect sizes of less than 0.2 are sometimes considered to be negligible (Cohen 1988). However, few analyses of meaningful effect sizes for estimates of participation in adult education have been conducted. See the technical notes for a discussion of effect size calculations.

Table 8. Results of logistic regression analysis of participation in any work-related informal learning: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect Size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.47*	0.115	0.62	-0.264
45 to 64 years	-0.89*	0.116	0.41	-0.493
65 years or older	-1.58*	0.123	0.21	-0.862
Sex (Reference category: Female)				
Male	0.09	0.074	1.09	0.048
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	-0.07	0.114	0.93	-0.040
Hispanic	-0.01	0.126	0.99	-0.006
Asian or Pacific Islander, non-Hispanic	0.04	0.233	1.04	0.022
Other race, non-Hispanic	0.07	0.276	1.07	0.037
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.52*	0.141	0.22	-0.837
High school diploma/equivalent	-1.05*	0.121	0.35	-0.580
Some college/vocational/ associate's degree	-0.62*	0.114	0.54	-0.340
Bachelor's degree	-0.26	0.132	0.77	-0.144
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.42*	0.113	0.66	-0.230
$25,001 to $50,000	-0.25*	0.106	0.78	-0.137
$50,001 to $75,000	-0.25*	0.108	0.78	-0.137
$75,001 to $100,000	0.08	0.125	1.09	0.048
Months worked in past year (Reference category: 12 months)				
6 to 11 months	0.13	0.104	1.14	0.072
Less than 6 months[1]	-0.46*	0.166	0.63	-0.255
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.36*	0.099	0.70	-0.197
Trades	-0.52*	0.114	0.60	-0.282
Not employed within past 12 months	-2.02*	0.178	0.13	-1.127

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Unlike the bivariate findings, the multivariate findings showed that female adults were no more likely than male adults, and Asian adults were no more likely than White adults to participate in work-related informal learning, when taking other adult characteristics into account simultaneously. However, as with the bivariate findings, no statistically significant differences were detected between White adults and adults of other racial/ethnic subgroups for participation in any work-related informal learning.

Multivariate Analysis of Participation in Specific Types of Work-Related Informal Learning

Separate logistic regression analyses were performed for each type of work-related informal learning. In each analysis, the dependent variable was participation in the given type of informal learning activity. Tables are presented in appendix B.

Consistent with the bivariate findings, the youngest adults (24 years or younger) were more likely than adults from the older age categories to participate in on-the-job demonstrations and supervised training or mentoring, and were more likely than the oldest adults (65 years and older) to participate in each of the six types of work-related informal learning identified in the survey. Also consistent with the bivariate findings, the multivariate analyses showed that adults with a graduate or professional degree were more likely than adults with less than a high school diploma to participate in each type of work-related informal learning. They were also more likely than adults at all other education levels to attend conferences or trade shows and brown-bag presentations, and to do self-paced study using books and manuals (although for self-paced study, the effect size of the difference was less than 0.2 for adults with a bachelor's degree and some college/vocational/associate's degree).

The bivariate analyses indicated that Asian adults were more likely than White adults to attend conferences and trade shows, attend brown-bag presentations, participate in self-paced study using books and manuals, and participate in self-paced study using computer-based software. However, the multivariate analyses showed that while Asian adults were more likely than White adults to do self-paced study using computer-based software and books or manuals, they were no more likely to attend conferences or trade shows or to attend brown-bag presentations, controlling for other factors. Also, while the bivariate analyses showed no differences between White and Asian adults with respect to participation in on-the-job demonstrations and supervised training or mentoring, the multivariate analyses showed Asian adults to be *less* likely than White adults to participate in these two types of work-related informal learning. As in the bivariate analysis, Hispanic adults were less likely than White adults to participate in

on-the-job demonstrations and supervised training or mentoring, although for the latter activity the effect size of the difference was less than 0.2.

In the bivariate analyses, adults in the highest income category ($100,001 or more) were more likely than those in the three lowest income categories ($75,000 or less) to attend conferences, trade shows, or conventions, to attend brown-bag presentations, and to participate in self-paced study using books and manuals. The multivariate analyses were consistent with these findings, although the effect sizes were below 0.2 in several cases (see tables B5 and B6).

The bivariate analyses indicated that men were more likely than women to participate in self-paced study using books, manuals, audiotapes, or videos; attend conferences, trade shows, or conventions; do self-paced study using computer-based tutorials; and attend brown-bag presentations; however, the multivariate analyses showed that men only more likely than women to attend conferences, trade shows, or conventions and to participate in self-paced study using computer-based software, although the effect sizes were less than 0.2 in both of these cases.

Finally, bivariate findings showed that adults in professional or managerial occupations were more likely than those in service, sales, or support and in the trades to participate in five of the six types of work-related informal learning (excepting on-the-job presentations). Consistent with the bivariate findings, the multivariate findings suggest that adults in professional or managerial occupations were more likely than those in service, sales, or support occupations and in the trades to attend conferences, trade shows, or conventions, as well as brown-bag presentations, and to participate in self-paced study using books or manuals and computer-based software (although the effect sizes for these latter two activities was less than 0.2 in several cases—see tables B3 and B5). Further, they were more likely than those in the trades to participate in self-paced study using computer-based software. However, they were no more likely than those in service, sales, or support occupations and in the trades to participate in supervised training or mentoring.

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SUMMARY OF FINDINGS

Findings from the Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program reveal that 40 percent of adults in the nation participated in some type of formal adult education for work-related reasons during a 12-month period in 2002–03. Thirty-three percent participated in work-related courses, 9 percent were in a work-related college degree program, 2 percent were in a work-related vocational degree/diploma program, and 1 percent had an apprenticeship.

Fifty-eight percent of adults participated in informal work-related learning activities. Among adults who were employed in the past year, 56 percent participated in on-the-job demonstrations, and 43 percent received supervised training or mentoring. Among all adults (i.e., employed or not in the past year), 31 percent did self-paced study using books, manuals, audiotapes, or videos; 23 percent attended conferences, trade shows, or conventions; 21 percent attended brown-bag or informal presentations; and 21 percent did self-paced study using computer-based software tutorials. Seventy-five percent of adults who were employed in the past year participated in some type of informal learning activity; and across each of the informal activities measured, those adults who were employed in the past year were more likely to participate than those who were unemployed in the past year.

Research on adult education participation rates during the 1990s (Creighton and Hudson 2002) found that participation in adult education during this period varied by level of education, race/ethnicity, occupational group, and employment status. For example, adults with lower education levels, Hispanics, adults in trade occupations, and part-time employees had lower rates of participation in work-related coursetaking. Darkenwald, Kim, and Stowe (1998) reported that adults with higher education levels were more likely to participate in work-related courses than adults with lower levels of education.

The findings of this report show similar patterns of participation. Adults with higher education levels were generally more likely than those with less education to participate in various types of formal and informal work-related educational activities. While this finding may be related to the fact that adults with a bachelor's degree or more education are more likely than those with less education to be in professional or managerial occupations, which require higher levels of continuing education (Frazis et al. 1998), multivariate analyses conducted for this report show that both education level and occupation have independent effects on participation in formal and informal work-related adult education.

Both bivariate and multivariate analyses conducted for this report showed that younger adults were more likely than older adults to participate in formal and informal work-related adult education. Both types of analyses also suggested that among employed adults, professionals and managers were more likely than those in service, sales, or support occupations and those in the trades to have participated in some type of formal work-related adult education and informal work-related learning activities.

The bivariate analyses suggested that Asian adults were generally more likely than White, Black, or Hispanic adults to participate in any formal and informal work-related adult education. However, no differences between Asian and White adults were detected in the multivariate analyses when controlling for other adult characteristics, such as education level, income, and occupation.[16] Also, while the bivariate analyses indicated that female adults were more likely than male adults to participate in work-related informal learning, this difference was not detected when controlling for other adult characteristics in the multivariate analyses.

The bivariate and multivariate analyses conducted for this report revealed that the various participation rates in formal and informal work-related adult education were affected by a complex interplay of factors, including age, education level, and types of occupation. Regression analyses are one relatively simple approach to teasing out these factors. Future analyses could use AEWR data to expand upon this analysis, focusing in greater detail on how participation in various types of work-related adult education is related to other factors, such as region and specific occupations (e.g., health professionals or educators).

[16] The multivariate analyses used White adults as the reference group and therefore did not test for differences between Asian adults and Black adults, Hispanic adults, and adults of other racial/ethnic groups. Differences were detected between Asian and White adults for *particular types* of informal work-related learning activities (see Appendix B).

TECHNICAL NOTES

The 2003 National Household Education Surveys Program (NHES:2003) is a program of telephone surveys sponsored by the U.S. Department of Education's National Center for Education Statistics (NCES). Data collection for NHES:2003 took place from January 2 through April 13, 2003. This report presents data from the Adult Education for Work-Related Reasons (AEWR) survey, fielded as part of NHES:2003. NHES surveys concerning adult education have been conducted in 1991, 1995, 1999, 2001, and 2003. Prior to 2003, NHES adult education surveys focused on adult participation in a wide range of educational activities taken for any reason. AEWR is the first in this series to focus specifically on educational activities taken for work-related reasons. Earlier surveys of adult education fielded through NHES also included educational activities taken for personal interest or personal development and included separate categories for basic skills and English as a second language (ESL). This section provides a brief description of the study methodology; further details appear in Hagedorn et al. (forthcoming).

The NHES:2003 sample was selected using random-digit-dial (RDD) methods, and the data were collected using computer-assisted telephone interviewing (CATI) technology. A two-stage sampling approach was employed, involving an initial Screener to collect information on household composition and interview eligibility. The only person in the household eligible to participate in the AEWR interview was the sampled adult. In the AEWR interview, information was collected about demographic characteristics, participation in a range of educational activities taken for work-related reasons in the previous 12 months, and labor force participation. Multiple attempts were made to complete interviews with persons not available at the time of selection. Interviews were conducted in both English (97 percent) and Spanish (3 percent). The AEWR sample is nationally representative of all civilian, noninstitutionalized persons in the 50 states and the District of Columbia who are ages 16 and older and not enrolled in 12th grade or below. This report is based on final data, which included 12,725 interviews.

Measuring Participation in Adult Education for Work-Related Reasons

Adult education is a diverse field defined in various ways (Cross 1984; Elias and Merriam 1984; Knowles 1980; Merriam and Caffarella 1999; Peters et al. 1991). The measurement of AEWR participation is dependent upon the specific definition of adult education used for the analysis. The approach to the study of adult education employed in the AEWR-NHES:2003 was based on prior work in

the field, including the conceptual model of Merriam and Caffarella (1999), as well as the extensive development and testing involved in prior NHES adult education cycles (1995, 2001).

The order in which questions were asked may have affected responses. Specifically, respondents were asked about their participation in a set of specific educational activities in the following order: college or university degree or post-degree certificate programs taken for work-related reasons, vocational or technical diploma or degree programs taken for work-related reasons, apprenticeship programs, work-related courses, and work-related informal learning activities. Respondents could not know the types of activities that would be addressed in later sections of the interview. As a result, they may have reported activities in early sections of the interview that may have been more appropriately reported in later sections. This phenomenon is known as an order effect. In this report, activities are classified according to the way in which they were reported.

Measure of Participation in Any Work-Related Formal Adult Education

The composite measure of participation in formal adult education includes those who took part in one or more of the following in the previous 12 months: college or university degree or certificate programs taken for work-related reasons, technical diploma or degree programs taken for work-related reasons, apprenticeships to earn journeyman status in a trade or craft, or work-related courses that had an instructor.

Measure of Participation in Any Work-Related Informal Learning

A composite measure of participation in work-related informal learning includes those who took part in one or more of the following in the previous 12 months: on-the-job demonstrations of equipment, techniques, or procedures by a supervisor or coworker; receiving other supervised training or mentoring on the job; self-paced study using books, procedures manuals, audiotapes, or videos; self-paced study using computer-based software tutorials, including CD-ROMs or from the Internet; attendance at brown-bag or informal presentations; and attendance at conferences, trade shows, or conventions related to one's work or career. Only those adults employed in the past year were asked about on-the-job demonstrations and supervised training or mentoring on the job. In creating the composite measure, those who did not work in the past 12 months were assumed to have negative response to those items.

Definition of Occupational Groups

Occupational groups were derived from the NHES variable FSOC, the final NHES occupation coding scheme that uses a set of 22 categories aggregated from Standard Occupational Classification (SOC) categories (see Hagedorn et al. 2003 for information on FSOC and how it was coded). For this report, these 22 occupation categories were classified into three groups: 1) professional or managerial, 2) service, sales, or support, and 3) the trades. The professional or managerial group consisted of the following occupations:

- executive, administrative, and managerial occupations
- engineers, surveyors, and architects
- natural scientists and mathematicians
- social scientists, social workers, religious workers, and lawyers
- teachers: college, university, and other postsecondary institutions; counselors, librarians, and archivists
- teachers, except postsecondary institutions
- health diagnosing and treating practitioners
- registered nurses, pharmacists, dietitians, therapists, and physician's assistants
- writers, artists, entertainers, and athletes
- health technologists and technicians

The service, sales, or support group consisted of the following:

- technologists and technicians, except health
- marketing and sales occupations
- administrative support occupations, including clerical
- service occupations
- miscellaneous occupations

The trades consisted of the following:

- agricultural, forestry, and fishing occupations
- mechanics and repairers
- construction and extractive occupations
- precision production occupations
- production working occupations
- transportation and material moving occupations
- handlers, equipment cleaners, helpers, and laborers

Data Reliability

Estimates produced using data from NHES:2003 are subject to two types of error, sampling and nonsampling errors. Nonsampling errors are errors made in the collection and processing of data. Sampling errors occur because the data are collected from a sample rather than the whole population.

Nonsampling Errors

Nonsampling error is the term used to describe variations in the estimates that may be caused by population coverage limitations and data collection, processing, and reporting procedures. The sources of nonsampling errors are typically problems like unit and item nonresponse, the differences in respondents' interpretations of the meaning of the questions, response differences related to the particular time the survey was conducted, and mistakes in data preparation. Efforts were made to minimize nonsampling error through cognitive testing in the survey design stage, a two-stage field test of the survey, and online data edits and post-interview edits.

An important source of nonsampling error for a telephone survey is the failure to include persons who do not live in households with telephones. This is particularly problematic in RDD surveys because so little is known about the sampled telephone numbers with which contact has not been made. In 1999, 95 percent of all adults ages 16 and older lived in households with telephones (U.S. Department of

Commerce 1999). As discussed below, estimation weights were used to help reduce the bias in the estimates associated with excluding the 5 percent of adults who do not live in households with telephones.

Response Rates

In NHES:2003, Screeners were completed with 32,049 households, with a weighted Screener unit response rate of 65 percent. For AEWR-NHES:2003, 12,725 of the 16,004 sampled adults completed the AEWR survey, a weighted unit response rate of 76 percent. Thus, the overall unit response rate for the AEWR survey was 49 percent (the product of the Screener unit response rate and the AEWR unit response rate). Due to this relatively low overall unit response rate, estimates from the NHES:2003 AEWR survey are subject to potential nonresponse bias. That is, the failure of some persons or households in the sample to respond to the survey leaves open the possibility that the population that did not respond might have different characteristics than the population that did respond. Previous nonresponse bias analyses conducted for NHES:1999, which had similar response rates for the same population covered by NHES:2003, did not reveal significant bias (Nolin et al. 2000). A unit nonresponse bias analysis was also undertaken for NHES:2003 (Hagedorn et al. forthcoming) and showed no evidence of bias in estimates from the AEWR survey.

Item nonresponse (i.e., the failure to complete some items in an otherwise completed interview) was very low for most items in AEWR. The item response rates for most variables included in this report are 97 percent or higher. The exceptions are items associated with credit hours or classroom instruction hours (with item response rates of 71 to 90 percent), and household income (with an item response rate of 80 percent). Items with missing data were imputed using a hot-deck procedure (Rao and Shao 1992) in which cells are formed that contain cases with similar characteristics (based on educational attainment, age, race/ethnicity, and household income range) and a donor value is used to impute the missing value. The estimates included in this report are based on the imputed data.

Sampling Errors

The sample of telephone households selected for NHES:2003 is just one of many possible samples that could have been selected. Therefore, estimates produced from this sample may differ from estimates that would have been produced from other samples. This type of variability is called sampling error because it arises from using a sample of households with telephones, rather than having surveyed all households with telephones.

The standard error is a measure of the variability due to sampling when estimating a statistic. Standard errors can be used as a measure of the precision expected from a particular sample. The probability that a sample estimate would differ from the population parameter obtained from a complete census count by less than 1 standard error is about 68 percent. The chance that the difference would be less than 1.65 standard errors is about 90 percent, and that the difference would be less than 1.96 standard errors, about 95 percent.

Standard errors for all of the estimates are presented in the tables. These standard errors can be used to produce confidence intervals. For example, an estimated 40 percent of adults participated in some type of formal adult education for work-related reasons in the previous 12 months, and this figure has an estimated standard error of 0.5 percent. Therefore, the estimated 95 percent confidence interval for this statistic is approximately 39 to 41 percent (40 ± 1.96 (0.5)). If the processes of selecting a sample, collecting the data, and constructing the confidence interval were repeated, it would be expected that in 95 out of 100 samples from the same population, the confidence interval would contain the true participation rate.

Estimation Weights and Variance Estimation

All of the estimates in this report are based on weighting the observations using the probabilities of selection of the respondents and other adjustments to partially account for nonresponse and coverage bias. Weights were developed to produce unbiased and consistent estimates of national totals. In accounting for the probabilities of selection, the weights account for the fact that a household with more than one telephone number has a greater chance of being selected than a household with a single telephone number. These selection weights are then adjusted for nonresponse; that is, the weights of persons who did not respond to the AEWR survey are redistributed (through a ratio adjustment) to persons with similar characteristics who did respond. The nonresponse adjustment reduces bias due to nonresponse to the AEWR survey. Finally, these nonresponse-adjusted weights are calibrated to external population totals from the Current Population Survey (CPS), using a raking adjustment. This raking adjustment aligns estimated totals from the AEWR survey to the CPS totals for the characteristics and categories used in the adjustment. It also reduces biases due to undercoverage (e.g., noncoverage of adults in households without telephones) and nonresponse.

In addition to properly weighting the responses, special procedures for estimating the statistical significance of the estimates were employed because the NHES:2003 data were collected using a complex

sample design. Complex sample designs result in data that violate some of the assumptions that are normally made when assessing the statistical significance of results from a simple random sample. Frequently, the standard errors of the estimates from these surveys are larger than would be expected if the sample was a simple random sample and the observations were independent and identically distributed random variables. The estimates and standard errors presented in this report were produced using WesVar Complex Samples software and a jackknife replication procedure. WesVar computes estimates and replicate variance estimates that reflect complex sampling and estimation procedures.

Statistical Tests for Bivariate Analyses. The tests of significance used in the bivariate analyses are based on Student's *t* statistics for the comparison of subgroup characteristics. An alpha level of .05 was employed for all tests of significance. To test the differences between estimates, standard errors derived by jackknife replication methods were used to appropriately reflect the complex sample design and estimation procedures. To test for a difference between two independent subgroups in the population in terms of the proportion having a particular characteristic, say P_1 *versus* P_2, the test statistic is computed as:

$$T = \frac{p_2 - p_1}{\sqrt{[s.e.(p_1)]^2 + [s.e.(p_2)]^2}},$$

where p_i is the estimated proportion of subgroup i (i = 1, 2) having the particular characteristic and $s.e.(p_i)$ is the standard error of that estimate.

Statistical Tests for Multivariate Analyses. To determine the association between two variables, tests such as Student's *t* can be used. However, when examining the associations among more than two variables, multivariate statistical tests must be employed. Multivariate tests allow researchers to examine the effect of an independent variable on a dependent variable while controlling simultaneously for other variables. For instance, researchers can look at the effect of income on participation in adult education activities while controlling for education level and occupation.

When the dependent variable is continuous, a common multiple regression technique is ordinary least squares (OLS) regression. However, when the dependent variable is dichotomous, a more appropriate technique is logistic regression (Gujarati 1988). In logistic regression, the binary nature of the dependent variable requires a different interpretation of results than is the case with OLS regression. Specifically, the regression coefficients for the independent variables indicate the change in the natural

log of the odds (the "log odds") of the presence of the characteristic (event) being analyzed. The odds of any event is defined as the probability of the event divided by the probability of the absence of the event:

$$\frac{P(event)}{1 - P(event)}$$

Odds can be computed for any proportion. For example, in table 2, the percentage of adults employed within the past year who participated in any formal work-related adult education was 52 percent. The odds of participating in formal adult education for an adult who worked within the past year is computed as 0.52/(1-0.52) = 1.08. The odds of an adult not employed within the past year participating in any formal adult education was 0.11/([1-0.11)] = .12.

A comparison of odds is often made using an "odds ratio." The odds ratio of participation by adults employed within the past year vs. adults not employed within the past year is 1.08/.12 = 9. This means that the odds of participating in any formal adult education were 9 times higher for those adults who worked within the past year than for those who did not work within the past year.

The results of logistic regression are often discussed in terms of the odds ratios. A logistic regression equation is often expressed as the natural log of the odds:

$$Log[\frac{P(event)}{1 - P(event)}] = \beta_0 + \beta_1 X_1 + ... + \beta_p X_p$$

where the subscript p represents the number of independent variables. The equation can also be equivalently expressed as the odds:

$$\frac{P(event)}{1 - P(event)} = e^{\beta_0 + \beta_1 X_1 + ... + \beta_p X_p}$$

In the analyses for this report, discussions focus on the direction of the associations between the independent and dependent variables, rather than the estimated odds ratio or log odds. Thus, in tables 3 and 8 and in the tables of appendices A and B, the logistic regression coefficients are given. The interpretation of the direction of the association between the independent and dependent variables from logistic regression is similar to that for OLS regression. If a statistically significant logistic regression coefficient is greater than zero, the variable is associated with an increase of the odds of the event. If a statistically significant logistic regression coefficient is less than zero, the variable is associated with a

decrease in the odds of the event. If a regression coefficient is not statistically significantly different than zero, then no association with the odds of the event is observed.

Interpreting the regression coefficients for a categorical independent variable is always done in contrast to the reference category. For example, in table 3, there are two categories for sex: Male and Female. Female adults are the reference category for this variable. That is, the regression coefficient for the Male category is meaningful in comparison to Female. Again, using the same example from table 3, the significant coefficient -0.15 for Male indicates that men were less likely to participate in any formal work-related adult education than were women.

Also given in the tables with the regression parameters and odds ratios are effect sizes computed by dividing the natural log (ln) of the odds ratio by 1.81, the standard deviation of the standard logistic distribution. See Chinn (2000) for additional discussion of this procedure. As noted in the body of the report, general guidelines suggest that effect sizes of less than 0.2 are considered to be negligible (Cohen, 1988, 1992). However, little research has been published on optimal effect size thresholds for logistic regression parameters, and substantively, it is unclear what would constitute a small effect in the context of adult education for work-related reasons. Effect sizes are presented for the purpose of providing readers with a rough sense of the magnitude of the relationships between the independent and dependent variables presented in the report. Consider the example above of a significant regression parameter of -0.15 for Male—the effect size for this parameter is -0.083. While the finding meets the statistical significance threshold of .05, the effect size falls below what is generally considered to be a small effect (0.2).

For this report, tolerance tests for the models were developed following Menard (1995), and no problems of multicolinearity were detected. For more detail about logistic regression analysis, see Agresti (1990), Menard (1995), and Hosmer and Lemeshow (1989). For specific information about the use of replication methods to fit logistic regression analysis to complex sample survey data, see Mohadjer, Yansaneh, and Brick (1996).

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Appendix A
Formal Adult Education
Logistic Regression Tables

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Table A1. Results of logistic regression analysis of adults' characteristics and work-related participation in college degree and post-degree certificate programs: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	-2.09*	0.109	0.12	-1.171
45 to 64 years	-3.62*	0.133	0.03	-1.937
65 years or older	-6.49*	0.481	0.00	†
Sex (Reference category: Female)				
Male	-0.18	0.100	0.84	-0.096
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	-0.19	0.130	0.83	-0.103
Hispanic	0.56*	0.180	1.75	0.309
Asian or Pacific Islander, non-Hispanic	-0.11	0.215	0.90	-0.058
Other race, non-Hispanic	-0.58*	0.283	0.56	-0.320
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-6.15*	1.759	0.00	†
High school diploma/equivalent	-1.80*	0.174	0.17	-0.979
Some college/vocational/associate's degree	-0.44*	0.159	0.65	-0.238
Bachelor's degree	-0.72*	0.156	0.48	-0.406
Household income (Reference category: $100,001 or more)				
$25,000 or less	0.34*	0.158	1.40	0.186
$25,001 to $50,000	0.31*	0.139	1.36	0.170
$50,001 to $75,000	0.26	0.154	1.30	0.145
$75,001 to $100,000	0.07	0.184	1.08	0.043
Months worked in past year (Reference category: 12 months)				
6 to 11 months	0.39*	0.112	1.48	0.217
Less than 6 months[1]	1.02*	0.178	2.78	0.565
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.30*	0.117	0.74	-0.166
Trades	-0.76*	0.160	0.47	-0.417
Not employed within past 12 months	-1.10*	0.218	0.33	-0.613

* $p < .05$.

† Not applicable. Effect size cannot be calculated for an odds ratio of 0.00.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table A2. Results of logistic regression analysis of adults' characteristics and participation in work-related courses: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	0.11	0.115	1.12	0.063
45 to 64 years	0.00	0.129	1.00	0.000
65 years or older	-0.86*	0.138	0.42	-0.479
Sex (Reference category: Female)				
Male	-0.18*	0.070	0.84	-0.096
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	-0.13	0.094	0.88	-0.071
Hispanic	0.05	0.134	1.06	0.032
Asian or Pacific Islander, non-Hispanic	0.25	0.174	1.28	0.136
Other race, non-Hispanic	-0.11	0.184	0.90	-0.058
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.59*	0.181	0.20	-0.889
High school diploma/equivalent	-0.97*	0.102	0.38	-0.535
Some college/vocational/associate's degree	-0.61*	0.092	0.54	-0.340
Bachelor's degree	-0.24*	0.090	0.79	-0.130
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.73*	0.117	0.48	-0.406
$25,001 to $50,000	-0.25*	0.085	0.78	-0.137
$50,001 to $75,000	-0.05	0.095	0.95	-0.028
$75,001 to $100,000	0.13	0.121	1.14	0.072
Months worked in past year (Reference category: 12 months)				
6 to 11 months	-0.10	0.080	0.90	-0.058
Less than 6 months[1]	-0.63*	0.176	0.53	-0.351
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.46*	0.073	0.63	-0.255
Trades	-0.88*	0.106	0.42	-0.479
Not employed within past 12 months	-1.72*	0.203	0.18	-0.947

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table A3. Results of logistic regression analysis of adults' characteristics and work-related participation in vocational programs: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.02	0.203	0.98	-0.011
45 to 64 years	-0.55*	0.244	0.58	-0.301
65 years or older	-2.27*	0.623	0.10	-1.272
Sex (Reference category: Female)				
Male	0.28	0.169	1.32	0.153
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	-0.40	0.241	0.67	-0.221
Hispanic	-0.28	0.203	0.76	-0.152
Asian or Pacific Islander, non-Hispanic	0.67	0.472	1.96	0.372
Other race, non-Hispanic	-0.33	0.399	0.72	-0.181
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.89*	0.597	0.15	-1.048
High school diploma/equivalent	0.03	0.305	1.03	0.016
Some college/vocational/associate's degree	0.54	0.275	1.72	0.300
Bachelor's degree	0.18	0.345	1.20	0.101
Household income (Reference category: $100,001 or more)				
$25,000 or less	0.09	0.322	1.09	0.048
$25,001 to $50,000	0.57	0.314	1.78	0.319
$50,001 to $75,000	0.32	0.266	1.38	0.178
$75,001 to $100,000	0.32	0.326	1.38	0.178
Months worked in past year (Reference category: 12 months)				
6 to 11 months	0.30	0.219	1.35	0.166
Less than 6 months[1]	0.63*	0.283	1.88	0.349
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	0.62*	0.233	1.87	0.346
Trades	0.39	0.242	1.48	0.217
Not employed within past 12 months	-0.45	0.393	0.64	-0.247

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table A4. Results of logistic regression analysis of adults' characteristics and work-related participation in apprenticeships: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.62*	0.305	0.54	-0.340
45 to 64 years	-2.20*	0.362	0.11	-1.219
65 years or older	-3.61	9.341	0.03	-1.937
Sex (Reference category: Female)				
Male	0.43	0.260	1.53	0.235
Race/ethnicity (Reference category: White)				
Black, non-Hispanic	-0.01	0.355	0.99	-0.006
Hispanic	-0.02	0.354	0.98	-0.011
Asian or Pacific Islander, non-Hispanic	-0.67	1.450	0.51	-0.372
Other race, non-Hispanic	0.95	0.638	2.59	0.526
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	0.63	0.725	1.87	0.346
High school diploma/equivalent	0.02	0.607	1.02	0.011
Some college/vocational/associate's degree	0.65	0.532	1.91	0.358
Bachelor's degree	-0.35	0.579	0.71	-0.189
Household income (Reference category: $100,001 or more)				
$25,000 or less	-1.01	0.657	0.36	-0.564
$25,001 to $50,000	-0.42	0.626	0.66	-0.230
$50,001 to $75,000	0.13	0.547	1.14	0.072
$75,001 to $100,000	-0.99	0.665	0.37	-0.549
Months worked in past year (Reference category: 12 months)				
6 to 11 months	-0.18	0.281	0.84	-0.096
Less than 6 months[1]	-0.55	0.592	0.58	-0.301
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.13	0.438	0.88	-0.071
Trades	1.30*	0.502	3.66	0.717
Not employed within past 12 months	0.47	0.774	1.59	0.256

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Appendix B
Informal Adult Education
Logistic Regression Tables

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Table B1. Results of logistic regression analysis of adults' characteristics and work-related participation in on-the-job demonstrations: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.62*	0.108	0.54	-0.340
45 to 64 years	-0.97*	0.121	0.38	-0.535
65 years or older	-1.32*	0.148	0.27	-0.723
Sex (Reference category: Female)				
Male	-0.02	0.067	0.98	-0.011
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	0.05	0.103	1.05	0.027
Hispanic	-0.42*	0.107	0.66	-0.230
Asian or Pacific Islander, non-Hispanic	-0.42*	0.170	0.65	-0.238
Other race, non-Hispanic	-0.52*	0.242	0.59	-0.292
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-0.51*	0.156	0.60	-0.282
High school diploma/equivalent	-0.23*	0.112	0.79	-0.130
Some college/vocational/associate's degree	-0.12	0.100	0.89	-0.064
Bachelor's degree	0.01	0.094	1.01	0.005
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.23	0.123	0.80	-0.123
$25,001 to $50,000	-0.09	0.112	0.91	-0.052
$50,001 to $75,000	-0.10	0.098	0.91	-0.052
$75,001 to $100,000	0.04	0.106	1.04	0.022
Months worked in past year (Reference category: 12 months)				
6 to 11 months	0.15	0.083	1.16	0.082
Less than 6 months[1]	-0.34*	0.144	0.71	-0.189
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.02	0.079	0.98	-0.011
Trades	-0.14	0.119	0.87	-0.077
Not employed within past 12 months	†	†	†	†

† Not applicable.

* $p < .05$.

[1] Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table B2. Results of logistic regression analysis of adults' characteristics and work-related supervised training or mentoring: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.66*	0.110	0.52	-0.361
45 to 64 years	-1.04*	0.115	0.35	-0.580
65 years or older	-1.72*	0.138	0.18	-0.947
Sex (Reference category: Female)				
Male	-0.04	0.066	0.96	-0.023
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	0.06	0.107	1.05	0.032
Hispanic	-0.29*	0.108	0.66	-0.159
Asian or Pacific Islander, non-Hispanic	-0.40*	0.163	0.65	-0.221
Other race, non-Hispanic	-0.14	0.288	0.59	-0.077
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-0.87*	0.186	0.42	-0.479
High school diploma/equivalent	-0.32*	0.118	0.72	-0.181
Some college/vocational/associate's degree	-0.07	0.104	0.93	-0.040
Bachelor's degree	0.07	0.098	1.07	0.037
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.27*	0.118	0.76	-0.152
$25,001 to $50,000	-0.02	0.103	0.98	-0.011
$50,001 to $75,000	0.01	0.092	1.01	0.005
$75,001 to $100,000	0.02	0.101	1.02	0.011
Months worked in past year (Reference category: 12 months)				
6 to 11 months	0.11	0.074	1.12	0.063
Less than 6 months[1]	-0.24	0.157	0.78	-0.137
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.03	0.072	0.97	-0.017
Trades	-0.17	0.111	0.84	-0.096
Not employed within past 12 months	†	†	†	†

† Not applicable.

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table B3. Results of logistic regression analysis of adults' characteristics and work-related participation in self-paced study using books, procedures manuals, audiotapes, or videos: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	-0.11	0.097	0.90	-0.058
45 to 64 years	-0.25*	0.095	0.78	-0.137
65 years or older	-0.91*	0.112	0.40	-0.506
Sex (Reference category: Female)				
Male	0.11	0.058	1.12	0.063
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	0.31*	0.105	1.37	0.174
Hispanic	0.22*	0.102	1.25	0.123
Asian or Pacific Islander, non-Hispanic	0.46*	0.164	1.58	0.253
Other race, non-Hispanic	0.03	0.235	1.03	0.016
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-0.78*	0.156	0.46	-0.429
High school diploma/equivalent	-0.49*	0.104	0.61	-0.273
Some college/vocational/associate's degree	-0.22*	0.105	0.80	-0.123
Bachelor's degree	-0.20*	0.095	0.81	-0.116
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.10	0.103	0.91	-0.052
$25,001 to $50,000	0.03	0.093	1.03	0.016
$50,001 to $75,000	-0.10	0.094	0.91	-0.052
$75,001 to $100,000	-0.04	0.109	0.96	-0.023
Months worked in past year (Reference category: 12 months)				
6 to 11 months	-0.17*	0.066	0.84	-0.096
Less than 6 months[1]	-0.38*	0.136	0.68	-0.213
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.25*	0.080	0.78	-0.137
Trades	-0.26*	0.096	0.77	-0.144
Not employed within past 12 months	-1.09*	0.167	0.34	-0.596

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table B4. Results of logistic regression analysis of adults' characteristics and work-related attendance at conferences, trade shows, or conventions: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	0.06	0.124	1.06	0.032
45 to 64 years	0.04	0.125	1.04	0.022
65 years or older	-0.54*	0.148	0.59	-0.292
Sex (Reference category: Female)				
Male	0.31*	0.068	1.36	0.170
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	0.10	0.126	1.11	0.058
Hispanic	0.10	0.121	1.11	0.058
Asian or Pacific Islander, non-Hispanic	0.15	0.175	1.16	0.082
Other race, non-Hispanic	0.07	0.188	1.07	0.037
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.43*	0.184	0.24	-0.788
High school diploma/equivalent	-1.12*	0.105	0.33	-0.613
Some college/vocational/associate's degree	-0.76*	0.091	0.47	-0.417
Bachelor's degree	-0.55*	0.084	0.58	-0.301
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.63*	0.105	0.54	-0.340
$25,001 to $50,000	-0.49*	0.090	0.61	-0.273
$50,001 to $75,000	-0.52*	0.097	0.60	-0.282
$75,001 to $100,000	-0.26*	0.104	0.77	-0.144
Months worked in past year (Reference category: 12 months)				
6 to 11 months	-0.14	0.089	0.87	-0.077
Less than 6 months[1]	-0.70*	0.153	0.50	-0.383
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.63*	0.063	0.53	-0.351
Trades	-0.81*	0.122	0.44	-0.454
Not employed within past 12 months	-1.09*	0.156	0.34	-0.596

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table B5. Results of logistic regression analysis of adults' characteristics and work-related attendance at brown-bag or informal presentations: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	0.12	0.135	1.13	0.068
45 to 64 years	0.14	0.153	1.15	0.077
65 years or older	-0.70*	0.175	0.50	-0.383
Sex (Reference category: Female)				
Male	0.09	0.064	1.10	0.053
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	0.06	0.099	1.07	0.037
Hispanic	-0.23	0.131	0.79	-0.130
Asian or Pacific Islander, non-Hispanic	0.16	0.159	1.18	0.091
Other race, non-Hispanic	-0.10	0.203	0.90	-0.058
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.78*	0.239	0.17	-0.979
High school diploma/equivalent	-1.04*	0.112	0.35	-0.580
Some college/vocational/associate's degree	-0.66*	0.088	0.52	-0.361
Bachelor's degree	-0.41*	0.096	0.66	-0.230
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.56*	0.107	0.57	-0.311
$25,001 to $50,000	-0.27*	0.103	0.77	-0.144
$50,001 to $75,000	-0.26*	0.093	0.77	-0.144
$75,001 to $100,000	-0.03	0.111	0.97	-0.017
Months worked in past year (Reference category: 12 months)				
6 to 11 months	-0.24*	0.089	0.79	-0.130
Less than 6 months[1]	-0.48*	0.165	0.62	-0.264
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.44*	0.077	0.64	-0.247
Trades	-0.93*	0.108	0.40	-0.506
Not employed within past 12 months	-1.45*	0.184	0.24	-0.788

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.

Table B6. Results of logistic regression analysis of adults' characteristics and work-related participation in self-paced study using computer-based software tutorials: 2002–03

Adult characteristic	Parameter estimate	s.e.	Odds ratio	Effect size
Age (Reference category: 24 years or younger)				
25 to 44 years	0.12	0.122	1.13	0.068
45 to 64 years	0.07	0.121	1.07	0.037
65 years or older	-0.95*	0.166	0.39	-0.520
Sex (Reference category: Female)				
Male	0.25*	0.063	1.29	0.141
Race/ethnicity (Reference category: White, non-Hispanic)				
Black, non-Hispanic	0.16	0.104	1.17	0.087
Hispanic	0.07	0.110	1.07	0.037
Asian or Pacific Islander, non-Hispanic	0.60*	0.149	1.83	0.334
Other race, non-Hispanic	0.38	0.207	1.46	0.209
Highest education completed (Reference category: Graduate or professional degree)				
Less than a high school diploma/equivalent	-1.21*	0.166	0.30	-0.665
High school diploma/equivalent	-0.75*	0.092	0.47	-0.417
Some college/vocational/associate's degree	-0.28*	0.087	0.76	-0.152
Bachelor's degree	-0.05	0.084	0.95	-0.028
Household income (Reference category: $100,001 or more)				
$25,000 or less	-0.63*	0.100	0.53	-0.351
$25,001 to $50,000	-0.36*	0.086	0.70	-0.197
$50,001 to $75,000	-0.21*	0.083	0.81	-0.116
$75,001 to $100,000	-0.09	0.100	0.91	-0.052
Months worked in past year (Reference category: 12 months)				
6 to 11 months	-0.23*	0.076	0.80	-0.123
Less than 6 months[1]	-0.35*	0.155	0.71	-0.189
Occupational group (Reference category: Professional or managerial)				
Service, sales, or support	-0.23*	0.083	0.79	-0.130
Trades	-0.82*	0.126	0.44	-0.454
Not employed within past 12 months	-0.61*	0.185	0.55	-0.330

* $p < .05$.

[1]Includes adults not employed in the previous 12 months.

NOTE: s.e. is standard error.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Adult Education for Work-Related Reasons Survey of the 2003 National Household Education Surveys Program.