

Building a World-Class Information Technology Workforce for the Chicago Region

A Framework for Action



*Council for Adult and
Experiential Learning*

UIC Great Cities Institute



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Introduction

The large number of IT workers in Chicago defies the conventional “rust-belt” image of the region’s economy and underscores the importance of a strong information technology workforce for the continued prosperity of the region. The Chicago region’s recent economic vitality is due in part to investment in information technology by companies across industries. IT has been applied to increase the efficiency of business processes and to develop new ways of doing business. The widespread application of IT to business has created demand across industries for workers who can apply the tools of technology to business.

Business and policy leaders in the Chicago region recognize the importance of developing information technology businesses, but have focused their attention on raising venture capital, promoting research and technology transfer, investing in infrastructure, and identifying technology growth sectors. The Chicago region still needs a coherent and sustained effort to develop a qualified IT workforce. With support from the MacArthur Foundation, the UIC Great Cities Institute and CAEL formed the Chicago Regional IT Workforce Initiative to help address this concern.

The goals of the initiative are to:

1. Identify trends, needs, and gaps in Chicago-area labor markets for IT professionals.
2. Map IT career requirements, entry points, and advancement paths.
3. Recommend strategies for addressing the needs of employers, IT professionals, and individuals seeking to enter the field.
4. Highlight strategies for increasing access of women and minorities to careers in IT.
5. Engage leadership to implement regional solutions and identify new needs as they arise.

This report is the culmination of the first phase of the project. The findings are based on data gathered from summer 2000 through spring 2001 in interviews and focus groups with a) over 30 employers of IT professionals in industries important to the region’s economy, b) 25 IT education and training providers, and c) nearly 50 IT professionals,

including women and minorities at all position levels, as well as IT workers in entry-level positions. The project also drew on existing information from the American Electronics Association (AEA), Computing Research Association, Information Technology Association of America (ITAA), and the Northwest Center for Emerging Technologies (NWCET). Although the research focused on employers and schools in Cook and DuPage counties, most findings apply to the greater metropolitan area. The research concentrated on the role of higher education in building the IT workforce because virtually all IT jobs require at least some post-secondary training, even at the entry level.

This report is intended for business, education, government, policy, foundation, non-profit, and labor leaders who understand the importance of positioning the Chicago region as a global center for businesses that produce and use information technologies. It is for policy makers who want to strategically use public investments in education and training resources and services, and for educators and trainers who want to respond more effectively to employer needs. It is also for individuals who are employed in or want to enter IT professions.

The report presents data on the supply of and demand for IT workers in the Chicago region, where IT workers work, the nature of IT work, typical qualifications for IT professionals, and how employers recruit IT workers. It describes various entry points to a career in IT, how to advance in the field, and the Chicago region’s educational and training resources available to the existing and potential IT workforce.

The recommendations are based on employers’ priority needs, IT career ladders and entry points, and the region’s educational and training resources. They draw on lessons learned from the effective strategies of other regions, and models and emerging opportunities in this region.

The Chicago Region Needs Information Technology Workers

A strong IT workforce is critical to the continued vitality of the Chicago region's diversified economy. A recent study that defines IT industry sectors according to the concentration of employees in IT occupations, such as systems analysts, data base administrators, computer professionals, and computer scientists, shows that many industry sectors not traditionally thought of as IT do, in fact, employ large numbers of IT workers. These include finance, insurance, communications, motion pictures, management consulting, and public relations (Markusen 2001). By this definition, the Chicago metropolitan region ranks first nationally in the number of employees in what the study calls "I-Tech Jobs." The chart below shows the top ten ranked metropolitan regions.

METRO AREAS RANKED BY I-TECH JOBS

Metropolitan Area	I-Tech Industry Jobs
Chicago	.277,400
Washington, D.C.	.277,100
New York	.262,500
Boston	.218,500
Philadelphia	.180,000
Atlanta	.151,500
Dallas	.150,800
San Jose	.148,700
Minneapolis-St. Paul	.133,500
Orange County	.114,900

Source: Markusen et al. 2001.

Although the current demand for IT professionals has softened considerably from a year ago, employers in Chicago and elsewhere continue to experience difficulty finding workers qualified to fill the many open positions, especially for jobs requiring experience in the field. These are described in the chart below. Given the rapid pace of technological change in the field, few professionals are able to stay on the cutting edge of their particular specialties. And the proliferation of telecommunications systems based on wireless and technologies that combine video, voice, and data has increased the demand for professionals with experience in these emerging technologies. Because the majority of Chicago-area employers want to apply IT tools to their particular business, there is a strong demand for technical experts who also have extensive business experience. Hospitals and health care systems, for example, need IT professionals who also know the health care business.

At lower position levels, employers continue to hire, but not at the pace of recent years. The market for entry-level programmers and web designers has cooled considerably, and recent graduates in web design have had difficulty finding jobs. In most areas, the entry-level shortages do not represent a shortage of applicants, but of qualified applicants. Employers continue to express great dissatisfaction about the readiness of applicants for entry-level jobs.

IT PROFESSIONALS IN SCARCE SUPPLY IN CHICAGO REGION

Job Title	Role
Business Systems Architect	Designs information systems for use in business applications. Requires deep technical knowledge as well as extensive business experience.
Enterprise Systems Developer/Integrator	Develops information systems for large-scale business applications typically using packaged systems such as SAP. Often charged with integrating existing or "legacy" data and systems with newer technologies, which are typically Internet-based. Requires facility with latest generation enterprise systems tools, including Internet tools, as well as knowledge of relevant business functions.
E-Commerce Specialist	Designs and works with systems developers to implement Internet systems through which businesses can communicate and share information with customer and supplier businesses and consumers. Requires extensive business knowledge as well as familiarity with Internet tools.
Telecommunications Engineer	Engineers and technicians with expertise in wireless telecommunications and systems that integrate voice and data.
Mainframe Administrator	Administers and develops business applications for mainframe computer systems. Contrary to popular perception, mainframe computers are still the mainstay of businesses that involve extensive transactions (such as banks and large manufacturers) or widespread or "ubiquitous" access to data by customers (such as with ATM networks). Some talent has been lost to "hot" areas in client-server technology and e-business. Especially in demand are professionals who can implement new generation enterprise systems tools on mainframes.
Project Manager	Manages large-scale development of IT systems by technology companies or implementation of enterprise systems by user organizations. Due to lack of supply within the IT field, some technology companies are hiring engineers with no IT experience because of the well-developed methodologies for large-scale project management in engineering disciplines.

How Chicago Can Meet The Need

Unlike other regions, Chicago does not have a strategy for building an IT workforce to help maintain its existing economic base and attract new industries to the region. Many regions are ahead of the Chicago area in developing a strategic response to IT labor market needs. They include not only such well-known high tech centers as Silicon Valley, Austin, and Boston, but also areas such as Northern Virginia, Memphis, Cincinnati, and Omaha that, like Chicago, have a diverse economic base. In some of these regions, IT workforce initiatives were responses to the IT labor shortages of recent years. In others – including the Silicon Valley and Omaha – IT workforce initiatives were responses to economic downturns long before the dot-com boom. All share an overriding vision of the necessity of an IT workforce for regional economic development.

Based on our research on the needs of employers in the Chicago region and our review of IT workforce initiatives in other regions, we believe that the following five components are key to an effective response to the short- and long-term needs for a strong regional IT workforce.

STRONG REGIONAL LEADERSHIP AND ENGAGED BUSINESSES

In forward-thinking regions, policy makers and intermediary groups, such as chambers of commerce, economic development organizations, and colleges, have taken action to address shortages of well-prepared IT workers. Such intermediaries work closely with the business community to identify specific IT workforce needs and to address them through collaboratively designed education programs, marketing and outreach campaigns, joint fundraising, and policy advocacy.

The Association for Information Management (AIM) in Omaha is one of the oldest and best-established regional IT workforce intermediaries. AIM was created in 1991 in response to concerns over the number of large corporations leaving Omaha for other areas. Three consulting firms were engaged to develop strategies to revitalize the local economy. All three recommended that the region build on its telecommunications infrastructure to become a national center for information-based business, or what we now call

e-business. In response, the Omaha Chamber of Commerce, with the backing of key business leaders, established AIM as an independent non-profit. According to Kathleen Eagen, AIM's associate director, "We are a neutral party, so it's a true consortium. Our role is to identify the need, start the dialogue, and rally the players."

AIM has spearheaded an impressive array of initiatives in response to priority issues identified through its research. For example, AIM's study of the business community's needs for IT education resulted in efforts by local colleges to create programs responsive to the needs of employers, including an internship program that has since evolved into a nationally recognized Internet internship clearinghouse used by local employers, colleges, universities, and students. Based on a study of strategies for motivating young people to pursue careers in IT, AIM launched a range of marketing and early exposure initiatives, including "IT Rocks!" a campaign that seeks to dispel the "nerd" image of IT professionals among school-age youth. When the Omaha and Lincoln campuses of the University of Nebraska could not agree about which should host a new IT teaching and research center advocated by the local business community, AIM intervened and negotiated the establishment of the Peter Kiewitt Institute, which serves as an umbrella organization for activities on both campuses.

Active business involvement is critical, because the business perspective gives authority to the activities of these groups. In Denver, three large technology firms – Qwest (formerly US West), Sun Microsystems and Hitachi – held a summit with Colorado higher education leaders to seek the assistance of the education system in relieving the shortage of IT professionals facing employers in the Denver area. The governor responded with a series of initiatives designed to meet business needs.

To leverage systemic change, all the players must line up behind a common vision with strong business leadership. In the Chicago region, policy makers, the business community, education providers, and other stakeholders have not come together around a common vision for the region's IT workforce.

AN EDUCATIONAL SYSTEM RESPONSIVE TO IT LABOR MARKET NEEDS

In the effort to design and implement successful regional workforce initiatives, the higher education system is generally seen as the most important infrastructure for developing the information technology workforce. And in redesigning educational programs to better prepare the workforce, a successful model must strategically involve the business community. According to employers interviewed, not enough graduates are emerging from IT education programs in the region to meet the demand. Employers also report that most recent graduates, or “fresh outs,” have inadequate communication, problem-solving, and organizational skills. IT professionals generally agree that educational programs do not prepare new hires well for the realities of work in the field.

Although it offers many educational and training programs at all levels, the Chicago-area education system needs to be organized to respond to emerging workforce needs. Programs are fragmented and uncoordinated, employers and students have inadequate information about the range of programs, and educational institutions are not aggressively forming partnerships with employers and other educational organizations.

The region’s community colleges are in a position to become leaders in building the IT workforce, but few have taken advantage of this opportunity. In other regions, community colleges have redefined their own missions to respond to the need. They provide leadership by initiating partnerships with the business community. They have raised funds for major industry/education initiatives to support innovative faculty development efforts, such as providing business internships for IT instructors, and to design curriculum that is relevant to the current needs of business. Leading community colleges are also reaching out to under-represented minorities and women by developing bridge programs in collaboration with community-based organizations to prepare low-wage workers for well-paying technology jobs and higher levels of education.

MORE ACCURATE PUBLIC PERCEPTION OF IT WORK AND CAREERS

Although most people believe that IT is a hot field, few understand what IT work entails, its potential career paths, and the importance of IT to all industries. Misconceptions

about IT are common among job seekers, youth, and policy makers. Many think that IT jobs are primarily for “nerds” who do nothing but work in front of a computer. They do not realize that most IT professionals spend the bulk of their time interacting with other people.

While it was true in the past that IT professionals generally worked in relative isolation from the primary business units, now IT professionals are integral to the core business team. Top management can no longer make strategic business decisions without involving their chief information officer (CIO). In fact, now CIOs often report directly to a company’s chief executive officer rather than chief financial officer or chief operating officer. IT has brought changes in job roles and qualifications throughout the enterprise.

Many believe that IT workers are employed primarily by information technology firms, even though most IT professionals work in non-IT firms. Today, firms in every industry have IT positions, ranging from jobs that require only a basic familiarity with computers to positions that require broad business knowledge and experience in addition to deep technical skills.

Finally, there are widespread misconceptions about the qualifications necessary to enter IT careers and about effective education and training programs. Lured by the prospect of high-paying jobs, many individuals enroll in the numerous IT certification programs offered by private training firms, universities, community colleges, and other organizations. They seem unaware that employers tend not to hire people with little or no experience, despite their certifications.

Accurate perceptions of IT jobs and roles are essential to recruiting students and employees at all levels, to the design and implementation of effective strategies and programs, and for policy makers to understand the value of a skilled IT workforce to their constituents.

OPPORTUNITIES FOR POTENTIAL IT WORKERS AMONG CURRENT WORKFORCE

The growing importance for IT jobs of business knowledge, as well as problem-solving, communication, and other “soft skills,” makes retraining current employees for these jobs an attractive opportunity. But the research shows that few employers see this potential. Consequently, few provide

opportunities for their employees to retrain for roles in IT, even though doing so may be a cost-effective response to their demand for IT workers. There are many employees who, because of their business knowledge and experience, could, with appropriate training in business application tools, become integral members of IT teams in their companies. Instead, most employers want to hire those with IT experience, and are reluctant to train employees outside of IT for IT positions.

GREATER REPRESENTATION OF WOMEN AND MINORITIES IN THE IT WORKFORCE

The high demand for IT workers offers opportunities for under-represented groups to enter the IT field. However, women and minorities continue to have limited access to IT jobs. The education system, beginning at the early grades, often steers minorities and women away from learning in math, science, and technology. As they progress from education to the workplace, they face many of the same barriers experienced by majority groups, but these barriers have a disproportionate impact on minority groups and women. Employers are often less willing to “take a chance” on them because they often do not have degrees from the better schools, experience in the field, or familiarity with corporate culture. Their lack of influential contacts, mentors, and professional networks exacerbates their disadvantages. Women in our focus groups indicated that the long hours required by many IT jobs – often 12 to 16 hours a day – may prevent women with family responsibilities from entering and advancing in IT.

This should be a concern for employers because the potential pool of IT workers is becoming more diverse — as is their customer base. A comprehensive strategy should include initiatives that increase quality opportunities for women and minorities at multiple levels of education, training, and transition to employment.

Defining The IT Workforce

WHAT DO IT WORKERS DO?

There has been a dramatic change in the role of information technology in business. Information systems are no longer limited to payroll functions and complex computations, but have become the infrastructure through which much business is conducted, and a tool for transforming how business is done. New technology is constantly being introduced into the business world. For example, even very basic business transactions, such as the processing of purchase orders, are increasingly carried out using the Internet. Conducting these transactions over the Internet makes them much more efficient not only because of the speed of digital computation and communication but, perhaps more fundamentally, because the processes are re-engineered to remove needless paperwork, intermediate steps, and middlemen.

The growing role of information technology in business and the proliferation of new technologies have brought about changes in the role of IT professionals. IT professionals are now integral to the core business team. Some firms rotate IT workers into different business units to familiarize them with the language and practices of particular functions. Others try to cultivate IT talent from among employees who have experience and expertise in specific business functions. Either way, the goal is to ensure that IT technical knowledge is applied to improving business functions.

Technical IT jobs can be grouped into seven basic IT business functions (see chart below), following the framework developed by the Northwest Center for Emerging Technologies (NWCET 1999). These are groupings of representative job titles, related by a close association with a common set of technical skills, knowledge, and abilities that reflect how work is organized today and illustrate mobility and progression among job titles. (NWCET calls these IT business functions “career clusters.”) Within each IT business function there are four basic technologist worker levels with numerous positions at each level. The higher-level jobs require greater integration of knowledge and skills across the IT business functions. Higher-level jobs generally also involve greater business content knowledge, in addition to technical skills. Most IT jobs are at the Technician and Operator/Frontline Supporter levels.



Combining the IT business functions and the technologist worker levels creates a framework for technical IT jobs. This framework, below, shows job titles that correspond to each IT business function and type of position. The job titles list

more employees. (This estimate does not include IT professionals who work in government and non-profit organizations.)

TECHNICAL IT POSITIONS							
IT Business Function ▶	Technical Support	Networking/ Telecommunication	Database	Programming	Web Technology	Digital Media	Enterprise Systems
Technologist Worker Levels ▼							
Architects/Specialists Design IT products and systems based on broad insight and deep technical knowledge.		Network Architect Telecom. Architect Firewall Specialist	Knowledge Architect IS Security Specialist	Applications Architect Applications Specialist	Internet Architect	Producer	Business Systems Architect E-Business Specialist
Developers Develop or customize IT products and systems based on designs created by others.	Technical Support Engineer	Network Engineer Telecom. Engineer	Database Developer	Software Engineer Systems Developer	Sr. Internet/Intranet Developer	Web/Multimedia Developer	Business Systems Developer/Integrator
	Tech Support Analyst Testing Engineer Field Service Engineer	Network Analyst Telecom. Analyst Security Analyst	Database Analyst Security Analyst	Programmer Analyst	Internet/Intranet Applications Developer	Web/Multimedia Designer Audio/Video Engineer	Business Systems Analyst/Planner
Technicians Install, administer, test and maintain IT products and systems.	Lead Tech Support Specialist (Help Desk III) Field Supertech	WAN/Internet Admin.	Database Admin. Security Admin.	Programmer	Web Master	Web Programmer Artist/Animator Multimedia Author	Data Systems Manager
	Tech Support Specialist (Help Desk II) Field Support Tech	LAN Admin.	Database Admin. Associate	Software QA Tech Software Tester	Web Admin.	Web Page Designer Graphics Designer	
Operators/Front-line Supporters Operate or help to facilitate use of IT.	PC Support Tech (Help Desk 1) PC Repair Tech						
	Customer Service Rep.	Cable Installer	Data Entry Clerk				

ed nearest to the top of the matrix offer the highest pay and most authority. For example, a Network Architect or a Business Systems Architect is much better paid and requires significantly more skills than a Cable Installer or Data Systems Manager.

Not all IT positions are strictly technical jobs. Other IT job roles are listed in the table below. Many of these non-technical IT positions are often best filled by individuals who have had some experience in technical areas.

WHERE DO IT WORKERS WORK?

According to the Information Technology Association of America (ITAA 2001), there are over 10.4 million information technology professionals working in the U.S. at private firms with at least 50 or

IT professionals, of course, work at IT firms, i.e., firms that produce information technology such as computers, telecommunications systems, and software, or provide technology services, such as network and systems consulting. But because IT has become the infrastructure for doing business in every industry, IT professionals are critical to every business sector. In fact, firms whose main business is not

NON-TECHNICAL IT POSITIONS		
Position	Job Description	Sample Jobs
Technology Service Providers	Support the work of technologists by providing services such as communications, sales, marketing, recruitment, and training.	Trainer, Technical Writer, Product Marketing Specialist, Technical Salesperson
Technical Managers	Manage people who develop and maintain IT products and systems, and provide IT services.	Recruiter, HR Manager, Project Manager
IT Users	Use IT products and systems produced by others. Their work is thus said to be "IT-enabled."	Surgeon, Bank Teller, Stock Trader, Graphic Designer, College Professor

information technology employ nearly 10 times as many IT workers as do information technology firms (ITAA 2001). In the Chicago area this ratio is even higher. Interviews with numerous employers in a wide range of industries that are users, rather than producers, of information technology, indicate that, in every case, IT has become essential to their core business. This includes employers in manufacturing, health care, banking, education, and government.

WHAT QUALIFICATIONS ARE EMPLOYERS LOOKING FOR IN IT PROFESSIONALS?

In general, when it comes to new entrants to the field, employers prefer applicants with degrees, because they see degrees as evidence of motivation and an ability to learn.

How important credentials are to entering the IT field varies by IT business function and level of position. The following table summarizes the credentials typically required to enter different IT business functions.

However, degrees by themselves are not sufficient to get a foot in the door of the IT field. Even employers that recruit from undergraduate computer science programs at elite research universities will not look at applicants unless they have had at least an internship in the field. As the president of a private, Chicago-area technical college observed,

The one stumbling block that many traditional-age students encounter is they've gotten their degree and they go for the interview and the employer asks what experience they have and they say 'well I have this great degree'... and they are surprised that that isn't enough. These are good students. They are just naïve about the fact that if they had done an internship or they had done something like a part-time job in the field they would be much, much more marketable.

In addition to the basic credentials listed in the table, IT employers are also looking for a set of traits in new hires that they believe workers need to thrive in today's rapidly changing IT work environment – traits such as resourcefulness, being “a quick study,” customer-oriented, flexible, and able to communicate and solve problems. Furthermore, employers now also seek general business knowledge and “soft skills” in their new IT hires.

As IT increasingly becomes an essential business tool, business knowledge has become more important as a qualification for IT professionals, and it becomes even more important the higher up one advances. Knowing the language of a particular business function is critical, since much IT work involves talking to staff in business units, translating business needs into technical solutions, and working with the business areas to implement those solutions.

A programmer spends maybe 20 percent of his or her time actually working on code. The rest of the time is spent attending meetings with clients, giving presentations to clients or other members of the technical team, getting feedback from other programmers on code, and the like. A big problem for companies is finding technicians who have people skills to deal with clients or end users. Old-school programmers don't fit into the new world of strong service orientation and extensive interaction with customers.

— Chicago university computer science faculty member with industry experience

New entrants to the field need to demonstrate their ability to solve problems, communicate effectively, and work in teams, in addition to showing that they have mastered the technical fundamentals. The best way to show that one has these qualifications is through work experience. In a recent survey of the demand for IT workers, hiring managers rated “specific experience” as by far the most important entry-level qualification for every IT job category (ITAA 2001). Informal “learning by doing” was ranked twice as important on average as educational credentials in securing an entry-level IT position.

IT Business Function	Typical Minimum Credential
Technical Support	Front-line help desk and repair tech jobs do not require a college degree. Degree in computer fields usually required for career-path jobs at the lead technical support level.
Networking and Telecommunications	Entry-level positions do not require a degree, although degrees are increasingly common. Career-path positions require computer or engineering bachelor's degree.
Programming/Software Engineering	Computer-related bachelor's degree.
Database Development/Admin.	Bachelor's degree for entry positions.
Web Technology	Increasingly requires bachelor's degree as web work now involves knowledge of databases, networks, and other sophisticated technology.
Digital Media	Associate degree and bachelor's degree from private technical colleges.
Enterprise Systems	Bachelor's degree in business or computer science; advanced degree and experience for higher-level positions.
Technical Writing Communications	Bachelor's degree.

Things change so fast that everyone in this field is pretty much self-taught. You buy a book, you talk to others with experience, you figure it out on your own. There's lots of "learning by tinkering." This is how new ideas get generated.

— Employer at suburban Chicago manufacturer of electronic devices for defense and commercial use

Interpersonal skills are also important qualifications for IT positions because most IT professionals have to interact extensively with others. IT employers and professionals consistently maintain that communication and other "soft skills" are every bit as important as technical, or "hard," skills.

There is always at least one level of back-up that a help desk or other technical support person can call on for help on technical issues [he or she] may not be qualified to handle. But if that person fails to deal with a customer in a satisfactory way, and if the customer goes elsewhere as a result, there is often little that can be done to repair the damage.

— Chicago-area IT trainer

Employers are highly skeptical of applicants who have had only limited training in IT, even if they have earned certification based on one of the myriad industry or professional standards. Still, the fact that experience and demonstrated ability count more even than degrees mean that it is possible for those without extensive formal education to enter the field. Indeed, more than half of IT professionals do not have a formal degree in a computer-related field (Freeman and Aspray 1999).

HOW DO EMPLOYERS RECRUIT IT WORKERS?

Employers use numerous methods to recruit new IT workers. The most common are summarized in the chart. In general, employers prefer hiring through referrals from current employees and "temp-to-perm." Both of these approaches give the employer some assurance that the new hire will have the appropriate skills and character to fit the position and the organization's culture.

Some employers train existing employees with functional business knowledge for IT positions, especially those involving extensive interaction with customers or knowledge of

the industry. For example, an HR manager at a large medical products manufacturer told us that it is often easier to take "well-rounded people" and train them in technical skills than to take techies and "round them out." About 10 percent of this firm's IT staff consists of these "career changers." Most employers, however, seem reluctant to train non-technical employees for IT roles, even in the face of tight labor markets.

Many employers limit the number of full-time employees by contracting out IT work to temporary or contract workers,

COMMONLY USED RECRUITMENT METHODS

Method	Trends in Use
Employee Referrals	Method preferred by many employers. Growing use of incentives – cars, trips, cash, etc., for referring candidates who are hired.
Temp-to-Perm	Many employers like "try before you buy" approach.
Internet	Use has exploded in recent years.
Recruiters	Expensive necessity in tight labor market. Most employers would avoid if they could.
H-1B Visas	Congress recently expanded quotas. Popular among large technology firms.
College/University Hiring	Small numbers, but still seen as important in long run. Internships or other experience a must.
Internships	Large employers especially use for recruiting new talent.
Job Fairs; User Groups	Good venues for networking.

consultants, or IT service firms. At some larger companies, contract workers comprise over a quarter of the IT workforce. While some of these contract workers are highly specialized consultants who move from company to company working on specialized projects, the majority of IT contract workers are in lower-level support functions such as programming, networking, and help desk. According to a recent survey (ITAA 2001), nearly half of the companies surveyed used outsourcing as the preferred method for filling vacancies for IT positions for which they were unable to find qualified applicants.

When there is a shortage of qualified in-house staff, employers turn to outsourcing to solve such problems as jump-starting the implementation of a new system that the full-time staff are then expected to take over, or obtaining specialized expertise not available in-house or needed in the long run. Contract workers give employers the flexibility to maintain a core staff and then increase or decrease

the amount of contract labor according to the level of demand. However, many employers use contracted labor as a gateway to full-time employment.

The same technology that is driving IT business facilitates global outsourcing and consolidation of labor-intensive operations. For example, a telecommunications systems manufacturer interviewed is outsourcing production of systems involving both hardware and software to India and Ireland. And one large consulting firm interviewed is considering consolidating help desk operations for its operations nationally in a single call center. This will eliminate hundreds of positions that have been decentralized throughout the firm's many offices.

Employers also seek to eliminate labor-intensive operations through automation. Among the examples mentioned by employers interviewed are the use of intelligent systems to handle routine customer questions and concerns, and automating support requirements through the use of mainframes and telecommunications.

We've had 125 openings we haven't been able to fill for months because the applicants aren't qualified...Since we can't increase the supply enough, we're going to try to decrease the demand through automation...We're automating the support requirements out of our systems so they can be run like mainframe systems with very few staff...I've told my managers that for every dollar they take out of salary, they can spend three on equipment – so long as it doesn't go back into salaries later...With capital, it is much easier to plan and we can depreciate our investment...[Plus] capital doesn't ask for a five to 15 percent raise every year...It's much easier to sell capital investment to our board, especially when we can't find qualified people...So long as tight labor markets continue, large employers like us will aggressively pursue a strategy of automation.

— VP for Technology Infrastructure for a large financial company

This strategy does create a demand for highly skilled professionals to operate automated systems. At the same time, it eliminates many more lower-level jobs that in the past could be used as stepping stones to careers in technology for new entrants to the field.

Some employers try to limit their need for IT staff by expecting all core employees to be computer literate and to assume some of the responsibilities previously assigned to specialized technical staff. This is becoming increasingly possible because information technology is advancing in ways that allow relatively unsophisticated users to perform very sophisticated tasks. For example, authoring languages allow just about anyone who is somewhat adept at operating PC applications to create their own Web site. This trend is changing job roles and qualifications throughout the enterprise. A human resources director from a medium-size manufacturing firm explained that, in the future, every one of her company's core employees – not just the IT staff – must be either a “business-savvy technologist” or a “technology-savvy business person.”

Entering The IT Field

IT ACCESS POINTS AND CAREER PATHS

In general, employers believe new entrants to IT need training that a) is developed in close conjunction with employers to meet labor market needs, b) provides hands-on experience through projects, internships, and the like, and c) devotes a lot of energy to preparing students for employment and actively connecting them with employers.

In addition to formal education and training, new entrants should seek opportunities for informal learning through building a portfolio of IT project work, even if it is mostly volunteer IT work, and developing a network of contacts in the field. Seeking guidance from others is critical. Many IT professionals indicate that a mentor was crucial to their entry to and development in the IT field.

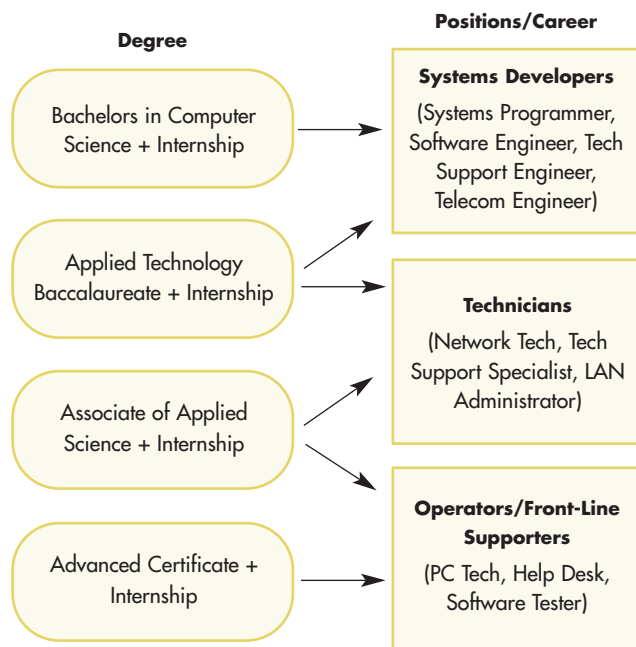
Degree Programs

Although it is possible for those without degrees to enter career-path positions in IT, a degree generally gives new entrants a start much higher up the job ladder and typically allows for more rapid advancement. The diagram below shows the IT job levels at which new entrants to the field with particular degrees can typically enter.

While completing their degrees, students can gain real work experience that employers seek through internships, summer jobs, or volunteer IT work for a church, school, or community organization.

Some programs provide opportunities for doing real project work for industry clients. Employers consider this project learning to be good training. Interacting with the “client” as part of such projects gives students a chance to show prospective employers what they can do. Students can also gain employment opportunities through faculty with industry contacts. Part-time instructors who have full-time jobs in

ENTRY POINTS TO IT CAREERS FOR IT DEGREE GRADS



industry can inform students about what it is like to work in their company, and whether there are opportunities for internships, summer jobs, or full-time employment. Some employers encourage their technical staff to teach classes at local colleges or universities to scout out talented students as possible hires.

Training Programs for Career Changers

The majority of IT workers are career changers who do not have formal degrees in a computer-related field (Freeman and Aspray 1999). Many have degrees in other technical fields and pick up IT skills on their own or through formal training. Others parlay their business knowledge and experience, together with some training in IT tools, to move into IT positions either with their current employer or at another company.

The best formal training programs designed for these career changers are taught by instructors with current industry experience and place a heavy emphasis on project learning. These programs teach students some of the IT basics, in areas such as operating systems, networks, and e-commerce.

Most professionals who complete these programs can expect to start out working in entry-level jobs such as help desk, quality assurance, software testing, junior business analyst, or perhaps as a low-level programmer, even though they entered training with relatively high levels of education and business experience. Professionals with extensive design experience or deep business knowledge can enter into higher-level IT positions. The diagram on the next page shows the various points at which career changers with different levels of experience and training can enter into IT jobs.

A lot of students [in career changer programs] have unrealistic expectations coming in about what jobs they can qualify for... We try to be straight with them up-front that in this field you have to pay your dues [by starting out in the entry-level jobs].

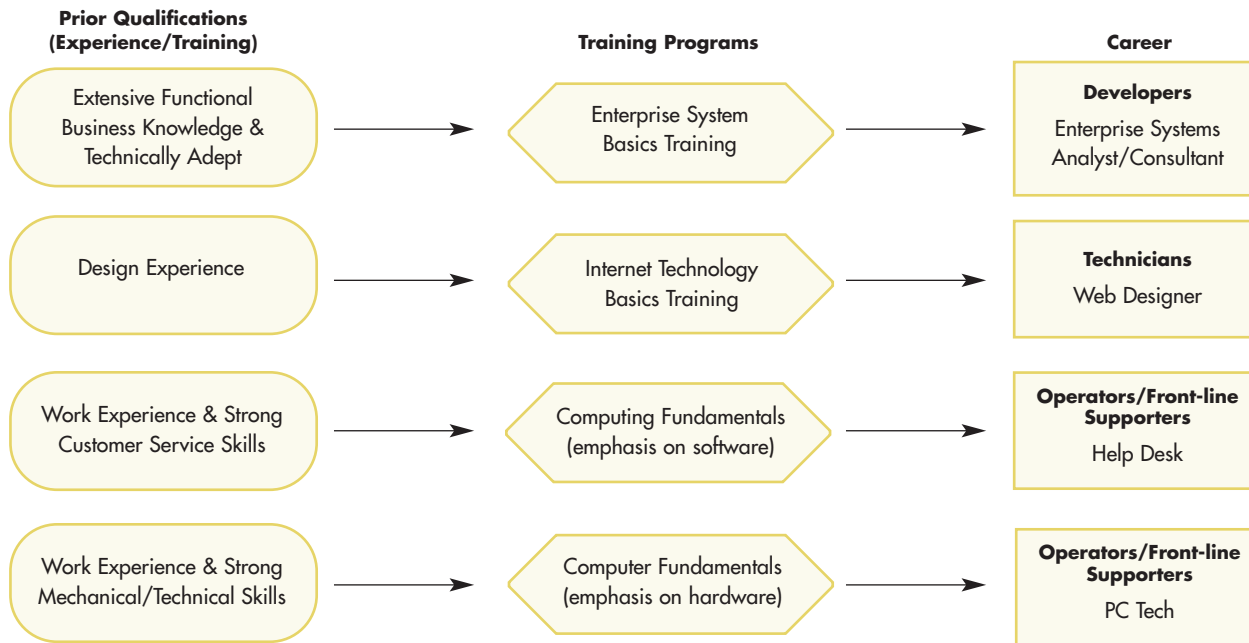
— Director of non-credit IT training program for a Chicago university

One pathway into a full-time IT position, especially for those with no degree and limited training and experience in IT, is by working through a staffing agency, which enables new entrants to build a broad portfolio of IT project experience in a relatively short time. Working with different clients also provides exposure to different technologies and industries, and helps build client skills quickly. Since employers increasingly rely on staffing firms to fill entry-level positions, staffing firms are becoming a key route through which many enter the field.

Skill Upgrading for Incumbent Professionals

Given how rapidly information technology changes, it is essential for professionals already in the IT field to keep their skills up-to-date. Community colleges, universities, proprietary training schools, vendors, and others offer myriad short-term training programs to help IT professionals upgrade their skills. Many of these are designed to enable industry professionals to be certified according to industry standards for skills they have developed through their work.

ACCESS POINTS TO IT CAREERS FOR CAREER CHANGERS



Most IT employers and professionals interviewed indicated that such certifications are most valuable in documenting proficiency with newer technologies that do not yet have wide currency in the field.

Nearly all employers interviewed are willing to pay for their IT employees to pursue training needed to keep their skills up-to-date. Most prefer the training provided by vendors of the IT systems they use (e.g. Microsoft, Cisco, SAP, etc.), or training that is customized to their particular business, rather than the more generic courses offered to the public. In general, both employers and professionals prefer short and intensive training to minimize time away from the job. However, most IT professionals keep their skills current by learning on their own through trade journals, guides and textbooks, e-learning, consulting other professionals, or just working through problems themselves. Some employers give employees paid time to learn and explore new ideas. As an IT manager at a medium-size electronics manufacturer explained,

I always keep a list of ideas and concepts that I take and discuss with the staff. I ask them 'what would you like to do on the side?' And by that, I mean on company time. I give everybody one day to a week to work on ideas and concepts. If somebody is interest-

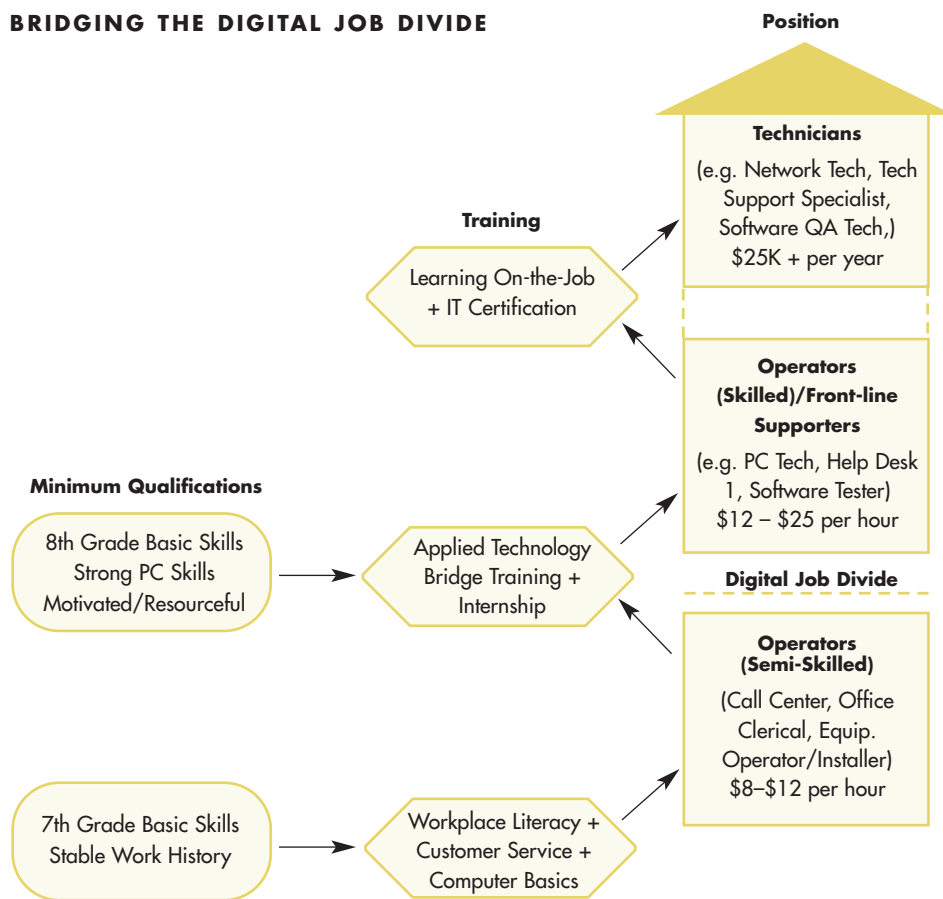
ed in looking at voice systems... They say 'I really think that's the future. We will not need secretaries in the future. We will be able to talk to our computers.' So I encourage them [the staff] to look into it. And I rely on them for that information and show them that I trust it. And the company leaves me open to do the same thing. This environment of learning and discovery is a big selling point for the company.

Bridge Programs for Underemployed

For individuals stuck in low-wage, low-skill jobs, the challenge of getting into well-paying jobs in IT and thereby "bridging the digital job divide" is great. The fact that employers are looking for experience in new hires for IT positions makes it very difficult for individuals with limited work histories and formal education to enter the field. However, it is possible for them to secure jobs in IT, generally through a combination of training and gaining experience through any means possible.

A small but growing number of "bridge" programs across the country have been successful in preparing former welfare recipients and other disadvantaged individuals for career-path jobs in IT. The diagram on the following page illustrates the digital job divide and shows the qualifications and training necessary to bridge it.

BRIDGING THE DIGITAL JOB DIVIDE



Successful bridge programs, such as the Bay Area Video Consortium’s MediaLink program in the San Francisco Bay area, Homeboyz Interactive in Milwaukee, and Manpower’s TechReach program, which is being piloted at sites throughout the country, share several essential characteristics. First, they are developed in close cooperation with employers to ensure that clients are prepared to meet and even exceed entry-level hiring standards. Second, they place a strong emphasis on problem-solving and learning by doing through laboratories and projects involving actual business problems, ideally with real clients. Third, by exposing students to real work and careers in the field through job shadowing, internships, and other means, they help to motivate and direct students to pursue careers in IT.

In addition, all such programs have to work to overcome employers’ reluctance to hire individuals with limited education and work experience. Homeboyz Interactive provides a sheltered work environment by running its own web development consulting business, staffed by individuals recruited from the local neighborhoods who have completed an initial period of training and preparation.

Individuals who complete the hands-on training in IT fundamentals through Manpower’s TechReach program are placed in six-month paid “mentorships,” where they are mentored by experienced IT professionals. Manpower thus assumes most of the risk of hiring TechReach training graduates during the initial six months.

Overcoming employers’ reluctance to hire relatively inexperienced workers for IT positions will be much more difficult now that the IT labor markets have softened, allowing employers to be more selective in hiring. This will make the work of bridge programs even more challenging. Most are very small in scale, serving 50 to 100 participants a year, and are often dependent for funding on limited-term grants from foundations or government programs.

How to offer such an extensive array of training and support services in a way that can be sustained over time and at a scale large enough to serve the large numbers of “working poor” who could qualify remains a challenge for the workforce field.

POST-SECONDARY IT EDUCATION AND TRAINING PROVIDERS

The Chicago region has a rich array of IT education and training resources. In Cook and DuPage counties alone, there are more than 220 state-approved degree and certificate programs and nearly 1,150 non-credit training programs. The latter include basic training programs for those seeking to enter the IT field, as well as advanced programs for IT professionals seeking to update their skills. Some basic and advanced courses are designed to prepare students to earn “industry certifications” through examinations that are developed according to standards set by technology companies or industry groups. In addition, there are thousands of programs and courses in computer basics and office applications designed for more general audiences.

CHICAGO-AREA POST-SECONDARY IT TRAINING PROVIDERS BY PROGRAM LEVEL AND TARGET AUDIENCE

Program Type and Target Audience	Program Level	Number of Institutions Offering Programs at Given Level				Number of Programs
		Universities	Private Colleges	Community Colleges	Proprietary Technical Schools	
Degree Programs – Entry-Level	Masters Degree	9	2	0	0	32
	Bachelor's Degree	9	5	0	0	42
	Associate Degree	1	5	12	0	56
	Professional Diploma/ Advanced Certificate	2	3	13	2	88
Non-Degree Programs – Entry-Level	Basic Certificate	0	0	8	0	35
	Industry Certification (A+)		1	6	26	34
	Course Completion Certificate (Basic)	2	2	13	51	243
Non-Degree Programs – Advanced	Industry Certification	0	3	7	47	379
	Course Completion Certificate (Advanced)	9	1	11	93	489

Most higher education institutions in the region offer IT education and training programs. In Cook and DuPage counties, all nine universities and 15 community colleges offer IT degree programs, as do seven private colleges. Most of the universities and all of the community colleges offer non-credit basic and advanced training.

Proprietary technical schools, operated by private for-profit firms, provide the largest number of non-credit training programs. These schools offer technical training tailored to the needs of industry as well as individuals seeking to enter the IT field or upgrade their skills. There are over 160 of them in Cook and DuPage counties alone, ranging in size from small “mom and pop” operations to large corporations with locations throughout the world. Most offer IT training through both classes open to the public and “customized” training under contract to employers. However, many are moving towards providing only contract training, which ensures enrollment numbers, allows them to schedule programs during normal business hours, and provides higher profits than courses offered to the general public. Public courses are less popular now also because new business software – especially office applications – is not coming on the market as rapidly as in the past.

When new packages were coming out, people needed training. Now it is mostly upgrades, and people can figure those out for themselves. They don't need to come to training. Everybody [in the training industry] is feeling the pull away from public classes. We can't offer widespread public classes because there isn't really [much] new software.

— For-profit training provider

Another reason these schools prefer contract training is the difficulty anticipating demand for public courses when technology changes so quickly and the rate of uptake by industry is so unpredictable. Even when a new product seems promising, industry may be slow to adopt it – hence the demand for training may not be as great as expected.

The toughest part about offering cutting-edge training is that most often it is hard to anticipate employers' moves. They are not always quick to try new things.

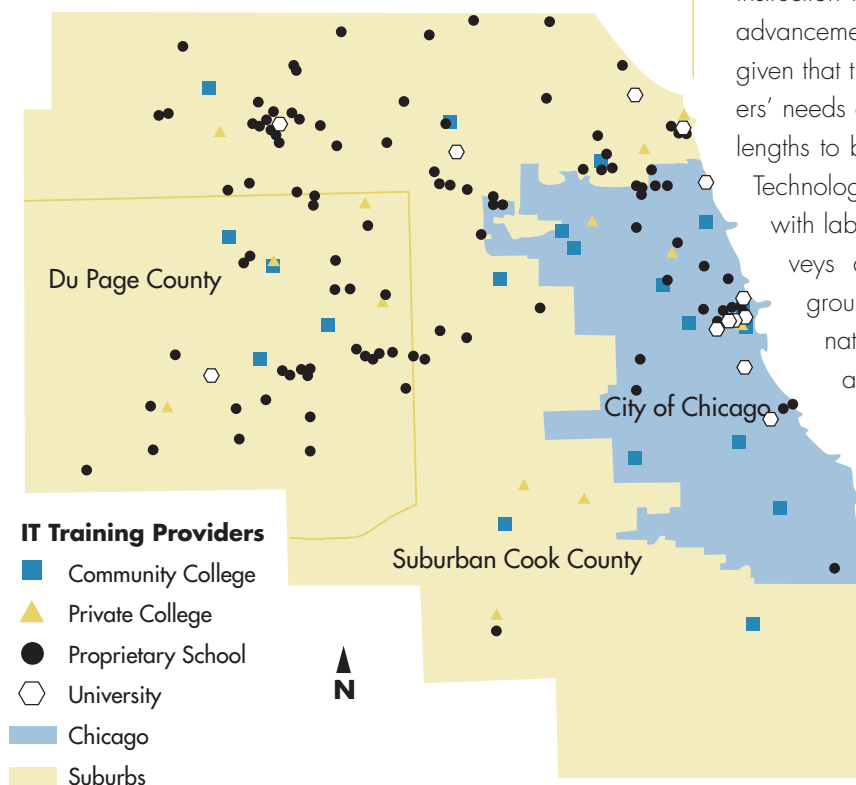
— For-profit training provider

Timing is very hard. New technology doesn't get to businesses very quickly.

— For-profit training provider

Many providers offer programs at multiple locations. The map below shows the locations of IT education and training providers in Cook and DuPage counties. There are high concentrations of providers in downtown Chicago and along the Highway 88 “high tech corridor” that runs between Northern Cook and DuPage counties.

CHICAGO-AREA IT EDUCATION AND TRAINING PROVIDERS



CHALLENGES FACING CHICAGO-AREA TRAINING PROVIDERS

Though the Chicago region has thousands of IT education programs and courses, providers face numerous common challenges to adequately preparing the IT workforce. The most common are summarized below.

Keeping up with rapid change and rising cost of information technology

Nearly every IT educator or trainer interviewed mentioned the difficulty keeping up with the rapid change and rising costs of equipment and software needed for IT training. The price of computer hardware is decreasing while its power increases, but it is still necessary to upgrade equipment frequently. In contrast, software systems are becoming more

costly as they grow more sophisticated. Because predicting which systems to train for has become tricky, the growing investment in both hardware and software required to offer IT training creates an increasing burden on trainers.

Developing and maintaining employer relationships

The best IT education and training programs are built on strong relationships with employers to ensure that the instruction meets industry needs and leads to jobs or job advancement. Building these relationships is challenging, given that training usually takes a long time, while employers’ needs change quickly. Some IT educators go to great lengths to build such ties. For example, DeVry Institutes of Technology use a variety of methods to keep up-to-date with labor market needs, including extensive use of surveys and focus groups with employers, advisory group meetings with both employers and alumni, a national database of employers and job openings, and regular visits to employers by a dedicated job placement staff who specialize in particular industry sectors.

Robert Morris College, a private non-profit institution, also employs a dedicated job placement staff responsible for building relationships with employers. These staff sit with the faculty on curriculum development committees to ensure that the college’s programs continue to meet employer demands (in all fields, not just IT). Both DeVry and Robert

Morris track student progress in the labor market after they graduate, and use this information to improve existing programs and plan new ones. Programs that do not invest as much in relationships with employers tend not to do as well in producing jobs for students and satisfaction among employers.

Need for Quick Training

Everyone in IT places a high priority on learning as fast as possible. Several IT training providers indicated that employers do not want their employees spending too much time away from work, so training must be compact and to the point. In response, some providers offer ‘IT boot camps’ where a company will pay for employees to spend a week-end or several work days in intensive training on specified topics.

The big challenge is trying to develop programs that [allow for] effective learning in shorter time frames. The teaching curriculum has to improve constantly. The challenge is working with a constantly moving target like the Microsoft curriculum.

— IT training provider

Many IT trainers and professionals are turning to e-learning – both formal courses and simply surfing the Web – to keep up with the fast-changing demands of the industry.

Integrating experiential learning into instruction

Everyone acknowledges the importance of including experiential learning as a central element in any IT education or training program. Project learning and internships are ideal ways to ensure that students are “learning by doing.” Actually incorporating projects and internships into the curriculum is a challenge, however. For younger students with limited work experience the challenge is how to ensure that they have an adequate level of maturity and work readiness (as well as technical skill). The problem with students who are also working is finding time to work, go to school, and do project work and internships. Mostly adults want to cram on skills, but learning by doing is more useful preparation.

Teaching through projects is also more expensive than teaching with lectures and books since classes need to be smaller and students often need individual assistance. And, many faculty members are not accustomed to teaching in this way. Given the importance of experiential learning in preparing for IT careers, the challenge is to incorporate into the curriculum the learning by doing demanded by employers while meeting working students’ need for convenience and expediency.

Finding part-time instructors with current industry experience

Many programs rely on industry professionals who teach part-time to keep the curriculum up-to-date, but it is difficult to find professionals willing to accept the relatively modest wages offered for part-time instructors when they could make much more consulting.

A big problem for us is finding qualified people who can teach those courses. What would be really helpful for us was if employers would be willing to contribute their employees to teach, in some way,

however that may be...even on a part-time basis, so that we build a good crop of part-time faculty. That way, we help employers, they help us.

— Community college IT program faculty member

In other parts of the country, employers have actively sought to help educators deal with this problem. For example, employers in Silicon Valley give employees release time to teach courses offered by the local community colleges at employer sites so neither the students nor the instructor have to travel far.

Helping full-time faculty stay up-to-date

Helping full-time faculty stay current is a tough problem, since keeping up is difficult even for professionals with both feet in the field. Many professors are not well-informed about career opportunities for their students because they have not worked in industry. As one professor with extensive industry experience explained,

Students are frequently asking career advice. Faculty may know some things based on people they've worked with. But in general, faculty don't know how things work in the corporations...[Students] can't go to our career placement office, because they don't know that much either except what the employers are telling them...I've had students come to me and ask, 'What is a programming job? Where can I go with a programming job? What other options are there for me? I don't think I want to sit in a cubicle all my life.'

Some institutions have made a serious effort to address this challenge. Full-time faculty at Robert Morris College are paid on a 12-month basis, but are permitted to take off up to 20 weeks to work in industry or pursue training to keep their skills up-to-date. The college also encourages continuous learning by paying 100 percent of the costs of continuing education and through creative scheduling to allow time off for training.

Unrealistic expectations and/or poor basic skills of many entering students

Several educators interviewed indicated that many students seek to enter IT training with overly optimistic expectations of what it takes to get in the field. Many students think they can get a job with just a few short courses.

Employers run ads and they tell people that if you are Microsoft certified or you know Java, you can make \$60,000. And in some ways that hurts us because we, as educators, know that students who have never programmed before, who have no experience, they are probably going to fail if they take our Java class without prerequisites....

— Community college IT faculty member

Other educators interviewed say that entering students lack not only the needed technical prerequisites, but also adequate basic skills in math, communication, and problem-solving. This is a common problem in non-credit programs, which tend to have loose entrance standards, but it is also a problem in college-credit programs, where instructors often have to spend an inordinate amount of time on “remediation.” Beyond that, many instructors complain that, even at the college level, many students are not accustomed to solving problems and learning on their own.

Overall, the problem-solving skill of students has declined over time. Students today want to have someone tell them how to solve problems rather than figure it out themselves. The schools should place more emphasis on teaching problem-solving techniques.

— Engineering manager at a large telecommunications equipment manufacturer who teaches engineering courses at a suburban community college

Little coordination among IT-related programs at different levels

There is too little coordination among education programs at different levels. There should be a clear and “seamless” educational pathway along which a person could advance toward and move up in a career in IT. For example, associate degree credits earned at area community colleges should be transferable to baccalaureate programs in related fields, but in practice this is rare.

Also, some proprietary school representatives interviewed expressed interest in the potential benefits of forming alliances with established educational institutions, whereby the educational institutions would provide a grounding in fundamentals and the proprietary schools would provide training in specific skills and technologies.

The type of [training] programs we have [to develop] in our industry didn’t exist yesterday and they won’t exist in a year. We can’t be accredited; [our programs] don’t have the life span long enough to be. What we need are traditional educators to lay down the foundations.... I can grab that student, give them the particular JAVA skills they need at that moment and return them to the educators. We need these partnerships.

— President, for-profit IT training school

In addition, there are few examples of real partnerships between post-secondary institutions and high schools aimed at preparing young people for post-secondary education and careers in IT. The NetPrep program developed by Harper College with assistance from 3COM and other high-tech employers is a notable exception. NetPrep provides training in networking fundamentals leading to a certification and college credit for high school students and career changers who take the program during the evening.

Priorities for the Chicago Region: Recommendations for Action

BUILD REGIONAL LEADERSHIP

The top priority for the region should be to organize a coalition that would provide the leadership necessary to proactively address the region's evolving IT workforce needs. The main role of this coalition would be to serve as a catalyst, focusing attention and resources on priority needs and promoting the message that IT workforce development is essential for the region's economic development. Among its specific activities, the coalition should:

- Research and communicate employer needs
- Frame the action agenda and monitor results
- Mobilize employer involvement
- Broker relationships between employers and service providers
- Spearhead marketing campaigns
- Advocate supportive public policies.

The experience of IT workforce coalitions in other regions demonstrates the importance of agreeing on a vision and setting specific short-term goals to build and maintain the active involvement of employers and other stakeholders. Short-term successes help to spur priority initiatives in the longer term.

In the Chicago region, an IT workforce leadership coalition may now emerge from the efforts of a joint working group of the Mayor's Council of Technology Advisors (MCTA) and the Chicago Workforce Board's Employer Demand Committee (EDC). The group, comprised of business, education, and government representatives, formed to make recommendations to the Mayor and other policy makers on how to address the region's technology workforce needs, with the IT workforce as a prominent focus. Seven Chicago-area Workforce Investment Boards have been invited to participate, and have agreed to adopt the group's main messages and recommendations for action.

Based on the findings of this study, a regional workforce initiative for the Chicago region should consider the following recommended actions.

BUILD THE EDUCATIONAL PIPELINE

The education system is by far the largest piece of infrastructure for IT workforce development. The Chicago region's resources for IT workforce education and training include some nationally and internationally recognized institutions and programs, yet these resources are not coordinated as a system that supports access to and advancement in IT careers for students and serves as a source of qualified workers for employers.

Any re-alignment of the education system has to be driven by the needs of employers, workers, and job seekers. There is strong consensus among employers and IT professionals interviewed about what the education system should provide:

- Exposure to IT applications and careers from the middle school (or even earlier) onward.
- Project learning, with an emphasis on applied technical fundamentals, "soft skills," and business fundamentals.
- Career planning assistance for students at all levels; work readiness and job placement assistance for students in post-secondary programs.
- Aggressive recruitment and preparation of talented middle and high school students for college-level IT programs by post-secondary institutions with help from secondary schools.
- Aggressive outreach to employers, particularly by post-secondary institutions.
- Capacity to supply greater numbers of IT professionals.
- Access to on-going training and education for professionals in the IT field.

The diagram below outlines steps that need to be taken at each level of the education system to create a more integrated and coherent "pipeline" for the supply of the future IT workforce. The activities indicated include those aimed at connecting learning in the classroom more closely to the demands of IT work as well as improving the connection among different levels of education.

PARTNERS IN BUILDING AN IT WORKFORCE PIPELINE

Baccalaureate Institutions

- Projectbased learning
- Senior projects for industry clients
- Internships/coop programs
- Tech. fundamentals for all students
- Job readiness training
- Faculty sabbaticals in industry
- Articulation with 2-year technology programs
- Host summer youth science/tech camps

Community Colleges

- Projectbased learning
- Capstone projects for industry clients
- Internships/coop programs
- Technology fundamentals for all students
- Job readiness training
- Faculty sabbaticals in industry
- Dual credit programs with high schools
- Host summer youth science/tech camps

Note: Although there is a role for grammar and high schools in preparing an IT workforce, this study focuses on post-secondary education because good IT jobs require some post-secondary education.

High Schools/Grammar Schools

- Required applied math/science/technology fundamentals at all grade levels
- Project learning
- Dual credit programs with technical colleges
- Technology fundamentals for all students
- Guest speakers/field trips/job shadowing
- After-school/summer internships
- Summer tech/science camps
- Teacher “externships” in industry

Adult Bridge Programs

- Recruitment and case management by community groups/social service providers
- Applied technical fundamentals
- Project learning
- Workplace success skills
- Field trips/job shadowing/internships
- Workplace literacy for adults with poor basic skills

Five of the actions recommended in the diagram should be given priority based on the findings of this study: 1) strengthening internships, 2) expanding dual high school-college credit programs, 3) expanding early exposure activities, 4) helping post-secondary institutions recruit part-time instructors with industry experience, and 5) keeping their full-time faculty up-to-date.

IT Internships

There was clear consensus among everyone interviewed for the study – IT employers, professionals, and educators – that internships need to be a prominent part of an overall strategy to address the gaps in the region’s IT education system.

In response to this urgent need, UIC and CAEL have organized a group of four area higher education institutions (City Colleges of Chicago, Harper College, Robert Morris College, and UIC’s Department of Computer Science) to pilot different model approaches to IT internships that address common challenges all face in offering internships responsive to the needs of students and employers. Among the specific approaches to be tested through this project is the potential of industry-sponsored scholarships for students who participate in IT internships. Employers in other regions offer such scholarships along with well-developed mentoring programs for undergraduate students they take on as interns.

Six leading business and professional groups that recognize the importance of the IT workforce for the region – the American Electronics Association, Black Data Processors

Association, Chicago Workforce Board, Civic Committee of the Commercial Club of Chicago, Metropolis 2020, and the Workforce Board of Northern Cook County – have agreed to serve as supporting partners by recruiting employers to participate in the internship pilots and otherwise working to ensure the project’s success.

Dual High School – College Enrollment

The Illinois State Board of Education and the Illinois Board of Higher Education have provided a framework for dual high school–college enrollment partnerships. Dual enrollment programs are a powerful tool for preparing and motivating high school students for post-secondary technical education. This approach is especially effective for first generation and other disadvantaged students since it gives them first-hand experience of what college is like and confidence that they can succeed there. In IT there are already proven models such as Harper College’s NetPrep and the Excel partnerships with the Chicago Public Schools at DeVry Institute of Technology and Robert Morris College. The scale of such programs needs to be expanded by involving other post-secondary institutions and high schools.

Exposure Activities

It is essential that every effort be made to expose young people to opportunities in technology and give them the preparation needed to seize those opportunities. Exposure activities can include extracurricular activities like math and science summer camps, science and technology fairs, guest speakers, and field trips. Ideally, however, exposure activities will have the greatest impact where they are integrated into the core curriculum of the schools. The Education Development Center (EDC) in Newton, Massachusetts has developed a schema for the sorts of exposure activities that are appropriate to students at different grade levels (EDC and ITAA 2000). EDC also provides examples of some of the many innovative ways groups throughout the country have sought to expose students to opportunities in technology.

Instructor Recruitment and Development

Without exception, the educators interviewed for this study reported having difficulty finding qualified part-time or “adjunct” IT instructors with current industry experience and keeping their full-time faculties up-to-date with the rapid

changes in the field. A partnership approach between educators and employers in the Chicago region is needed to respond to the lack of industry-current faculty. In other regions, employers have teamed up with educators to tackle these challenges by, for example, finding innovative ways to free up employees to teach courses for local colleges, and offering summer “externships” in industry for schoolteachers and full-time college faculty.

IMPROVE ACCESS FOR WOMEN AND MINORITIES

The IT workforce is overwhelmingly white and, in certain functional areas, predominantly male. Finding ways to expand access of women and minorities to post-secondary education and careers in IT has the potential to expand the pool of qualified labor to address short- and long-term labor market needs.

Intensive efforts are needed to provide information, counseling, and exposure to girls and minority youth from the primary grades onward, and to involve them in dual high school-college enrollment and post-secondary internship programs. At the same time, the instruction should stress communication, problem-solving, and other soft skills as well as applied mathematics and science and technology applications. Other regions are initiating educational programs that focus on technology, either within existing schools or created as separate schools, such as High Tech High in San Diego.

Many of the women and minority IT professionals interviewed stressed the importance of mentors in helping them decide to enter the field and later in helping them advance in their careers. Those who said they did not have a mentor indicated that they suffered as a result. Employers need to do more to train and cultivate managers and other employees who can serve as mentors. Professional associations such as the Black Data Processors Association (BDPA) and Webgrlrs also provide forums for expanding the network of contacts and guidance that are so crucial to advancement in the field. Employers can also expand the opportunities available to women with children by taking advantage of the “networked” nature of much of IT work, which lends itself to telecommuting. Creative use of telecommuting and flexible scheduling could benefit women and attract them to the field.

TAP EXISTING AND POTENTIAL LABOR POOLS

To meet the IT workforce needs of the region, more needs to be done to tap the experience and skills of individuals already in the workplace. This includes efforts to target potential “career changers” who could parlay their experience into jobs in IT, and under- and unemployed workers who could be trained to fill entry-level IT jobs and thus expand the pool of qualified workers.

Career Changers

Some regions have been very proactive in their efforts to train and prepare professionals experienced in other fields for jobs in IT. The Northern Virginia Regional Partnership has not only expanded training for career changers, but actually employs business outreach staff to engage employers in the development of the training and recruitment of graduates from these programs. Northern Virginia also offers financial assistance in the form of low-interest loans to cover the cost of training for those seeking to enter the IT field.

The Chicago area has a handful of programs to prepare career changers for work in IT. What the region lacks is more systematic outreach to employers by an intermediary like the Northern Virginia Regional Partnership. Such an effort would be needed if the region wants to facilitate the flow of experienced workers into IT on a significant scale. Northern Virginia and other regions also have web sites with guidance on IT careers and IT training for prospective career changers. Similar information would be useful for Chicago-area professionals considering careers in IT.

Unemployed and Underemployed

The booming labor market for IT workers in recent years has generated a lot of discussion among organizations that serve low-income communities on how to prepare low-wage workers for well-paying jobs with a future in the IT field. As was discussed, a number of programs nationally have succeeded at least on a small scale in helping unemployed and under-employed workers “bridge” into career-path positions in IT. In addition, employers need to be made aware of opportunities to retrain their own front-line workers for better jobs within their companies.

In Chicago, there are a number of relatively new bridge programs operating on a small scale that may provide models of effective strategies for overcoming educational,

income, and social barriers to IT careers. I.C. Stars prepares young adults ages 18 to 25 from inner-city neighborhoods for IT jobs through an intensive 90-day training designed not only to enable participants to develop skills, but expose them to the rigors of work in the IT field. After about a year of operation, the program has had 27 graduates, mostly working in high-tech firms. Homeboyz Interactive is opening up a Chicago “branch” in the Rogers Park neighborhood. The Civic Committee of the Commercial Club of Chicago has partnered with Manpower Professional Services along with two community organizations and the City Colleges of Chicago to pilot the TechReach program in Chicago. In the current downturn, employers are much more selective about whom they hire. This makes strong ties to employers even more crucial for the success of bridge programs such as these.

INCREASE AWARENESS OF CHICAGO-AREA IT CAREER AND BUSINESS OPPORTUNITIES

The Chicago region needs to be more assertive about its strengths as a world center for IT business and careers. Other regions have conducted formal marketing campaigns aimed at attracting new technology business to their locales (often using a well-trained workforce as a lure) as well as recruiting talent to the local IT labor pool from both inside and outside. Our research suggests that formal marketing campaigns might be appropriate for at least three audiences in the Chicago region:

Top IT graduates

Several employers interviewed expressed concern that Chicago loses the most talented graduates from area programs to other regions, especially the East and West Coasts. A recent study conducted by Northern Illinois University for the Illinois Board of Higher Education found that recent graduates from Illinois baccalaureate programs in IT are more likely than graduates from other fields to leave the state for jobs elsewhere (Peddle and Trott 2001).

IT professionals in other regions

The continuing abundance of IT job opportunities afforded by Chicago's diverse economy even amid the current economic downturn may well be attractive to IT professionals from other regions with economies much more dependent on technology-producer industries. The time seems ripe to advertise the greater stability afforded by the region's economy in order to attract talent and IT employers into the region.

Youth

Industry and economic development groups in other regions are conducting marketing campaigns designed to convince young people that the well-paying jobs of the future will require facility with information technology, and persuade them to pursue education and careers in IT.

However, marketing is not enough. There also needs to be good information about IT job opportunities and education and training resources to help job seekers take advantage of the opportunities. Other regions offer on-line career and job information for job seekers and resume banks for employers. These Internet resources supplement the sorts of information available on commercial job sites like Monster.com by including information about resources for education and training. Some have produced guides to IT education and training programs for use by employers and job seekers in a given locale. For example, the San Diego Workforce Partnership and the San Diego Economic Development Corporation prepared a guide to IT education and training providers for their area that lists schools, specific programs, and degrees by technical specialty.

Finally, strong leadership is crucial to focus attention on the labor market needs, frame responses, gain commitments for implementation, and assure successful outcomes. Chicago-area policy makers and business leaders have made credible efforts to promote the region's strengths as a center for technology business. However, these leaders need to do much more to acknowledge that the region's strength in technology business rests on the quality of its workforce and to champion efforts to build a strong IT workforce for the continued economic vitality of the region.

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