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E-Human Resources:

A Review of the Literature and Implications for People with Disabilities

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"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect."

-- Tim Berners-Lee, W3C Director and inventor of the World Wide Web

Introduction

Background of the Cornell Study

This is a four-year Research and Demonstration Project funded by the U.S. Department of Education National Institute on Disability and Rehabilitation Research (NIDRR), to address ways to improve the employment practices covered by Title I of the ADA. The study is administered by the Program on Employment and Disability in the School of Industrial and Labor Relations-Extension Division at Cornell University, in collaboration with the Washington Business Group on Health, the Society for Human Resource Management, and The Lewin Group. The purpose of this effort is to investigate the impact of the ADA on the employment practices of small, medium, and large private sector businesses. The intended outcome of the research is to assist in the identification of employment practices that have been the most challenging in implementing the ADA, and to identify interventions that can be used by the private sector employers and persons with disabilities to address these employment practices. Employment policy and practices that enhance both the hiring and retention of workers with disabilities are being examined.

Results to Date

A representative sample of small, medium, and large size employers were selected for study from the membership of the Washington Business Group on Health (WBGH) and the Society for Human Resource Management (SHRM). A survey was conducted of almost 1,000 private sector employers, and the results have been used to identify specific interventions to address remaining

barriers. In addition, in Years Three and Four, case studies were conducted by WBGH of six of their members, including CIGNA, Bank of America, Hewlett-Packard, Ford Motor Company, Texas Instruments, and Proctor and Gamble. Results of these inquiries have assisted us in the identification of progress made in the implementation of the ADA in Business organizations to date, and remaining problem area and barriers to the employment and retention of people with disabilities.

E-Human Resources and Disability Nondiscrimination Initiative

In Year Four of this initiative, Cornell asked to amend its proposed agenda to address information needs that might dovetail with the newly articulated NIDRR Disability and Business Technical Assistance Center (DBTAC) focus on access to information technology (IT) for persons with disabilities that began October 1st, 2001.[1] Therefore, the focus of Year Four has been an inquiry into the current employer use of IT in the employment and human resources management processes, and the accessibility of these services. We believe that examining the current use of information-based technologies (IT) in the employment process will assist us in better understanding the skills young people with disabilities need to access and stay in the workplace as employees, as well as illustrating the needs of older employees. This information will also inform the DBTACs about the accommodation and IT accessibility information needs of businesses, as well as how that will translate to preparation of both young and older individuals with disabilities for the work force.

[1] Further information about the NIDRR Disability and Business Technical Assistance Centers can be found at www.adata.org, or by calling 800-949-4232.

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An Overview of This Article

To accomplish this, an extensive review of the literature on information technology applications to the employment process was conducted. Three human resources related uses of the Internet are explored in this review of current literature:

- E-recruiting
- E-benefits/HR
- E-training

Each of these areas can have a significant impact on employees with disabilities, especially given the growth of business' use of the Web. If E-recruiting is not accessible, it could prevent people from applying for or even finding open positions. E-training, if not accessible, could create a new barrier to the advancement of individuals who are unable to access online training to improve or update their skills. E-benefits, while likely to make enrollment and other activities easier for many employees, may become an obstacle for individuals with certain disabilities if not designed to be accessible. In addition, we examined the literature for any current discussion of access issues for applicants and employees with disabilities by business.

In the remainder of this introduction, we also cover the World Wide Web and accessibility issues for people with disabilities, legislation relevant to Internet accessibility, and studies of Web accessibility

The World Wide Web and Accessibility

According to a U.S. Department of Commerce report (2000), Americans are buying computers and connecting to the Internet at an unprecedented rate. Over half of U.S. households (51.1%) in the U.S. now own a computer. In the 20 months between December 1998 and August 2000 the share of households with Internet access increased by 58%, from 26.2% to 41.5%. As

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of August 2000, 116 million Americans were online, accounting for 44.4% of the U.S. population (age three and older), up from 32.7% in December 1998. In just 20 months, 31.9 million people became Internet users in the U.S.

This amazing growth in computer and Internet use has not been the same for individuals with disabilities. A report by the U.S. Department of Commerce (2000) found that people with disabilities were half as likely to have Internet access as those without a disability (21.6% versus 42.1%). Computer experience is much less common for those with disabilities. Nearly three out of five of those with disabilities reported having never used a personal computer, compared to slightly under a quarter of those without a disability. Among those with a disability, those with vision or manual dexterity problems are less likely to regularly use a computer or have Internet access than those with hearing difficulties.

Kaye (2000) focused on those with access to a computer and the Internet. He analyzed uses of the Internet by those aged 15 years and over, with and without a work disability, using 1998 and 1999 Census Bureau data. For the most part the Internet uses of those with and without a disability were very similar. The most common application was e-mail, used by seven out of ten people with disabilities. Six out of ten searched for information, and four out of ten used the Internet for news and weather information. About a third (29.3%) of those with a work disability reported using the Internet for courses and schoolwork, compared to 35.2% of those without a disability. Job related tasks were far less likely to be performed online by those with a disability -- 26.2% as compared to 43.1% -- probably reflecting the fact they are less likely to be employed. Interestingly, despite this, individuals with disabilities are just as likely to use the Internet to search for jobs as those without disabilities -- 15.9% and 16.7% respectively.

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Georgia Institute of Technology's Graphic, Visualization, and Usability Center's Web based survey, although outdated by Internet standards (1998), gives another perspective on Web users with disabilities. Based on a sample of over 5,000 respondents, they found nearly one in ten reported some type of disability: 3.6% reported being visually impaired, 2.0% mobility impaired, 1.7% hearing impaired, and 0.5% cognitively impaired (an additional 1.5% preferred not to say). This survey clearly demonstrates that people with disabilities are utilizing the Web. Note also that people with disabilities in several of the categories mentioned are likely to encounter some access problems if the Web sites are not designed with accessibility in mind.

The Internet can make a significant difference to adults with disabilities, according to an online poll by Harris Interactive (Taylor, 2000a). It was found that adults with disabilities were more likely to report that the Internet had significantly improved the quality of their lives than those without disabilities (48% vs. 27%). Adults with disabilities were also more likely than those without disabilities to report that the Internet helped them to be better informed about the world (52% vs. 39%), feel connected to the world (44% vs. 38%), and reach out to people with similar interests and experiences (44% vs 38%). This reported impact on individuals with disabilities underscores the importance of ensuring Web accessibility to all, regardless of disability. Internet access may help to counteract the findings of another Harris poll that found that individuals with disabilities were more likely to feel isolated, felt left out of their communities, and expressed a desire to participate more (Taylor, 2000b). These results further emphasize the importance of ensuring accessibility to all, regardless of disability.

As the World Wide Web is becoming increasingly important, businesses are also becoming increasingly network intensive, both internally (intranets) and externally (Internet) (Schrage, 2000). A cross-sectional survey of 248 executives from larger companies was recently performed

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by Towers Perrin (2001). They found that 86% saw the Internet as changing business practices and processes. Nearly half (48%) expect that the Internet will result in a significant change, while one in five (20%) saw it as a "truly transformational event that will completely change business models over the next 10-15 years." The Web's influence in this area is not limited to large businesses. A survey performed at the Harvard Business School (Kanter, 2001) found that small (fewer than 100 employees) and medium (100-500 employees) businesses actually matched or outpaced larger businesses in the use of the Internet for internal operations such as training and receiving employee feedback. At least a third of all companies surveyed used the Web for each of the purposes asked about in the survey, ranging from attracting new customers, to purchasing, to conducting online meetings.

Given these predictions and expectations, what effects will this "transformational event" known as the Internet have on employees, specifically those with disabilities? The impact of the Internet will likely depend on the type and nature of the person's disability. For those with mobility related impairments, many of these technologies may be greatly enabling, allowing easy access to information at their computer. However, these "cutting edge" Web applications also have the potential to be significant barriers for those who have vision impairments, hearing problems, or limited dexterity for mousing/navigating, unless the applications are designed to be accessible.

The following is a list from the World Wide Web Consortium (W3C), whose mission focuses on making the Web more accessible, which describes some of the barriers the Internet can present to people with different kinds of disabilities (Brewer, 2001, p.5):

- visual disabilities:
    - unlabeled graphics, undescribed video

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  - poorly marked-up tables or frames
  - lack of keyboard support or screen reader compatibility
- hearing disabilities:
  - lack of captioning for audio
  - proliferation of text without visual signposts
- physical disabilities:
  - lack of keyboard or single-switch support for menu commands
- cognitive or neurological disabilities:
  - lack of consistent navigation structure
  - overly complex presentation or language
  - lack of illustrative non-text materials
  - flickering or strobing designs on pages

There are a variety of evaluation tools that can be used to find these barriers and determine how accessible Web sites are. Two of the most commonly used evaluation tools are: BOBBY (http://www.cast.org/bobby/) developed by the Center for Applied Special Technology (CAST) and WAVE (http://www.temple.edu/inst_disabilities/piat/wave/), developed by Pennsylvania's Initiative on Assistive Technology (PIAT) at Temple University. Another tool is A-Prompt (Accessibility Prompt), developed jointly by the University of Toronto and the University of Wisconsin (http://aprompt.snow.utoronto.ca/). These tools use the W3C's Web content accessibility guidelines (http://www.w3.org/TR/WCAG10/) to determine if the site being evaluated is accessible. There are a variety of commercial products available as well that are designed to assist Web developers build accessible Web sites (see http://www.w3.org/WAI/ER/existingtools.html for a comprehensive list). These tools examine

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Web sites for specific accessibility problems and flag them. Some of the more advanced versions suggest solutions to correct the problem. As noted by several studies utilizing the most popular evaluation engine Bobby, no automatic checker is infallible and all require further manual checks to ensure accessibility (Sams and Yates-Mercer, 2000, Jackson-Sanborn, Odess-Harnish and Warren, 2001, Schmetzke, 2000)

How accessible are Web sites? Although there is a great deal of literature on how to make Web sites accessible, there are few published studies evaluating the accessibility of existing sites. The few studies of post-secondary distance education sites are described in detail in the e-learning section of this report that follows. At best, only about half of the sites studied were found to be accessible (Sams and Yates-Mercer, 2000). A recent study examined the accessibility of over 1,800 state and federal government Web sites, and found that 17% met standards of accessibility. These standards included either Bobby approval (5%), W3C or section 508 compliant (4%), or had a text version available or text labels for their graphical images (8%) (West, 2001). Regarding commercial sites, Heller (2001) states that very few companies have made their Web sites accessible, or have even considered it, primarily due to concerns about the expense of doing so. This despite the fact that making a site accessible is estimated to run about one to two percent of the entire site cost, according to Kynn Bartlett, the director of the HTML Writers Guild's accessible Web Authoring Resources and Education Center (Heller, 2001).

One of the most comprehensive studies to date of Web accessibility examined the 50-100 most visited Web sites in six categories: overall most visited, clothing, international, jobs, college (Jackson-Sanborn, Odess-Harnish and Warren, 2001). The sixth category was a random sample of 295 government sites. Bobby v3.2 was used to evaluate the first layer of each of these sites. The results only discussed Bobby's most basic priority 1 level errors, "show stoppers" that

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could prevent individuals with various disabilities from being able to access information on the site. The percentage of sites that passed without Bobby's priority 1 error flags was 33%; overall two thirds (66%) of the Web sites failed Bobby's most basic accessibility tests. The government sites performed the best, with 60% passing without these errors. Interestingly, 85% of the 100 overall most popular sites on the Web were found to have priority 1 accessibility errors. Of particular interest for this review is the fact that four out of five (81%) of the job sites were found to be not accessible according to Bobby's priority 1 criteria. Again, by far the most common error found was the absence of alternative text for images (58% of the sites). Only 6% of the sites passed Bobby's more stringent user checks level -- areas that may create accessibility problems that require manual evaluation. It is important to note that the sites that trigger these user checks do not necessarily mean they actually are inaccessible, only that Bobby cannot automatically determine its effects. The most common user check related to whether color is used to convey information, to ensure that the information is conveyed in an alternative and more accessible way as well. This is a significant issue for the large population of those who experience colorblindness.

Legislation Relevant to Internet Accessibility

Several major federal laws are applicable to Web accessibility, including the ADA, Sections 501 and Section 504 of the Rehabilitation Act of 1973, and in particular the following two pieces of recent legislation:

- Section 508 of the Rehabilitation Act, as amended (1998), which requires Federal agencies' electronic and information technology to be accessible to people with disabilities, including employees and members of the public (see www/section508.gov/docs/508law.html); and

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- Section 255 of the Telecommunications Act of 1996 , which requires manufacturers of telecommunications equipment and providers of telecommunications services to ensure that such equipment and services are accessible to persons with disabilities, if readily achievable. The Federal Communications Commission's Report and Order implementing Section 255 was released in September 1999 (see www/fcc.gov/telecom.html).

These laws have begun to bring about improvements in accessibility. In 1999 the National Federation for the Blind (NFB) filed suit against America Online Inc. based on the ADA's equal access provisions. NFB used the ADA because AOL's service was not compatible with screen reader software used by the blind that translates text to speech. The NFB dropped their suit after AOL agreed to make its browser software compatible with the screen reader software (Gibson, 2001). In the wake of this suit the IRS's e-filing partners HDVest Inc., Intuit Inc., and H & R Block have agreed to make their sites accessible. Some of the response to these lawsuits in the popular business press has been quite negative, emphasizing potential liability and frivolous lawsuits related to lack of accessibility (Frezza, 2000; Olson, 2000; and Schrage, 2000).

With this backdrop of accessibility issues for people with disabilities, we will now turn to the focus of this literature review, and the use of the Internet for applications in the human resources process.

Web Recruiting

Recruiting qualified employees is vital for business success. Recruiting on the Internet has become one of the primary ways that companies attempt to find employees and the growth of this method has been nothing short of amazing. In this section, we will discuss the current use of online recruiting, the different forms Internet recruiting can take, and its impact on employees and the hiring process. Interestingly, despite extensive searches through the literature, the issue

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of accessibility only surfaced on a few special niche sites designed to cater to individuals with disabilities. Additionally, only one research study was found that examined the accessibility of job sites – the first step towards employment in this world of the Internet.

Current Use of Web Recruiting

With millions of jobs and resumés available online "The Internet has become the most effective way to broadly disseminate information about the availability of jobs and people" (How online recruiting changes the hiring game, 2001). Bruce Hatz, a corporate staffing manager at Hewlett-Packard, states "It's dramatically more effective than any medium ever known. The Web is the future of recruiting." (Useem, 1999, p. 97). Indeed, research by Golman Sachs showed that between the beginning of 1999 and November 2000, traffic to career-oriented Web sites had more than doubled, to 12.3 million unique visitors per day (Rosenwald, 2000).

According to Intel chairman Andy Grove, digital resumés, digital employment advertising, and digital resumé searches are resulting in a "rebuilding of the infrastructure," and "It's almost following e-mail in its growth" (Useem, 1999, p. 97). A July, 2001 poll of 400 recruiters by Recruiters Network found that 78% felt Internet job postings were the most effective way to spend job search budgets, far outstripping newspaper classifieds (12%) and career fairs (7%) (Gill, 2001).

A January 2001 poll by the Society of Human Resource Management (SHRM, 2001) supports these findings: 88% of the HR managers surveyed reported using Internet job postings, just slightly behind the proportion using personal contact/networking (95%), newspaper advertisements (96%) and employee referrals (91%). Internet job postings came in ahead of headhunters (74%), employment agencies (76%), and advertisements in professional and trade journals (67%). The survey also asked about the effectiveness of these different recruiting

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methods. The majority (58%) of the respondents said that Internet job postings were an effective or extremely effective method of search techniques, just slightly less effective than the highest rated "personal contact/networking" (61%).

A survey of 150 hiring executives in the 1,000 largest U.S. firms found that nearly half (48%) preferred to receive resumés by e-mail, a significant change from 1998 when only 4% had this preference (OfficeTeam.com, 2000).

According to a survey conducted last year by Yankelovich Partners, over a 12-month period, one out of every ten new hires was a direct result of online recruiting for the companies surveyed (Kforce, 2000). Dow Chemical is going even further. They are no longer accepting paper resumés for professional positions (estimated 1,500 people nationwide) and are recruiting all new salaried workers from their pool of online candidates (Gill, 2001).

Job seekers themselves also have demonstrated a great interest in the Internet. A 1998 study performed by J. Walter Thompson's Specialized Communications Group found that 70% of all active job seekers preferred the Internet to other methods and that more than half the general public planned to use the Internet to find their next job (Conhaim, 1998). The Society for Human Resource Management (SHRM) search tactics poll (2001) found that 96% of job seekers surveyed had used Internet job postings to look for a new job. While that is a very high percentage, it is also important to note that the job seekers polled for this study had signed up for the CareerJournal.com's Job Alert list, and were therefore more likely to have used online job searching than a random sample of job seekers.

Recruiting Methods - Then and Now

Traditionally, organizations used five primary methods of attracting job applicants: newspaper advertisements, word of mouth, campus recruiting, trade organizations, and job fairs.

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Recently, however, online recruiting has made a significant impact on how many companies go about finding new employees. The first online job site was established in 1994 by Jeff Taylor, the founder of Monster.com (the 454th dot.com site). Job candidates could post their resumés and search a database of job openings for free, while employers paid for access to the resumé database and for the right to post job openings. Over the past seven years online recruiting has ballooned into a multi-billion dollar international phenomenon (Marron, 2001). According to Kay (2000), few markets have been hit as hard by the power of the Web and e-commerce as the recruiting industry. A 1999 Forrester Research report projected that companies would spend $1.7 billion on Internet recruiting by 2003. Two years later, in their 2001 Electronic Recruiting Index, Interbiznet predicted that $7.5 billion would be spent on Internet recruiting efforts in 2001.

Web recruiting typically takes two forms: job listings posted by individual companies on their own Web sites; or job listings on third party sites or job boards, where employers pay to post their positions and to search the resumé database for candidates. In either case, job postings can be searched for free by potential candidates to identify positions that might be of interest and appropriate for their skills. Many company career sites allow applicants to submit their resumés online and take virtual tours of the company via the Web site.

Why this interest in online recruiting? A recent survey of 311 HR professionals and 244 professional search organizations by Hunt-Scanlon (a firm that provides information to the recruiting industry) asked why they choose to recruit on the Internet. The most common answers included: expanding the potential pool of applicants, lower cost of posting the opening, absence of a middleman, and greater convenience and speed (Kay, 2000). At high tech firms such as Microsoft, Sun Microsystems and Unisys, online recruiting has become the second-highest

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source of new hires after employee referral programs (McCool, 2000). Cost savings can be significant; according to the Employment Management Association the cost per hire with traditional advertising is $3,295 vs. $377 using online recruiting (Lightly, 2000). PricewaterhouseCoopers has reduced its cost per hire from $23,000 (including headhunter fees) to $280 though the use of the Web, and now finds 90% of its hires through the Internet (Muoio, 2000). Cisco Systems receives 81% of its resumés and hires 66% of its new employees over the Web. Its cost per hire is 39% lower than the industry average, a savings of over $4,000 per employee (Useem, 1999). These cost savings are due to a combination of factors, including the lower costs of advertising online ($200) vs. traditional print advertising ($1,500+), and removing the headhunter's cut (typically 20% to 35% of the new hire's base salary). Sutter Health claims to have cut their paperwork related to recruiting in half (White, 2001).

Time is of the essence in the e-recruiting world. According to a study by Recruitsoft.com, "the life expectancy of a hot resumé now is 72 hours" (McCool, 2000). The potential speed of getting an employee on board can have a significant effect on a company's bottom line, by minimizing the productivity loss related to an unfilled position. An iLogos study found that using the Web takes 20 days off the hiring cycle on average. Cisco systems cut their time to fill a job opening by over half, from 113 days three years ago to 45 days (Useem, 1999).

Internet recruiting has also improved the ability of smaller companies to find and attract talented employees; this was previously only possible for larger companies. A survey of HR executives commissioned by Kforce.com, a Internet recruiting company, found that nearly 60% of respondents from small companies said they now competed with large companies for talent, thanks to e-recruiting (More Pros and Cons to Internet Recruiting, 2000).

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Job Boards

Monster.com was the pioneer in job boards, but now, less than seven years later, there are over 28,500 Web sites vying for employer job postings and resumés. Some, such as Monster.com and JobsOnline.com, are "all around" sites that list a huge variety of positions. Others are "niche" sites focused on specific types of jobs, applicants or geographic areas. These include IT Workers (Dice.com), healthcare workers (medimorphus.com), hotel employment (SOShotels.com, hcareers.com), and even morticians (funeralnet.com). ExBigFive.com focuses on candidates with specific consulting backgrounds (Swanson, 2000). There are also sites designed for employers looking for recent college graduates who are seeking jobs (jobtrak.com). Recently a bilingual site opened specifically designed to serve those of Hispanic origin and employers in need of Spanish speaking or bilingual employees (saludos.com). As the demographics of the available workforce change, job boards are trying to stay ahead of the curve.

A relatively new development in the online job arena is the idea of "diversity sites." These enable employers who are looking to increase their diversity to perform a more focused search. Many of these are not-for-profit sites that "specialize" in certain minorities, such as Black Collegians Online (black-collegian.com), U.S. Hispanic Chamber of Commerce (jobcentro.com), American Association of Hispanic Certified Accountants (hispanic-cpa.org), and Native Americans (NativeWeb.com). There are also several job boards targeted towards people with disabilities, including the National Business and Disability Council (business-disability.com), handiworkonline.com, hirepotential.com, jobaccess.org , and justonebreak.com.

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FlipDog.com (recently acquired by Monster.com) takes yet another approach to job postings by trolling the sites of over 50,000 large and small employers and gathering them into one source. The site includes job searching capabilities and career advice.

Hard numbers regarding the recruiting field are difficult to come by, but everyone agrees that business is growing very quickly, and so far significantly faster than even very optimistic predictions had expected. A yearly report entitled "Electronic Recruiting Index," published by interbiz.com (an Internet business consulting firm), generates a revenue projection through 2005. In their 1999 report they predicted that the year 2000 revenues from job postings would be $1.45 billion. In 2001 they reported $3.25 billion of revenue in the year 2000, more than twice the predicted growth. Interbiznet.com predicts job boards will generate over $16 billion on posting fees alone in the year 2005 (interbiznet.com, 2001). The Massachusetts based International Data Corp. predicts that the worldwide e-recruiting market will reach $13.4 billion by 2005 (Marron, 2001).

According to a press release dated May 14, 2001, Monster.com, still the largest job board, claims to lead the industry with a 53% market share in terms of site visits (Goodridge, 2001), has over 10 million resumés in its resumé bank, and lists over 450,000 positions. Its clients include 90 of the Fortune 100, and 480 of the Fortune 500 companies (Richardson, 2000). In April 2001 Monster.com had 5.7 million unique visitors to its Web site (up 63% from the previous year) and they stayed an average of 36 minutes at the site, while clicking on an average of 28 pages per visit (White, 2001). It was estimated that 6.6% of the total Internet population accessed Monster.com in the month of April 2001 (Monster.com, 2001).

Almost all job boards offer job searching and resumé posting for job seekers, but many are going beyond those basic services in an attempt to differentiate themselves from the competition.

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Most sites offer additional resources as enticement to both job seekers and employers. Such information includes how to create a successful resumé, salary calculators, career planners and company profiles for job seekers. Examples of additional services offered by job boards, both for applicants and employers, are listed below.

Services for applicants:

- Job Agents -- a searcher identifies the type of job in which they are interested and the Agent e-mails the individual when a match is found.
- Resumé builders, which allow an applicant to either paste their resumé in or build it online.
- Confidential career services, which allow applicants to apply anonymously, protecting their identity from their current employer.
- Q & A areas where a job seeker can post questions or search a database for similar issues. Techies.com is even considering a mentoring service that would match up experienced IT professionals with new Techies.com members (Online job sites try to stand out from a crowd, 2000).
- Metasearch capabilities, which allow the job seeker to extend their search beyond the primary job board's internal job boards to include jobs located at other sites.

Services offered for employers:

- Web-Based Applicant Tracking Programs, which allow companies to track applicants as they move through the recruitment process, and enable HR departments to evaluate their process. Some applicant tracking programs are designed to "keep tabs" on quality applicants that take a position with a different company (in case they change their minds).

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- One Stop Service -- some job boards, such as CareerSite.com can automatically "cross post" positions to other job boards for additional exposure. The service can remove the position when it has been filled or expired from all the job boards automatically.
- Online "interviews" allow hiring managers to customize a set of "screening" questions for online applicants to answer (Murphy, 2000).
- Phone interviews of promising candidates by professional recruiters prior to sending them on to a company (Kforce, 2000).
- Additional information for employers such as how to create effective job postings, ways of luring IT talent, average sign-on bonuses for employers, etc.
- Metasearch capabilities, which allow the employer to extend their search beyond the primary job board's internal resumé files to include resumés located at other sites.

Individual Company Use of Recruiting Sites

A study of online job seeker behavior by iLogos (a research division of Recruitsoft) found that the vast majority of corporate career Web site visitors came directly to the site and were not funneled in by way of a job board. Of those visitors 72% are employed and 21 percent are happily employed. Nearly half of the happily employed came from somewhere else on the corporate Web site (iLogos, 2001). This study suggests that companies would be well advised to enable visitors to browse and apply for positions at the corporate Web site and make the company attractive to both "passive" and active job seekers encouraging them to explore possible employment opportunities.

Many companies are now creating dedicated job sites on their corporate Web sites in addition to posting positions on job boards. A study performed by iLogos of the global 500 (500 largest companies in the world based on gross revenue, compiled by Fortune magazine). They found

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that corporate Web site recruiting has ballooned in these large companies: from only 29% in 1998 to 88% in 2001. Fully 93% of the US based global 500 companies are currently actively recruiting on their corporate Web sites. Significant growth over the past year has occurred in Europe (73% in 2000 to 83% in 2001) and Asia/Pacific (68% to 88%). The following list shows the proportion of Global 500 companies using their corporate Web site for recruiting by industry (iLogos Research, 2001):

- 100% of companies in the Healthcare* sector
- 97% of companies in the Manufacturing sector
- 96% of companies in the Transportation* sector
- 89% of companies in the High Tech sector
- 87% of companies in the Consumer sector
- 83% of companies in the Natural Resources sector
- 82% of companies in the Financial sector
- 82% of companies in the Wholesale* sector
- 79% of companies in the Utilities* sector
  *denotes small sample size

Although a few of the sectors had small sample sizes, leading to less accurate estimates of that sector, it is evident that corporate Website recruiting is no longer restricted to the high tech sector.

Small companies are also getting into corporate Web site recruiting with the assistance of online recruiting firms. Jobnet.com has a new technology that allows small to medium employers to easily create a career site on their own Website in just a few minutes for a minimal cost ($1 for a job posting and $.25 for each resumé collected). This site is actually hosted and maintained by Jobnet, but exists on the company's Website, allowing them to compete with the larger firms. CareerSite.com also has a similar offering.

According to a press release by JobTrak.com (now part of Monster.com), corporate Web sites have become the primary means students use to research companies and evaluate career opportunities, replacing company brochures and annual reports. A poll of college students taken

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by JobTrak.com (2000) found that over three-quarters (79%) of those polled said the quality of an employer's Website was important in their decision of whether or not to apply for a job; of these, 44% said it was very important.

A study by iLogos Research outlined the "Best Practices for Fortune 500 Career Web Site Recruiting" to attract, convince, and process jobseekers via the Web (Ilogos Research, 2000). Some of the best practices include: linking the careers section directly from their Web site homepage; the ability to apply for a job with a single click; including information on corporate culture and on benefits; maintaining a searchable database of open positions; and offering a separate college recruiting section. Other recommended features include: a resumé builder, cutting and pasting of resumés, "Email to a friend" option (adding the potential for personal networking), job agents that automatically notify candidates of matching positions, allowing anonymous applications for those concerned with privacy issues, and candidate profiling to speed applicant processing.

Other Effects on Employers and Applicants

Even with all the new services available, Internet recruiting and job boards can be a mixed blessing for both employers and applicants. One of the interesting "side effects" of e-recruiting is a change in the relationship and balance of power between the organization and the candidate. Peter Cappelli, a professor of management at the Wharton School, suggests that online recruiting levels the playing field between employees and employers (How online recruiting changes the hiring game, 2001). Toni Langlinais, a consulting partner in Andersen Consulting, goes a step further and states "We are seeing a fundamental shift driven by the Internet from a seller-driven world to a buyer-driven world – and the onset of a new battlefield between business models" (Piturro, 2000). The ability to "passively job hunt" (placing a resumé online and see who "bites")

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is expected to erode employee loyalty, especially for those with the most desirable job skills. Since there is no cost to e-mail a resumé, e-recruiting allows employees to always have their resumés in play for the any better offer that may come along. Employees can easily check out the competition's employment site, see what's available, e-mail a resumé, and have the company get back to them when an opportunity arises.

Despite this more level playing field, a survey by the Society for Human Resource Management found that job seekers are not completely satisfied, with less than half (48%) saying that Internet job postings are effective (SHRM, 2001). However, these same job seekers rated Internet job postings as third most effective behind personal contact/networking (78%) and employee referrals (65%). Internet job postings were rated as more effective than many traditional methods, including headhunters (45%), employment agencies (31%), newspaper ads (30%), and job fairs (23%) (SHRM, 2001).

For employers, access may be easier and faster, and smaller companies may be able to compete with larger corporations, but online resumés do come with a price. Due to the combination of extended reach of Web recruiting and the ease of applying, HR departments can find themselves overwhelmed with applicants. In order to get the best applicant for the position, they must process all resumés submitted as quickly as possible. For example, Sutter Health found themselves inundated by 300,000 resumés a year, which often took weeks for the HR affiliates to work through (Seminerio, 2001). Once a resumé is submitted electronically by a candidate it is processed and deposited into a central database. In many larger companies even paper resumés are scanned into the database. Hewlett-Packard (H-P) has even developed technology to process resumés in a variety of languages, including Asian characters. H-P's resumé database contains over 150,000 resumés (Useem, 1999). The electronic resumé database allows HR to search for

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candidates whose resumés contain specific terms or certain combination of terms such as "manager" and "C++."

To further help corporate Human Resource professionals deal with the flood of resumés, certain vendors and companies are offering a new line of services. They have developed software that automatically evaluates, ranks and matches candidates with openings, using sophisticated data mining and filtering techniques. Sutter Health uses Recruitsoft Inc., an application service provider, or ASP, to perform this task, and has reduced their recruiting process time from weeks to days (Seminerio, 2001).

Another technique that is becoming available to assist HR in handling the resumé flood is Web based questionnaires/skill tests. Applicants are queried regarding specific skills and experience that are required for the position, and candidates are then automatically ranked on the basis of those qualifications (Martinez, 2001). Some of the more sophisticated programs, such as that available from Recruitsoft, will even automatically shift candidates from the job they applied for to one that they may be better qualified for (Seminerio, 2001) based on their test results.

Resumé evaluation software is actually driving a change in what makes a successful resumé. Traditional resumés are action verb oriented, and use bold and italicized lettering for emphasis. In contrast, electronically submitted resumés must include terms and acronyms specific to the employing industry, and terms for which employers will likely search (Hodowanes, 2000). Any special formatting used in a paper resumé is lost in an electronic document and may actually interfere with a search engine's ability to search the document. Chronological order has been replaced by "knowledge, skills and abilities," with those most sought after being listed close to the top of the resumé to improve the number of search engine "hits"(Useem, 1999).

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One network engineer described how his first resumé submitted to Monster.com only produced a few responses. After exploring the resumé preparation guides offered by Monster.com, he restructured his resumé emphasizing his experience with some major companies. Within a span of four days he was inundated with calls from dozens of companies (Ruber, 2000). Some savvy applicants are including a keyword section in their resumé to improve the chances of the search engine catching them. On the downside, some less scrupulous applicants include terms such as C++ or Java just to get the attention of search engines, while some employers may include such terms in their job descriptions in the hope that they will attract better candidates even if the skills aren't central to the position (Ruber, 2000).

Web recruiting technology offers great potential to many job applicants, especially those who may have a disability that reduces their mobility, as the job search can take place at their own computer. On the other hand it raises a concern regarding access, as minorities and people with disabilities are less likely to have a computer and Internet access (Kaye, 2000). According to research noted earlier (Jackson-Sanborn, Odess-Harnish and Warren, 2001) only 18% of the 100 most heavily trafficked recruiting Web sites were found to be accessible according to Bobby level 1 priorities. Given these results, inaccessible Web based recruiting presents a significant employment roadblock for those who have disabilities that prevent them from using a primarily visually oriented, point and click environment.

E-Benefits

Benefits is another Human Resource area that is rapidly becoming Web-based. The Web allows employees easy access to information, and communication by the company is also simplified – assuming the designers of the site considered accessibility. Accessibility for employees with disabilities was never mentioned in any of the literature reviewed. The following

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section will describe the use of the Inter/intranet in the benefits process, the extent of its use, growth predictions, and some specific examples of E-benefits use and impact in the literature.

Benefits Self-Service

According to a 2000 survey by The Hunter Group, an international consulting firm based in Baltimore, Internet/intranet based systems, which allow employees to see and manage their own information about benefits, payroll deductions and career changes 24/7, are revolutionizing HR functions (Wells, 2001). They found that over 90 percent of the 342 companies surveyed reported "successful or somewhat successful" self-service systems, as measured by improvements in employee satisfaction and the rapid return on investment. The survey found that the average company spent $1.5 million on employee self-service systems. The per-employee cost was found to vary widely, from $35 to $1,500, depending on company size and offerings.

This use of the Web for benefits self-service is becoming more popular due to improved efficiency and speed. The following are some of the more common transactions employees can perform utilizing Web based E-benefits:

- Personal data maintenance
- Employee communication
- Benefits inquiry
- Online enrollment
- Family status changes
- Access to "Elective" benefits

Towers Perrin, a management and HR consulting firm, has performed an annual survey for the past four years of nearly 100 leading companies examining HR service centers. The

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participants represent a variety of industries in the U.S. including: manufacturing/industrial (29%), energy companies (10%), consumer products (12%), health care (13%), financial services (18%), other (19%) (Towers Perrin, 2001). In their most recently published study (2001) Towers Perrin found that 91% of the firms surveyed offer employees access to their HR Website at work and nearly half (49%) allow access from home (up from 83% and 31% in 2000). Over half (60%) of the firms allow online benefit enrollment, almost double that found the previous year. Just over the past two years, the growth in the services available has been significant, as demonstrated by the numbers below:

	2000	**2001**
Provide internal job postings	86%	96%
Provide plan/policy information	83%	97%
Provide 401K information.	65%	81%
		(Towers Perrin, 2000, 2001)

The survey also found a dramatic increase in self-service transactions across the board over the past two years. A comparison of the firms who participated in both the 2000 and 2001 survey (nearly 60% of the 100) demonstrates the rapid growth of the four most common transactions:

	2000	**2001**
Annual benefit enrollment	33%	51%
Personal data changes	21%	43%
401K loan modeling	50%	67%
401K changes	58%	80%
		(Towers Perrin, 2001)

The majority of those who had not implemented these transactions as of 2001 planned to do so within the next year.

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The Towers Perrin study also examined three issues that relate to workplace changes due to online HR. Virtually all reported a significant increase in timeliness of transactions, with more than 70% reporting significant improvements in the accuracy of information. Fewer reported significant reductions in HR workload. It appears that employees utilize the online systems to address their basic questions, while the HR representatives are fielding more specific questions and fewer basic queries.

In a recent survey performed by Watson Wyatt (2000), 79% of companies surveyed chose the company intranet as their primary method of delivering HR–related services to employees, with the Internet coming in a close second at 70%. This represented a huge increase from the 50% of companies using the Web just two years ago. Results of this survey found to be focused on improving HR service and communication with employees. Satisfaction with these technologies was quite high, with 80% reporting the intranet method as being moderately to very effective and 69% reporting the same for their use of the Internet.

Larger companies most often used a combination of their company's intranet (85%), the Internet (72%), interactive voice response systems (63%), and call centers (43%) to perform human resource service delivery. Interestingly, smaller firms were most likely to use the company intranet (74%) and public Internet (68%) for HR service delivery (Wells, 2001). This may be a result of the improved efficiency of a Web-based process, requiring fewer people to provide service delivery.

Most of the studies mentioned above focused primarily on larger companies, but third party service providers have recently begun offering to deliver similar benefits via extranets to smaller companies as well, such as work/life services (Frost, 1998; Cohen, 2000). This allows small companies to offer such benefits as dependent care accounts and 401K plans, along with 24/7

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access to information that they typically could not provide internally. Forrester Research recently found that 32% of employers surveyed use the Internet for benefits administration and an additional 54% plan to go that route within the next five years (Elswick, 2001).

There are numerous examples of companies that have moved towards this online-based process. With 80,000 employees in 150 countries, Canada-based Nortel now does all benefits enrollment online. Nortel estimates that just five percent of the workforce signs up for benefits on paper (Wells, 2001). Many online systems allow employees to get the most out of their benefit plans by offering products and services along with objective tools to assist them in their planning (Mitchell, 2000). IBM designed an interactive question and answer "plan finder" located on their intranet. This tool uses data and choices supplied by the employee, weighs the merits of different plans based on a variety of criteria (such as cost, coverage, customer service and performance), and returns a view of preferred plans ranked and graphed. As of last year, more than 80% of IBM's 140,000 Armonk, New York employees enrolled online (Wells, 2001). According to IBM's manager of HR e-business solutions, the previous paper-based process was so confusing that it could take days for the employee to figure out what to do (Greengard, 2000). This Web based paperless system also saved IBM an estimated $1 million in costs related to the delivery of benefits information.

"Elective" Benefits and Knowledgebase Systems

"Elective" benefits are also increasingly popular offerings by companies. These benefits can include a wide variety of products and services such as life stages education, personalized retirement and financial planning, insurance and a variety of banking products including mortgages, checking credit cards and discount brokerage (Mitchell, 2000). These benefits may be offered by external providers through a Web "portal" such as RewardsPlus.com, which allows

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an employee to not only file medical claims and other standard benefit transactions but also gives access to non-traditional "niche" services such as real estate referrals, car insurance quotes, and pet service discounts.

One of the latest advances in HR technology is the knowledgebase system. Knowledgebase technology allows HR to consolidate all information they make available to employees into a central online database. Almost 60% of the companies surveyed in the 2001 Towers Perrin survey use knowledgebase technology. IBM has developed a knowledgebase system that contains more than 500 "data elements" related to each of its 140,000 employees (Greengard, 2000). When linked with the employee self service system, it can allow employees to receive personalized information tailored specifically for them, based on their HR information in the system.

At least three-quarters of employees of the companies participating in the Towers Perrin (2000) survey had access to the Web. How can the 25% without computer access benefit from these new technologies? Some companies are taking steps to ensure shop-floor workers and other employees without desktop computer access opportunities to access their information as well. For example, the Hard Rock Café International has touch-screen kiosks in the break room of each of its 45 U.S. restaurants. Schlumberger Ltd, a global oilfield services and technology testing company, has 60 kiosks at its manufacturing centers (Communicating benefits information online, 2001). Intel also makes public kiosks or terminals available to factory workers who don't have computers on their desks (Roberts, 1999). According to a 1999 study by the marketing and training firm Frost and Sullivan, the interactive kiosk market is expected to grow to nearly $3 billion dollars by 2003 (Communicating benefits information online, 2001).

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As the Hunter Group suggests, E-benefits and self-service are revolutionizing HR by improving their ability to provide and communicate information to their employees. If the pace of growth continues as it has for the past three years it will rapidly become as ubiquitous as the Web itself.

As with E-recruiting, E-benefits have the potential to be either a great boon to employees with disabilities or a significant barrier, depending on the type of disability and the accessibility of the benefits system. An inaccessible benefits system would disadvantage employees with certain disabilities, denying them the easy access to information, updates, or the special elective benefits or "Plan finder" tools enjoyed by other employees. On the other hand, having benefits information and the ability to enroll on-line on their own computer at any time could be a significant advantage for employees with mobility impairments. Knowledgebase systems and "Plan finders" (interactive Q&A tools) could simplify the decision making process for individuals with cognitive or psychological disabilities. If the interface and information are designed to be accessible for screen reader use, visually disabled employees would have access to updated benefits information at the same time as employees without disabilities, avoiding any delay as materials are converted to audio, large print, or Braille. However, as noted above, if E-benefits are not accessible, they may present a new E-barrier for employees with disabilities in the workplace.

Online Training

Online training has been becoming increasingly popular over the past several years, due in part to its potential for cost savings and convenience of 24/7 access. This section will focus on online training - specifically on corporate use of the technology. Trends in the use of online training in the literature will be explored, including who is using it and for what purposes. The

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few studies found that have examined the accessibility of such training technologies are also reviewed.

E-Training

The Commission on Technology and Adult Learning report: A Vision of E-Learning for America's Workforce (2001) has this to say about E-training:

> E-learning has the potential to revolutionize the basic tenets of learning by making it individual - rather than institution-based, eliminating clock-hour measures in favor of performance and outcome measures, and emphasizing customized learning solutions over generic, one-size-fits-all instruction. It is this transformational potential of e-learning that the Commission believes America must recognize and embrace in the years ahead (pg. 4).

Corporate Employee Training

According to Employee Benefit News, corporate employee training has become an integral contributor to business success (Elswick, 2001). In the year 2000, U.S. companies budgeted $54 billion for employee training (Training Magazine Staff, 2000). Corporate training typically encompasses the following general categories: management/supervisory skills, communication skills, technical skills, customer service, executive development, sales, and computer applications. A study by PricewaterhouseCoopers found that nearly three quarters (70%) of the world's largest companies cited the lack of trained employees as the number one barrier to sustaining growth (Stacey, 2000). The speed at which knowledge and skills are becoming obsolete is also pushing training to the fore. According to Margaret Driscol, Director of Strategy for IBM's MindSpan Solutions "fifty–five percent of employees' skills are outdated in three to five years" (Elswick, 2001).

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In 1999, three-quarters of corporate training was instructor-led; however, instructor-led training is one of the most expensive types of training to provide. It is estimated that two-thirds of the costs of training are allotted to travel related expenses - getting the employees to the classroom. Another significant "hidden" cost includes lost employee productivity while traveling to the training site. In an attempt to reduce training costs, many companies have been exploring other methods beyond traditional classroom/instructor based training.

A Forrester Research study confirmed the importance of cost savings, finding that 79% of companies interviewed identified it as a reason for adopting online training. The savings can be significant – IBM saved more than $80 million in travel and housing expenses in 1999 alone by using online training across its worldwide operations (Murray, 2001).

The most rapidly growing alternative training method is referred to as technology-based learning. Technology-based learning includes: audio/video tape, satellite broadcast, interactive TV, CD-ROM and online via Internet or intranet. In 1999 technology based learning accounted for 20% of corporate learning and is expected to account for 40% by 2003 (Corporate University Xchange, 1999). International Data Corporation (IDC), technology and e-business consultants, predict that corporations will spend $14.5 billion on e-training by 2004 (up from nothing in 1997). Within e-learning, IDC has determined that online training is the fastest growing of all the e-learning mediums – increasing at 83% per year (Urdan and Weggen, 2000). As with many Internet predictions, numbers vary, but virtually all predict significant growth over the next few years. Urdan and Weggen (2000) predict that online training will be the hottest trend in corporate training and expect it to climb to $11.4 billion by 2003, while Credit Suisse First Boston Corporation predicts a $40 billion market by 2005 (Rosenbaum, 2001).

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An industry survey performed by Training Magazine found that over 70% of the largest companies (10,000+) used online training, and almost half (47%) of the smaller companies (100-499) used this method as well (Training Magazine Staff, 2000). Online-based training was only exceeded by traditional classes (97%) and videotapes (79%). Overall, 13% of corporate training is delivered by computer alone, with an additional 6% using a combination of online programs and a remote instructor. Fully half of the computerized instruction is network-based, with 31% delivered via internal "intranet," and an additional 19% by the Internet (40% by CD-ROM). The majority of online training is in the form of tutorials; however Training Magazine found that nearly a third (29%) of online training is based on a classroom model, allowing interaction between the instructor and/or other students.

Benefits and Drawbacks of Online Training

The rapid growth of online training is a result of its many benefits. There are also, however, some inherent drawbacks. A summary of these, drawn from the literature, is presented below.

Some benefits of online training:

- Flexibility – it is relatively easy to refine/adjust the training if needed
- Consistency – no variation between trainings caused by individual instructors
- Unlike traditional training, per person costs *decrease* as more employees take the course
- 24/7 access
- Training can be offered in 10-30 minute "learning chunks" to fit into a workday
- Self paced – allowing students to move back and forth to review material
- Avoids "knowledge lag"— since online training is not limited geographically, all employees can be trained at the same time rather than experiencing delays as a traditional class is "rolled out" across locations

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- "Just-in-time/learning on demand" – quick tutorials can be available on an "as needed" basis
- Student progress can be easily tracked

Some drawbacks of online training:

- Initial development cost can be high
- Less interaction (or none) with instructor or fellow students and subsequent loss of learning from this interaction
- Students must be self-motivated
- Requires a minimum level of computer literacy
- Comfort level with online training can be a problem
- Minimum computer requirements (ie. CPU speed, download speed of pages) may require updating older office equipment

Types of Training Offered

The first use of online training was for IT training, focusing on teaching desktop applications, networking, and Internet skills. Recently, training in non-IT areas such as management, finance, employee orientation, product information, and customer relations skills has been growing at a compound annual rate of 123%, nearly twice the rate of IT training at 65% (Urden & Weggen., 2000). According to Training Magazine (2000), 45% of computer delivered corporate training was in these non-IT areas.

As with E-recruiting, larger firms often produce their own E-training programs for internal use. However, there are also a number of third party vendors that make E-learning programs available to small and medium sized companies. TrainingSupersite.com lists nearly 1,000 companies offering some sort of online e-training. IT industry leaders often offer E-training for

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their products, including HP, IBM, Oracle and Cisco Systems (Kelly, 2001). Traditional educational institutions are also getting into online corporate training, including collaborations such as that between New York University (NYUonline) and McGraw-Hill Higher Education (Corporate University Review, 2000).

Forms of Online Training

There are three basic forms of online learning, and many classes combine several of the methods (Ryan, 2001). These are as follows:

- *Self-paced independent study* – The trainee sets the schedule and the pace and can review material as much as is needed. Online quizzes provide automatic pre-programmed feedback. This type of learning requires the most motivation and no one is available to answer questions that the student may have.
- *Asynchronous interactive* – Trainees participate with an instructor and other students but not necessarily at the same time. This method allows support and feedback from instructor and fellow participants but not as self-paced as an independent study.
- *Synchronous learning* – Trainee attends live lectures via computer and can ask questions by e-mail or real-time chat. This is most like a traditional classroom with the lecture format and interactive element, but also the most expensive and least flexible format of the three.

Current Users of Online Training

A wide variety of firms use E-training. According to Masie Center, a technology and learning think tank, 92% of large organizations implemented some form of online learning in 1999 (Terry, 2000). A Training Magazine study found very little variation by type of industry or

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company size and their use of online training (Training Magazine Staff, 2000). Some specific examples of larger entities using of online training are:

- The fast food giant McDonald's piloted an e-learning program in five different languages, with plans to standardize training across its 28,000 restaurants in 120 countries (Martin, 2001).
- The hotel chain Days Inn has developed interactive Web-based training for its 18,000 employees in 1,800 locations to help deal with its constant need to train new employees (Roberts, 1998).
- IBM has moved almost all of its first three phases of management training for first line managers to online training. According to a study by Brandon-Hall, IBM now offers five times the training content prior to E-learning at one-third the cost, at an annual savings of $200 million (Verespej, 2001).

The federal sector has also moved into E-training in a big way. The Army plans to spend about $500 million over the next five years providing laptops and offering distance education to all of its soldiers through universities and distance learning corporations (Carr, 2000). The Army hopes to improve its ability to recruit, train and retain technically savvy "employees" by offering its soldiers an opportunity to earn technical certification or an associate's, bachelor's, or master's degree (Seffers, 2001). The IRS determined that 78% of its $100M training budget was travel-related expenses. The agency decided that implementing an e-learning program could save money and be more efficient by allowing employees to train at their desks, speeding the agency's reorganization and modernization program (Hasson, 2001).

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Online Learning and Accessibility

A recent Web based survey performed by the European Centre for the Development of Vocational Training (CEDEFOP, 2001) focused specifically on E-learning for people with disabilities. Ninety percent of the 320 respondents were European respondents, with approximately half from the public sector, 30% from the private sector and 17% from the disability field. It must be noted that the respondents were not a random or representative sample but rather those "interested/motivated" to participate; however, the results are still of interest. Over half (55%) agreed that "E-learning will open up new and innovative learning opportunities for communities of learners with disabilities," and four out of five believed that E-learning should be provided to improve equality of access. Over a quarter of respondents "always have some learners with disabilities and have standard arrangements in place," while an additional 37% said they made arrangements on an ad hoc basis. Only 23% said they never had learners with disabilities or they had learners with disabilities but made no special arrangements. Between 46% and 66% of participants considered E-learning suitable for learners with sight, hearing, speech, motion and learning disabilities. Interestingly, the highest percentage (66%) was for those with hearing disabilities and the lowest (46%) with sight disabilities.

The respondents to the study were also asked about the accessibility needs of their students: Nearly a third (32.5%) reported their learners required visual assistance (from glasses to Braille) and another third (31.6%) required hearing aids or signing (CEDEFOP, 2001). About 23% require voice or speech technologies to communicate with IT technology and an additional 28% require other technologies to assist with the physical manipulation of information.

Only a few studies have attempted to evaluate the accessibility of online training/education sites. Those that have been performed have primarily focused on post-secondary distance

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education sites, and have found the majority of sites to be inaccessible. The studies used BOBBY to check for compliance with the Workforce Investment Act's (WIA) Web Content Accessibility Guidelines and Techniques. Rowland and Smith (1999) collected accessibility data from a random sample of 400 colleges, universities and online learning institutions and found only 22% of the home pages to be free from any major (BOBBY "priority 1") accessibility errors. Results indicate that these errors are "show stoppers" that would make it impossible for one or more groups to access the information contained on the page. A follow up study examined the home pages of the distance education "entry point" and found only 24% accessible (Rowland, 2000). A UK study surveyed higher education lecturers about their awareness of accessible Web content design, specifically the World Wide Web Consortium (W3C) accessibility guidelines (Sams and Yates-Mercer, 2000). Only nine of the seventy-four respondents actually tested their sites for accessibility and nearly half (47%) did not provide alternative text descriptions of images -- a very basic accessibility issue.

Schmetzke (2000) examined the home pages of 219 post-secondary distance education institutions and discovered that only 15% were accessible. When pages linked to the home pages of these institutions were included, there was a slight improvement; however, Schmetzke still found only 23% free from major accessibility errors. A building analogy suggested by Rowland (2000) seems very appropriate to this situation. Imagine if you need to meet someone in a large office building. The building has many floors and many units per floor, with departments nested within units. How easy would it be to get to a specific person you needed to meet if three out of every four doors in the building are locked to you? It is unknown how similar corporate training sites are in this regard, but these results highlights a potential problem regarding accessibility of online training for employees with disabilities.

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There are some promising signs on the online E-learning accessibility front as well. Microsoft has begun offering courseware designed to be accessible to visually impaired students (Kiser, 2001). In January 2000 a courseware vendor, Mindleaders, began collaborating with the Texas Commission for the Blind working to make its Web-based training user-friendly for those with visual impairments. Since this agreement they have produced text only versions of more than 500 of their courses. The courses also allow the use of command keys to navigate, search the glossary, and answer questions among other features (Mindleaders, 2000).

Conclusions

Effective HR management can give a company a competitive advantage by helping make the best use of employees' skills. The integrated solutions offered by E-HR have the potential to reduce data entry, minimize errors, and cut down the time required to maintain the overall HR infrastructure (McCausland, 2001). Applications such as job postings, employee benefit information, and online training and registration are "value added" offerings for employees as well.

A vast number of HR transactions currently occur online, and according to all reports this number will continue to increase. A report by the AberdeenGroup Inc., a Boston-based IT consulting firm, suggests that HR transactions are just the beginning. Uses of the Internet for business will not be limited to HR purposes. Applications will likely be available to assist the employee to perform almost everything job related: HR processes, procurement, travel arrangements, expense filing, and provision of information and content directly related to job duties (Roberts, 2001). Indeed the findings of a recent e-Track survey performed by Towers Perrin (2001) of executives from a cross section of 248 larger companies support this conclusion. They found that 54% used the Web as a vehicle for employees to perform HR transactions (while

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38% more planned to), while fully 64% currently used the Web to streamline operational processes (again, an additional 28% more planned to), and 81% used it for internal communication and information sharing with employees (16% more were planning to).

Given that so many human resource functions and much of the employment process increasingly are being delivered by Web-based approaches, knowledge of how to access and navigate the Internet is absolutely imperative for all job seekers and incumbents. It is vital to gain an understanding of the accessibility of E-HR in order to be prepared to cope with a Web-based revolution in the workplace, as the Web will become central to the essential functions of many jobs in the near future. The need to gain and keep current the skills to use information technology (IT) is equally important to people with disabilities. IT can offer people with disabilities a window on the world and access to jobs that previously have not been available to them. However, the inaccessibility of most Web sites, as well as the lack of adequate preparation offered to many youth and older individuals with disabilities to deal with this medium, may only serve to widen the already-existing disparity in employment opportunities for people with disabilities.

The Americans with Disabilities Act, and its predecessor, the Rehabilitation Act of 1973, were passed in an attempt to address workplace and cultural inequities for people with disabilities. The implementation of the employment provisions of disability civil rights legislation falls largely in the realm of human resource (HR) professionals. HR professionals are often the architects of workplace policies and practices governing the employment process. Also, HR professionals, working with supervisors, often play a critical role in responding to requests for workplace accommodations for employees with disabilities. HR professionals can create a more disability friendly environment in their employment settings by putting in place

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policies and procedures which minimize, if not eliminate, needless discrimination against applicants and employees with disabilities.

These disability nondiscrimination polices and practices must be applied to employment process functions on the Internet, such as those illustrated in this review of the literature on information technology applications to the human resource process. Few human resource professionals or their employers fully realize the potential discriminatory impact of these E-HR applications, or are equipped to proactively eliminate this needless barrier to the workplace and the employment process. Significant education is needed to raise awareness of these issues, with employers, human resource professionals, and the information technology professionals that are the architects of these Internet employment process functions.

Compared to their non-disabled peers, people with disabilities are less likely to have computer skills and less likely to use computers or the Internet, despite the advantages those technologies provide. Education and training via the Internet and distance learning programs offer easier access to skill development for people with disabilities, but only if they have the basic skills to use computer equipment. They need to know about vocational options and labor market demands. They need to be motivated, in part by the availability of jobs, to take part in educational efforts, and finally they need to have the access to computers.

Therefore, education about use of information technology becomes even more imperative for people with disabilities. Yet currently, people with disabilities in education and training programs have lower participation rates as a consequence of attitudinal barriers and accessibility problems. People with disabilities must have an equal opportunity to acquire the skills that are in high demand both for emerging new technical jobs, and to access jobs among non-technical industries.

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Educational institutions can assist by identifying and documenting any unique needs of students with disabilities in accessing IT technology in the educational setting. They can also identify and implement strategies to meet these needs for successful full participation in this learning process. Governmental bodies can assist by stimulating partnerships (training, internships, mentoring) between educational institutions and private sector employers to fund the kind of education needed to appropriately equip young people with disabilities in the IT labor force. Current technology training initiatives under President Bush's New Freedom Initiative, as well as the proposed Disability and Business Technical Assistance Center (DBTAC) initiative are significant steps forward in this process.

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