

# Employment of Persons with Disabilities in Information Technology Jobs: Literature Review for "IT Works"

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## Abstract

This article reviews relevant literature on the labor pool of qualified individuals with disabilities and employment in information technology (IT) sector jobs. First, the article reviews the empirical literature on barriers to employment in IT for persons with disabilities. The examination is then extended to studies of barriers to employment for individuals with disabilities in other employment sectors. Findings illustrate the limited experiences that IT and non-IT companies have in employing and accommodating employees with disabilities. Implications are discussed for enhancing the employment of qualified workers with disabilities in IT through research, education, training, and mentoring programs.

## Introduction: The IT Industry

### Demand for Qualified Workers

According to the U.S. Department of Commerce (Henry et al., 1999), by 2006 almost half of workers in the U.S. would work in industries that either produce information technology (IT) products or use IT products extensively. The Bureau of Labor Statistics (December 2001) projected that eight of the ten fastest growing occupations between 2000 and 2010 would require significant computer skills.

Even with revised projections because of a downswing in the overall U.S. economy, demand for IT workers continued to exceed supply. Based on a survey of 532 IT hiring managers, ITAA (the Information Technology Association of America) predicted a shortfall of almost 600,000 skilled workers in 2002—positions that would go unfilled because of a lack of qualified applicants.

ITAA commissioned studies of hiring managers at IT and non-IT firms in 2000, 2001, and 2002. IT employees accounted for 9.9 million employees in 2002, 10.4 million in 2001, and 10 million in 2000. Demand for new IT employees was estimated at 1.6 million for 2000, 0.9 million for 2001, and 1.1 million for 2002. Of those 2002 positions, more than half (52.6%) were expected to go unfilled because managers would be unable to find qualified employees.

### Labor Force Participation of Individuals with Disabilities

A corresponding employment-related need affects the majority of individuals with disabilities. Despite nearly a decade of Harris polls citing that more than two-thirds of individuals with disabilities who are not employed say they would prefer to work, the 2000 Harris poll found that only 32% of individuals with disabilities between the ages of 18 and 64 work full- or part-time, compared with 81% of people without disabilities—a difference of 49%.

Even with years of sustained economic growth, people with disabilities remain poorer than the rest of the population and continue to face overwhelming discrimination in the workplace. Depending on age and definition of disability, the poverty rates of people with disabilities range from 50 to 300% higher than the general population. More than one-third (34%) of people with disabilities live on a household income of less than \$15,000 per year, compared with 12% of people without disabilities.

Poverty is significantly negatively correlated with the ability to work. Although one in ten working-age adults with no work limitations live in poverty, the rate is three times greater for those with some work limitations, and rises to 38.3% for working-age adults with a "severe disability." The poverty rate among full-time, year-round workers with disabilities is still 60% higher than among their counterparts with no disabilities.

Significant income discrepancies exist between Americans with and without disabilities, regardless of gender and age. Those with disabilities who are employed earn only 72% on average of what workers without disabilities earn annually. Two of every five Americans with disabilities report that their disability has prevented them from working.

The barriers people with disabilities face in finding satisfactory employment are numerous. The most significant barriers include low pay (47%), poor access to public facilities and transportation (27%), and inadequate health insurance (23%). Approximately two-thirds (67%) of adults with disabilities report their disability has prevented them from "reaching their full abilities as a person."

The National Science Foundation (2002) estimated that individuals with disabilities account for only 5.8% of the science and engineering labor force, despite the fact that they make up at least 20% of the U.S. population.

## **Barriers to Employment Specific to IT**

In examining factors that affect the number of individuals with disabilities considering IT careers, the ITAA Task Force on Recruiting Underrepresented Groups reviewed the literature and identified five barriers that may apply to underrepresented groups, including people with disabilities:

- The image of the IT field as the domain of the highly educated and technical elite
- Lack of encouragement and appropriate role models
- Lack of opportunity and access to accessible technology and computers
- Lack of appropriate skills and challenges from rapid technological change
- Broader socioeconomic issues, including limited access to educational resources in under-resourced or rural areas

One study specific to employment of individuals with disabilities in IT jobs was identified: From Promising Practices to Promising Futures: Job Training in Information Technology for Disadvantaged Adults (Chapple et al., 2000). This study examined 26 IT training programs in six high-technology regions and identified five common factors among successful programs:

- Provide soft skills training (motivation, flexibility, and social interaction) in the form of job search techniques and peer support groups
- Place individuals in jobs related to their training
- Target jobs with a career trajectory and enable trainees to obtain additional skills while working
- Pay careful attention to the quality of teachers, particularly their links to the IT industry
- Reshape curricula and maintain state-of-the-art equipment to keep pace with changing industry needs

## **Empirical Studies of Barriers to Employment for Individuals with Disabilities**

The review expanded to include empirical studies of employers' attitudes about employees with disabilities, focusing on attitudinal factors that serve as facilitators and barriers to hiring, retention, and advancement. The review was limited to empirical studies published after the effective implementation of the ADA in 1992.

Twenty empirical studies of employers since the 1992 initiation of the ADA were identified. No studies specifically surveyed IT firms or inquired about IT positions in non-IT firms. Almost half of the studies (nine) used mail surveys; four used telephone interviews or surveys; four used in-person interviews; and one each used a record review, focus group study, and experimental study. Sample sizes varied from nine employers to 418 employers.

## **Themes from Post-ADA Empirical Studies and Implications for IT**

### **Theme 1: Positive Employment Experiences**

Five empirical studies report that employers' positive experiences hiring or working with employees with disabilities are associated with more favorable attitudes about employing other individuals with disabilities. Mail surveys of Fortune 500 companies and New York businesses find that employers express generally favorable attitudes about the employability of persons with severe disabilities. Employers who had hired and worked with individuals with disabilities report more favorable attitudes than employers without these experiences.

These findings are confirmed in studies of specific types of disability. Employers who had hired individuals with mental disorders had more favorable attitudes about the employment of individuals with these types of disability than employers without those experiences. Employers with specific policies about hiring individuals with disabilities also expressed more favorable attitudes.

Employer lack of knowledge may be particularly profound for less obvious disabilities. Interviews by Price and Gerber (2001) revealed that employers' knowledge about learning disabilities was so limited that they often confused learning disabilities with mental retardation or Attention Deficit Disorder. They also perceived their ADA responsibilities to be primarily for accommodating physical disabilities.

## **Theme 2: Concerns about Providing Reasonable Accommodations**

Five studies suggest that a barrier to employment of individuals with disabilities is employers' concerns about the types and costs of workplace accommodations. In telephone interviews, employers reported that their greatest concerns about the ADA were with restructuring jobs and accommodating workers in a cost-effective way.

Research by Roessler and Sumner (1997) shed light on what accommodations employers are willing to provide. The majority of respondents were willing to pay between \$501 and \$5,000 for accommodations and considered the following to be reasonable:

- Flexible scheduling
- Purchasing assistive or adaptive equipment
- Special parking
- Physical changes to the office space
- Temporary reassignment of duties to a colleague
- Physical modification of the facility
- Job sharing

Employers were less likely to consider as "reasonable" providing support persons (such as readers, interpreters, or personal attendants), transportation to work, or allowing employees to work at home.

A lack of knowledge about appropriate accommodations may be fueling employers' fears about costs. Studies reveal that most accommodations are moderate, often costing less than \$500.

## **Theme 3: Hierarchy of Disability Prejudice**

A third theme is employers' responses by type of disability. Scheid's (1999) telephone surveys asked employers to rate how uncomfortable they would be with disabled employees:

- History of substance abuse: 68.9% of employers uncomfortable
- Currently taking anti-psychotic medication: 67.1%
- Previous hospitalization in a mental facility: 52.1%
- In treatment for depression: 43.8%
- Learning disabilities: 24.3%
- Physical disabilities: 16.2%

Individuals with physical disabilities appear to be the least subject to prejudice. Employers rated a hypothetical applicant with a physical disability (paraplegia) more favorably than applicants with hidden disabilities (epilepsy or depression), and even more favorably than an applicant who did not disclose any disabling conditions.

## Discussion

### Challenges Ahead

Limited experiences with disabled employees will continue to confront qualified applicants in the IT industry. Because individuals with disabilities represent less than 6% of the science and engineering labor force, it is unlikely that IT and non-IT companies have significant experience working with or accommodating employees with disabilities. Identifying individuals with disabilities in the industry as role models and spokespersons is one recommended tactic.

Research suggests that employers have more favorable attitudes about accommodations to retain employees rather than for new hires. IT employees and applicants face challenges regarding the types of accommodation employers will consider reasonable. Although employers may be willing to allow flexible scheduling and pay for assistive technology, they are less likely to agree to telework, telecommuting, or providing support persons.

Individuals with psychiatric disorders or hidden disabilities face different and sometimes more difficult barriers than those with obvious physical disabilities. IT employers need to be educated about appropriate accommodations for qualified workers with these types of disability.

### The "IT Works" Demonstration Project

The Law, Health Policy, and Disability Center (LHPDC) at the University of Iowa, under a grant from the U.S. Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR), established the "IT Works" project to begin filling the research gap.

IT Works explores the interfaces among IT training programs, individuals with disabilities who participate in these programs, and employers who have hired individuals with disabilities for IT jobs. The project is guided by a diverse expert panel bringing together representatives from education and training sectors, employers and IT industry representatives, individuals with disabilities working in IT, and representatives of federally funded IT training projects.

A primary goal of IT Works is to identify barriers and seek solutions to enhance hiring, advancement, and retention of individuals with disabilities in the IT workforce. The theoretical model for the project identifies four categories of predictor variables:

- Environmental factors: accessible transportation, health care provisions, telecommuting possibilities, and economic forces
- Organizational factors: corporate culture, accommodations provided, and availability of assistive and accessible technology
- Attitudinal factors: individual attitudes of managers, co-workers, and hiring staff

- Individual characteristics: nature, type, or severity of disability; health status; age; gender; ethnicity; wealth; family supports; and education

Research questions addressed by IT Works include:

- Is the availability of IT in an organization related to the advancement of individuals with disabilities within the organization?
- Are IT organizations that are aware of issues related to employment of individuals with disabilities more successful in hiring, retaining, and advancing them?
- Are IT companies that provide and encourage the use of assistive and accessible technology more successful in hiring, retaining, and advancing individuals with disabilities?
- Are individual differences (disability type and severity, age, and gender) a determining factor in hiring, retaining, and advancing individuals with disabilities?
- Are IT organizations with mentoring/internship programs more successful at hiring, advancing, and retaining individuals with disabilities?

The LHPDC and ITAA also created a national awards program to honor and disseminate information about IT firms that develop strategies to enhance employment of individuals with disabilities, with six award categories: recruiting, hiring, accommodations, retention, training, and career advancement.

## Increasing Importance of IT to Persons with Disabilities

The importance of IT and computers in the workplace has significant implications for the future workforce of people with disabilities. IT accommodations help compensate for the physical limitations inherent in some disabilities—for example, voice-recognition software for those without finger dexterity, and text-to-speech software for those with severe speech impediments.

Under Section 508 of the Rehabilitation Act, government agencies are required to purchase accessible technologies for their employees with disabilities.

IT plays a role in increasing the productivity levels of people with disabilities. Lack of IT computer skills restricts occupational options. Among people with spinal cord injuries (SCIs), those who used computers prior to the SCI had more rapid returns to work. Among the employed, there was no earnings gap between computer users with and without SCIs, while non-users with SCIs earned significantly less than non-users without SCIs.

Evidence indicates that people with disabilities are less likely to be IT proficient. Less than one-quarter (23.9%) of individuals with disabilities had access to a computer at home, compared with more than half (51.7%) of individuals without disabilities. Among full-time workers, almost half (46%) of those without disabilities use computers at work, compared with one-third (35%) of those with disabilities.

The growth of IT also increases the prevalence and productivity of home-based work, which is of special benefit to people with impairments that make travel to a work site difficult. Studies confirm that people with disabilities are more likely than other workers to do work for pay at home.

Economic incentives in federal and state tax policy for the provision of IT as workplace accommodations may enhance the employment of qualified individuals. Tax credits, deductions, and other treatments influence employer behavior in connection with costs incurred. Despite this activity, no studies to date have assessed whether tax policies are accomplishing their intended purposes.

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## **Appendix: Empirical Studies of Employer Attitudes about Employees with Disabilities Published After ADA Implementation**

*Note: Instrument references: A = Schmelkin & Berkell (1989), Attitudes Toward the Employability of Persons with Severe Handicaps Scale; B = Yuker & Block (1986), Attitudes Toward Disabled Persons Scale; C = Satcher & Hendren (1991), Americans with Disabilities Act Survey; D = Kregel & Tomiyasu (1994), Scales of Employer Attitudes Toward Workers with Disabilities.*

Authors	Year	Sample (Response Rate)	Method	Instrument	Target Disability	Key Findings
Gilbride, Stensrud, and Connolly	1992	80 companies in RSA region VII with ≥200 employees (62%)	Telephone interview	10 questions about employment-related ADA issues	Not specified	<ul style="list-style-type: none"> <li>Employers' greatest concern was accommodating workers in a cost-effective way.</li> </ul>
Levy et al.	1992	341 human resource managers or vice presidents at Fortune 500 Companies (30%)	Mail survey	Instruments A; B	Severe disabilities	<ul style="list-style-type: none"> <li>Favorable attitudes about employability of persons with severe disabilities.</li> <li>More favorable attitudes expressed by participants with positive work experiences with employees with severe disabilities.</li> </ul>
Satcher and Hendren	1992	85 employers in three county area of Mississippi (34%)	Mail survey	Instrument C	Not specified	<ul style="list-style-type: none"> <li>Moderate agreement with the ADA.</li> <li>Employers agreed with employment provisions of the ADA significantly less than with transportation, telecommunications, and public services provisions.</li> </ul>
Kregel and Unger	1993	46 employers of supported employment program participants	In-person structured interview	Attitude scale and open-ended questions	Supported employment	<ul style="list-style-type: none"> <li>Employers had favorable attitudes about employment potential of supported employment program participants.</li> <li>Less favorable attitudes about their own experiences with supported employment programs, particularly regarding quality of work product.</li> </ul>
Levy et al.	1993	418 companies doing business in NY (6.2% return rate)	Mail survey	Instrument A; B	Severe disabilities	<ul style="list-style-type: none"> <li>Favorable attitudes about the employability of persons with severe disabilities.</li> </ul>

Authors	Year	Sample (Response Rate)	Method	Instrument	Target Disability	Key Findings
						<ul style="list-style-type: none"> <li>• More favorable attitudes by participants with positive experiences, and those working in government compared to profit or not-for-profit agencies.</li> </ul>
Kregel and Tomiyasu	1994	170 employers in the Richmond, VA metropolitan area (70.8%)	In-person structured interview	Instrument D	Not specified	<ul style="list-style-type: none"> <li>• Most employers had some previous experience with an employee with a disability (73%).</li> <li>• Employers had favorable attitudes about employment of individuals with disabilities.</li> <li>• Employer attitudes did not significantly correlate with number of employees, type of business, or satisfaction with prior experiences.</li> </ul>
Fabian, Luecking, and Tilson	1995	13 employers (65%) and 11 rehabilitation personnel (73%)	Focus group study	Three open-ended questions	Not specified	<ul style="list-style-type: none"> <li>• Both groups reported that negative attitudes and prejudice were the greatest barriers to job placement.</li> <li>• Employers cited lack of knowledge about disabilities and little experience working with people with disabilities.</li> <li>• Increased support from top management, role models, disability training, and more qualified applicants were cited as needed improvements.</li> </ul>
Moore and Crimando	1995	178 state chamber of commerce (48%); 164 state	Mail survey	32 questions regarding attitudes toward Title I of the ADA	Not specified	<ul style="list-style-type: none"> <li>• Chamber of commerce members believed, in contrast to rehabilitation and</li> </ul>

Authors	Year	Sample (Response Rate)	Method	Instrument	Target Disability	Key Findings
		rehabilitation association (60%); 186 state coalition for persons with disabilities (52%)				coalition members, that ADA compliance would present high costs for employers.
Walters and Baker	1995	69 employers and 31 recruiters (61%)	Mail survey	Acceptance of Individuals Scale (including B)	Not specified	<ul style="list-style-type: none"> <li>• More favorable attitudes expressed by respondents whose companies employed some full-time employees with disabilities.</li> <li>• More favorable attitudes expressed by recruiters at a job fair for individuals with disabilities.</li> </ul>
Diksa and Rogers	1996	373 employees in charge of hiring at companies (68%)	Telephone interview	Employer Attitude Questionnaire	Psychiatric disorders	<ul style="list-style-type: none"> <li>• Employers in social services expressed less concern about symptomatology affecting work than employers in other industries.</li> <li>• More favorable attitudes by employers who had hired an individual with a mental disorder and at companies with policies about hiring persons with disabilities.</li> </ul>
Dowler and Walls	1996	392 job accommodation cases from JAN concerning workers with hearing impairments	Record review	Records coded for job type, essential functions, career progression, and suggested accommodations	Hearing impairments	<ul style="list-style-type: none"> <li>• Employers most frequently sought assistance in order to retain or improve conditions for a current employee.</li> </ul>
Nietupski et al.	1996	98 Iowa businesses (49%)	Mail survey	48 items concerning supported employment benefits and concerns	Supported employment	<ul style="list-style-type: none"> <li>• More positive attitudes reported by employers who had hired supported employees and by larger businesses.</li> <li>• Benefits included employee dedication, community image,</li> </ul>

Authors	Year	Sample (Response Rate)	Method	Instrument	Target Disability	Key Findings
						<p>and personal satisfaction.</p> <ul style="list-style-type: none"> <li>Concerns included extra training, necessary job skills, and quality of work.</li> </ul>
Gordon, Feldman, Shipley, and Weiss	1997	141 individuals with disabilities (37%)	Mail survey	Items concerning health, types of assistance, employment, accommodations, and ADA knowledge	Multiple sclerosis	<ul style="list-style-type: none"> <li>Approximately 65% were unemployed; 95% had worked prior to diagnosis.</li> <li>Major impediment to employment was physical condition; secondary barriers were transportation, work schedules, employer attitudes.</li> <li>Employed respondents noted that accommodations, flexibility, and assistive technology allowed them to maintain employment.</li> </ul>
Petty and Fussell	1997	47 employers of supported employment program participants in Tennessee	In-person structured interviews	Items from Instrument D and additional items about supported employment	Supported employment	<ul style="list-style-type: none"> <li>Employers had favorable attitudes about supported employment workers and programs.</li> <li>Employers reported that there were few opportunities for supported employment workers to gain promotions or jobs with benefits.</li> </ul>
Roessler and Sumner	1997	83 business personnel (21%)	Mail survey	22-item survey including experiences working with people with disabilities	Chronic illness (e.g., multiple sclerosis, cancer, diabetes, arthritis, epilepsy)	<ul style="list-style-type: none"> <li>Reasonable accommodations included: flexible scheduling, assistive/adaptive equipment, special parking, physical office changes, temporary duty reassignment, job sharing.</li> <li>Not considered reasonable: support</li> </ul>

Authors	Year	Sample (Response Rate)	Method	Instrument	Target Disability	Key Findings
						<p>persons, transportation to work, working from home.</p> <ul style="list-style-type: none"> <li>• Majority willing to pay \$501–\$5,000 for accommodations.</li> <li>• Employers most concerned about cost, perceived inability to work at a hectic pace, and chronic absences.</li> </ul>
Trach and Mayhall	1997	19 participants in a natural supports training program	Document review; phone survey	Phone survey regarding natural supports	Severe disability	<ul style="list-style-type: none"> <li>• Most frequent types of support were training, physical, and social.</li> <li>• Employers reported that a planning meeting with key stakeholders was the most important step in identifying supports that met employee needs.</li> </ul>
Scheid	1999	117 businesses in a southern metropolitan area (61.6%)	Telephone survey	Custom questionnaire on business responses to ADA, satisfaction with employees with disabilities	Mental disabilities	<ul style="list-style-type: none"> <li>• More than one-third (37.6%) had hired an individual with a mental disability since the ADA; 70% were satisfied.</li> <li>• Primary reasons for not hiring: lack of qualified applicants, perceived safety risk, and absence of job openings.</li> <li>• Employers most uncomfortable with employees who had a sporadic work history, substance abuse history, or were taking anti-psychotic medication.</li> </ul>
Clarke and Crewe	2000	53 rehabilitation counseling graduate students (26%); 62 students with disabilities (17%);	Mail survey	ADA-IS (indirect measure of attitude toward Title I of the ADA)	Not specified	<ul style="list-style-type: none"> <li>• Employers had the least positive attitudes about individuals with disabilities.</li> </ul>

Authors	Year	Sample (Response Rate)	Method	Instrument	Target Disability	Key Findings
		83 employers from companies with ≤50 employees (13%)				
Bell and Klein	2001	98 students and 88 employees	Experiment: hypothetical applicant	Heilman's scales for hiring recommendation, competence, starting salary, activity, and potency	None, paraplegia, epilepsy, and depression	<ul style="list-style-type: none"> <li>• Respondents rated the applicant with paraplegia significantly more favorably than other applicants.</li> <li>• Authors note limitations including potential social desirability factors, the use of students, and small sample size.</li> </ul>
Price and Gerber	2001	9 employers in PA and VA with some previous experience with the ADA and disabilities in the workplace (36%)	In-person interview	Knowledge of ADA, learning disabilities, and accommodations for learning disabilities	Learning disabilities (LD)	<ul style="list-style-type: none"> <li>• Employers were concerned with ADA compliance but focused primarily on physical disability issues.</li> <li>• Respondents had little experience with employees with LD, knowledge of LD, or knowledge of appropriate accommodations.</li> <li>• Half of the employers confused LD with intellectual disability or ADHD.</li> <li>• Respondents expected individuals with LD to be proactive and self-advocate.</li> </ul>