Assessing Local Industry Needs for the Gateway Technical College

IBM Advanced Career Education Program

by

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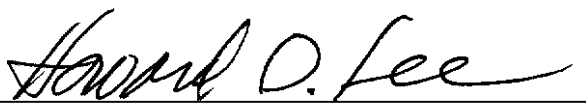

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ABSTRACT

This exploratory study of indirect secondary survey data regarding the extent of local demand for Information and Communications Technology (ICT) professionals and the alignment of the Gateway Technical College/IBM Accelerated Career Education (ACE) program with local business needs finds that there is a substantial need for a local ICT program and that the ACE program is well aligned with business needs.

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Background Information

Information Technology (IT) is the fastest growing industry in the nation's economy with a 68% increase in growth projected between 2002 and 2012 (U.S. Bureau of Labor Statistics). Moreover, by the year 2015, employment in the IT industry is expected to increase by 18.5%, equating to 632,000 new jobs by 2012. In Wisconsin, the IT industry ranked second in industry growth with manufacturing continuing to lead the nation in productivity growth (Hart, Kriz, & Ward, 2001).

Occupations in the IT industry include, but are not limited to: network systems and data communications analysts, network or computer systems administrators, computer support specialists, and computer programmers. Systems analysts resolve computer problems and employ computer technology to meet the specific needs of a business. They help a business to recognize the greatest advantage from its investment in equipment, human resources, and business practice. Systems analysts may also plan and develop new computer systems or create methods to utilize existing systems' assets for other operations. Most systems analysts work with definite types of systems such as, business, accounting, or financial systems, or scientific and engineering systems.

Network or computer systems administrators create, install, and maintain an organization's LAN (local-area network), WAN (wide-area network), network segment, Internet, or intranet system. They supply daily on-site administrative maintenance for software users in a wide range of work settings, including small and large businesses, and government agencies. They support network hardware and software, investigate problems, and supervise the network to guarantee its accessibility to users.

Computer support specialists determine the cause of specific computer problems and provide overall assistance to their company's computer users. They may also install, modify, and repair computer hardware and software. In addition, support specialists oversee the daily performance of their company's computer systems and evaluate software programs for value it may add to their company (U.S. Department of Labor Bureau of Labor Statistics, 2005).

Yet, the IT industry has evolved in recent years from careers solely focused in computer science to those that combine formal IT training with training in a selected business sector; commonly referred to as Information and Communications Technology (ICT) or e-business. For the purposes of this study, occupations under the IT and ICT umbrella will be referred to as ICT or e-business.

The U.S. Department of Labor (DoL) reports, "More than 90% of IT workers are performing jobs outside the IT industry, [making] it necessary for them to have both IT training and complementary training in their respective business sector such as health care, manufacturing, financial services, etc" (http://www.doleta.gov/BRG/Indprof/IT_profile.cfm). Electronic-business involves online business transactions. The term is often used synonymously with e-commerce. An e-business site may be very comprehensive and offer more than just selling products and services. For example, it may feature a general search facility or the ability to track shipments or have threaded discussions. In such cases, e-commerce is only the order processing component of the site.

Despite reports of a decline in IT employment and educational offerings, e-business occupations and commerce is growing. According to a report by Craig Symons from Forrester Research, Incorporated, IT budgets are expected to increase in 2005 (Symons, 2005) and the skills and jobs in most demand will be occupied by those who can easily shift between business

and technology. Also, according to the same report, several other IT occupations including security, Web services, business process modeling, business intelligence, and agile programming will be in high demand. Others in the information and communications industry agree. Career Space, a consortium of ICT companies, issued a report in 2001 discussing the evolution of IT to ICT (e-business) and its impact on nearly every aspect of the economy.

As technology continues to change the way industry conducts business and leisure activities, the demand for individuals with high-level skills will increase. Moreover, individuals possessing high-level skills will enable enterprises to increase productivity and utilize ICT to produce better economic worth and to create and develop information (Commission of the European Communities, 2001; Boreham, & Lammont, 2000).

The positive outcomes of the evolution from IT to ICT/e-business include the ability of individuals to multi-task, increased competence and skills, expanded career opportunities, integration and subordination of work to daily life, increased pay, and reduced time to perform tasks (Rubery, 2001). Selwyn and Gorard (2003) found that adult learning and life-long learning are yet other positive aspects of ICT. They assert that ICT will "overcome barriers to learning by 'helping' individual learners to overcome preexisting problems [to learning] by offering education anyway, anyhow, anywhere" (Selwyn, 2003).

The transition from careers solely in IT to those combining IT with other occupations in industry (e-business) has caused the need for institutions of higher education, including two year colleges, to partner with leaders in the IT industry to offer specific skills training that meets the needs of working adults and employers. According to Mees (1997), educational and government leaders see the growth of education and business partnerships as an extension of the college's mission to serve community. Liston et al. (2003) reports that specialized labor markets improve

employers' labor pools, and Day (1998) contends that two year colleges have a major history of success and customer satisfaction. Yet, previous studies of colleges that offer e-business programs have demonstrated that there is substantial variety in course offerings between schools and many of these courses are only offered in MBA and MS programs (Novitzki, 2002). The study also revealed that there is little consistency among programs. As a consequence, it is difficult to identify a solid core of e-business competencies or skills sets (Novitzki, 2002).

Additionally, e-business program curriculum that is driven by the skill needs of a college's stakeholders help ensure that up-to-date industry needs are met (Fedorowicz & Gogan, 2001). Also, Hernandez, Victor, and Sorensen (1995) contend that global competition and increasing developments in technology are creating situations within the educational system and workplace that demand a highly skilled labor force. These trends call for further partnership among postsecondary institutions and industry to foster economic development (Hernandez et al., 1995). In their research in e-business competencies, Norris and Olsen (1999) assert that the secret to success in designing e-business programs is found in concentrating on the needs of members, customers, suppliers, and stakeholders, including students (Norris & Olsen, 1999). Yet, Novitzki argues that e-business academic programs should not focus solely on employer/stakeholder needs, but rather "detailed analysis of critical elements and knowledge in the field." In failing to do so, according to Novitzki, "it is unlikely that the field will develop as a major independent field of study." (Novitzki, 2002).

However, it is the role of most two-year colleges, including the Wisconsin Technical College System to respond to the needs of industry by providing training programs. In response to regional industry need and to increase the capacity of the college to offer the latest technological advances in ICT/e-business, in 2004 Gateway Technical College, located in

Southeast Wisconsin, formed a partnership with IBM to offer an e-business applications program titled, "IBM Advanced Career Education (ACE)".

The IBM Advanced Career Education (ACE) program is a complete and structured e-business certificate training program intended to enhance application development knowledge and skills, furthering careers, and meeting the evolving e-business demands of organizations. The program allows professionals and graduates interested in e-business application development to improve their skills. The program offers more than 700 hours of both theoretical and practical experience through a combination of classroom education, laboratory exercises, and team projects to stimulate real-world business application experience.

The goal of the IBM ACE program is to provide the theoretical and practical training necessary to expand participants' existing skills to the level of an IT professional with specialization in e-business application development. The main objective is to transform individuals with varying levels of expertise and experience in IT into e-business application developers, programmers, and/or analysts. The IBM ACE program trains participants to become e-Business Application Developers (The IBM ACE program). An e-Business Application Developer is an individual who develops, manipulates, designs, and integrates a computer based business model; as well a developer of an application system in which execution of real-time business processes will take place with the assistance of various network technologies (e.g., intranets, extranets, and/or the Internet using the World Wide Web). This includes not only buying and selling (e-commerce transactions) but also servicing customers and collaborating with business partners. Job roles for e-Business Developers include:

- Web developer
- Web site administrator

- Object-oriented programmer
- e-business solutions advisor
- e-business application developer
- Software developer

(Alex Rodriques, personal communication, June 8, 2005).

While the IBM ACE partnership program was in existence for over one year at the time of the study, the impact of the program had not been assessed.

Statement of the Problem

As throughout the United States, the Gateway Technical College District and the surrounding area lacks an e-business program driven by the skill needs of stakeholders. Partnership among postsecondary institutions and industry can help to meet these needs and foster economic development. Accordingly, in 2004 Gateway Technical College entered into such a partnership with IBM to create the ACE program. The capacity and design of the program would best be determined by an analysis of local industry need.

Purpose of the Study

The purpose of this study is to determine the extent of the demand for ICT professionals and the e-business needs of key employers in the Gateway Technical College District and surrounding area.

Research Questions

The following questions are addressed by this study:

1. What is the extent of the local demand for ICT professionals?
2. How could the program be aligned with local business needs?

Importance of the Study

The study examines the transition of IT to ICT/e-business and the educational programs that have been developed to prepare students for this transition. The study evaluates local industry need for the IBM/Gateway Technical College partnership. The data from the study also provides information to guide decision making about potential changes to curricula. Based on the findings, recommendations may be made to the College and IBM to better meet industry needs for ICT professionals. The information can be used by IBM and Gateway Technical College administrators to improve outcomes for IBM ACE students and employers. The study can be used by other colleges that are considering implementing an e-business program to improve outcomes for their students and employers.

Limitations of the Study

Only select employers generally located within the southeastern quadrant of Wisconsin and extreme northern Illinois were surveyed. A significant percentage (40%) of Gateway Technical College graduates find employment outside of the immediate College district. Despite efforts to operationally define key terms, job titles and job functions, terms such as *ICT* are relatively new, therefore some employers may not yet be familiar with the job function of ICT professionals. Similarly, the term *e-business* may have a specific meaning for each industry sector.

Definition of Terms

Agile Programming—An increasing software development methodology. "The agile method encourages programmers to work on a single piece of code together at one computer to foster face-to-face feedback. It also insists that IT and business users jointly spec out an application's features and functionality" (Levinson, 2003).

Alignment—The "degree to which expectations and certifications are in agreement with respect to what individuals are expected to know and do." (Webb, 1997).

E-Business—Electronic-business is defined as conducting business transactions online. The term is often used synonymously with e-commerce, but e-business can be thought of as an overall term for having a presence on the Web (http://www.answers.com/e-business).

E-Business Application Developer—an individual who develops, manipulates, designs, and integrates a computer based business model; as well as developers of an application system in which execution of real-time business processes will take place with the assistance of various network technologies (e.g., intranets, extranets, and/or the Internet using the World Wide Web).

E-Commerce—Commerce that is transacted electronically, as over the Internet.

ICT—(Information and Communication Technology) The development, installation, and implementation of computer systems and applications (The American Heritage® Dictionary of the English Language, 2005).

Internet—An interconnected system of networks that connects computers around the world via the TCP/IP protocol.

Intranet— A privately maintained computer network that can be accessed only by authorized persons, especially members or employees of the organization that owns it.

LAN (local-area network)—A system that links together electronic equipment, such as computers and word processors, and forms a network within an office or building.

Network segment— A part of an Ethernet or other network, on which all message traffic is common to all nodes, i.e. it is broadcast from one node on the segment and received by

all others. This is normally because the segment is a single continuous conductor, though it may include repeaters.

Skill Standards—Performance standards that delineate what a person must know and be able to do in order to successfully perform roles related to specific jobs and occupational clusters across an industry sector (http://www.gskillsxchange.com/humancapitalseries.htm).

WAN (wide-area network)—A communications network that uses such devices as telephone lines, satellite dishes, or radio waves to span a larger geographic area than can be covered by a LAN (Dictionary.com).

Methodology

This exploratory study of the relationship between an e-business curriculum and the needs of local industry is largely based on analysis of data gathered through a custom designed 20 item survey created by the Gateway Technical College Associate Vice President of Research, Planning, and Development. The survey was conducted as one of the requirements for program approval by the Wisconsin Technical College System. Analyses included calculations of absolute numbers and percentages of respondents from within and outside of the district; absolute number and percent of responses for current and projected employment related data; relative rankings of potential employee qualifications; measures of central tendency (including median and mean as appropriate), measures of variability (range), and trend analysis.

Chapter II: Literature Review

Introduction

This chapter includes information on the progression of the Information Technology (IT) industry to Information and Communications Technology (ICT)/e-business; the growth of this sector; and the skills and competencies required of those who are employed in the ICT/e-business industry. The chapter concludes with an examination of e-business education programs in contrast to the IBM ACE e-business Application Developer program at Gateway Technical College.

The Transformation of IT to ICT/e-business

ICT (Information and Communications Technology) is an umbrella term that includes any device or application concerning computer and network hardware and software, satellite systems, as well as the various associated services and applications. ICT is often spoken of in a particular business or industry environment such as ICT in education, health care, or other knowledge intensive industries. As a result of these two phenomena, traditional methods for capturing and defining labor market requirements do not reflect the full extent of the demand. For consideration, it is now widely believed that between 60-90% of so-called ICT/e-business workers are not within the traditional job roles or industries that define workforce demand.

The focus away from a technology emphasis to a business enabled-by-technology emphasis across any sector, and the broad use of e-business, is a critical juncture in the capacity of America's higher educational systems, including community and technical college systems, to serve the workforce demand. E-business is a high growth, high demand category of knowledge and skills that cuts across multiple industry clusters including manufacturing, healthcare, business and administration, manufacturing, construction, education, and engineering.

E-business enables companies to link their internal and external processes in a more diverse and flexible environment, and work more closely with suppliers and partners to better satisfy the needs and expectations of their customers. In application this involves the introduction of new products and services with their related revenue streams through the use of e-commerce, the enhancement of relationships between clients and partners and improving efficiency from using knowledge management systems.

E-business includes applications that can be divided into three categories: 1) Internal business systems, which includes: customer relationship management, enterprise resource planning, employee information portals, knowledge management, workflow management, document management systems, human resources management, process control, and internal transaction processing; 2) Enterprise communication and collaboration, which includes: content management system, e-mail, voice mail, discussion forums, chat systems, data conferencing, and, collaborative work systems; and 3) Electronic commerce—Business-to-business electronic commerce or business-to-consumer electronic commerce, including: electronic funds transfer, supply chain management, e-marketing, and online transaction processing.

According to Mohini Singh, RMIT University, Australia, "E-business is an innovation that modern day organisations cannot do without. It is based on technology, evolves with technological developments, digitises and automates business processes, is global and leads to improved competitiveness, efficiencies, increased market share, and business expansion." (Singh, 2004). Many experts in the e-business arena agree that ICT skills are essential for the future workforce. In his commentary in *adults learning*, author Alan Clark writes about the impact ICT is expected to have on society, "60 per cent of existing and 90 per cent of new jobs need some form of ICT skills. To support his position, Clark refers to a quote in the November,

2004 issue of *IT Insights: Trends and UK Skills Implications*, "individuals without IT skills risk being excluded both professionally and socially." The United Kingdom Government agrees, and as a consequence, the Qualifications and Curriculum Authority drafted the document, *Skills for Life*, with the intent to link ICT skills, national curriculum, and national occupational standards. Moreover, the Department for Education and Skills is behind a variety of small action research projects to investigate the delivery issues and are creating new ICT qualifications (Clark, 2004).

The literature also indicates that "European employers will need a 50% increase in users with advanced-level ICT skills by 2007. This represents 1.7 million people." Surveys conducted on behalf of the *Skills for Life* initiative suggest integrating ICT in literacy, numeracy, and English for Speakers of Other Languages (ESOL). (Clark, 2004).

Further evidence supplied by a World Economic Forum poll illustrates that among the ten top nations, the United States ranks 10th in the business use of ICT, behind Japan coming out on top, followed by Germany, Sweden, Switzerland, Finland, Iceland, Denmark, Israel, and Singapore (Forward, 2005). Although the U.S. is slow to integrate e-business into current business practices, the rate of growth is expected to increase in the coming years. To accommodate the expected increase in e-commerce, many companies are turning to e-learning suppliers or are creating their own training programs. For example, author, Mike Fadden of InformationWeek reports that General Electric Capital's Center for Learning and Organizational Excellence created a 20-hour online training program as part of a broader e-business initiative. The goal at GE is to train 40,000 people—including executives, managers, professionals, and other salaried staff. A benefit of the GE program is the GE-customized content tailored to fit company needs. (Fadden, 2000).

Yet, GE is not alone in their quest to prepare their employees for the inevitable rise in e-business—Dillard's Incorporated, based in Little Rock, Arkansas with stores in 29 states, is quickly moving to e-commerce. To facilitate the transition, Dillard's contracted with SmartForce, an e-learning supplier. Fadden writes, "SmartForce will help more than 400 IT staffers learn languages and tools such as Java." (Fadden, 2000). Dan Bartholomew, practice leader at KPMG, a global network of professional services firm that provides audit; tax, and advisory services, has 22,000 staffers taking online e-business training.

The above companies are not alone. An increasing number of businesses within the United States are embracing e-commerce enabling technologies as domestic borders are rapidly being replaced by cyberspace and traditional business models are replaced by virtual corporations and virtual employees. University of West Florida researchers report that the United States alone will generate at least $139 billion and Union member states will generate at least $92 billion in business-to-business and business-to-commerce revenues in 2000." (King, et. al., 2001).

In response to the growth in business-to-business and business-to-commerce technologies, the demand for e-business training programs has grown as well. As a result, many two and four year institutions of higher education are offering programs in e-business and many traditional business programs are integrating e-business courses into their curriculum. Many of these programs are tailored to suit individual employer skill needs. At GE, for example, custom content may comprise as much as 70% of e-business curriculum, although "for a less-innovative company, 30% may be enough." (Fadden, 2000). Companies such as Strategic Management Group, Inc., traditionally a provider of business-skills training, and NETg, are branching out into e-business training.

E-business Educational Programs

E-business education programs are as different as the students they serve. James E. Novitzki, Johns Hopkins University, asserts that there is "considerable variety in course offerings between schools and considerable change in offerings from year-to-year." (Novitzki, 2002). The Novitzki report compares several MBA and MS programs for course offerings, program offerings, and course requirements. The most serious problem identified in the report is the lack of consistency in what is offered between programs and like most, the Johns Hopkins study revealed that many organizations are yet searching for the ideal e-business model.

The above sentiment is shared among most programs that offer e-business courses or programs and some believe the rapid growth of e-business is partially to blame for the inconsistencies in these programs. According to a report issued by the University of Louisiana at Lafayette, "Business programs have been faced with the challenge of preparing students to participate successfully in an economic environment radically different from that of a few years ago." (Etheridge, 2001). Part of the difficulty has been in defining which aspects of e-business should be covered in the business program.

Overwhelmingly, e-business programs tend to be aligned with business schools. The majority of the programs are offered at the graduate level with less than half offered at the undergraduate or certificate level. In addition, the King study indicates that a vast number of institutions are offering e-business certificate programs and "forming centers to house e-commerce activities." (King et. al., 2001). Among the e-business Masters programs, the total number of program hours required ranged from 30 to 66 with an average of 36; among Bachelors programs, the total average hours required was 122; and among certificate programs the total required hours averaged 18. (Etheridge et. al., 2001). Among each of the programs evaluated in

the Etheridge study, e-marketing was the "most frequently required e-business course." (Etheridge et. al., 2001). In summary, the King study illustrates the vast inconsistencies in e-business program offerings. As of late, schools offering e-business programs are now adopting a more technical approach, requiring students to become competent in "programming, networks, communications, and system design." (Etheridge et. al., 2001)

Skills of IBM ACE Graduates/Compared to Industry-stated Needs

The IBM Advanced Career Education (ACE) program is a complete and structured e-business certificate training program designed to enhance application development knowledge and skills to meet the evolving e-business demands of industry. This technical training program allows students, either industry professionals or graduates, to increase their e-business skills. The program requires more than 700 hours of both theoretical and practical experience through a combination of classroom education, laboratory exercises, and team projects to stimulate real-world business application experience. The IBM program totals 47 credits divided among four modules. Modules include, among others: Introduction to Computers and Office Tools, Linux Basics, Internet and e-business Fundamentals, Core Java, Software Engineering, and Networking Essentials. The IBM course material is continuously updated by IBM, ensuring that the curriculum contains reference to only the latest technological advances.

Students who complete the IBM ACE e-business program are awarded an IBM ACE Certificate, validating their newly acquired technical skills and knowledge. This expertise is in high demand by organizations involved in e-business development projects who must ensure their IT staff is well equipped to handle the demands of an e-business environment.

Upon successful completion of the program, IBM ACE graduates obtain an internationally recognized IBM ACE certificate, with specialization in e-business application

development. Moreover, the program helps students to prepare for industry certifications such as Certified Internet Webmaster (CIW) Associate, Sun Java Programmer and some IBM product certifications. Analysts and researchers agree that the industry identifies 'e-business' with IBM, an image confirmed by the IBM employees' e-business skills and experience. Many of these skills were gained in IBM classrooms around the world, where immersion in e-business technologies is accomplished through instructor led learning, mentored workshops, hands-on laboratory sessions, and collaborative distance learning courses. In addition, graduates have the option of obtaining high school credit, credits, non credit continuing education credits and industry credentials. The portability of this credential is critical and the college partners will establish a credit transfer process between each institution.

Employer Skills Needs

Employer surveys overwhelmingly indicate that the most critical types of skills needed in e-business occupations are technical skills, managerial skills, and soft skills. Specifically, in a Canadian study, employers indicated that within IT occupations lie three distinct skill types. Employers listed the following as "Very Important" Technical Skills: Analytical skills, Design skills, and Programming skills. Business Skills include: Time management, Planning, and Project Management Skills. Soft Skills include: Team work and Oral communication skills (Survey of IT Occupations, 2001).

A similar study conducted in Canada is in agreement, "The skills employers are looking for from ICT staff are commonly divided into two main types (Bosworth, 2000) technical or 'hard', vocational skills; and generic or 'soft' skills. Most of the discussion and evidence on skill requirements in ICT focuses around technical skills, in particular those associated with specific

operating systems and software products, and increasingly networking technology" (Connor H, Hillage J, Millar J, & Willison R, 2002).

Moreover, the Canada report stresses the increasing demand for ICT skills by users of PCs and the Internet in their work environment. "The most up-to-date and comprehensive evidence on ICT technical skills required by UK employers for their ICT professional staff comes from the ICT Skills Survey, conducted in early 2001 (e-skills NTO, 2001c). This survey was structured around key ICT functions and asked employers which specific skills are needed to perform the main roles in each of the functions, including

> The overwhelming demand for skills associated with the Windows/NT operating systems - by far the most commonly identified skill area across nearly all functions and roles. The importance of being skilled in using Microsoft (MS) applications. MS Access was the application most commonly cited in a range of functions and roles. MS Office and MS Publisher were also important as were a range of other lesser known but still specified Microsoft applications (although the 'other' category does not include Excel which was specified separately and generally appeared further down the 'top skills' list). Understanding of the Unix operating system - both at operational manager level in internal IT or telecommunications operations and also at customer support level (both in internal and external support functions). The object oriented programming languages C and C++ - in particular for software development professionals in ICT-dedicated organisations and also among technicians and engineers involved in product development. (Workforce Development Plan, 2004).

These findings parallel other survey information and add greater insight into the extent of demand. For example, the ICT Skills Survey (see Caine, 2001) indicated a wide range of technical skills perceived as being noteworthy to respondents in their jobs. The most commonly mentioned were those associated with databases, Windows, networks, programming, analysis,

and project management skills. The Skills Survey provides a more clear status of demand, placing Windows/NT skills out at the front. The report also indicates that the "qualitative interviewing with employers, as part of [this] dialogue review, highlighted the importance of some of the newer skill areas which could be considered 'up and coming' - particularly languages and operating systems such as Java, Perl, XML and Linux." (Caine, 2001).

Eric Goldfarb, CIO at IT training firm Global Knowledge Inc., states that many IT professionals who refer to his firm for training in networking want to improve or learn new skills in areas including, TCP/IP, voice over IP, networking fundamentals, security technologies with the highest demand being for Java programming, E-commerce-infrastructure, and database classes. "Web development isn't going away," he says. (Mcgee, 2005).

Yet in a 2001 article titled, *Student Interest in Computer Science Plummets*, Marjorie C. Bynum, a vice president of The Information Technology Association of America, started a program to prod colleges into better preparing students for industry jobs. Bynum states that companies are having trouble filling positions not only because fewer students are going into computer science, but also because many graduates lack "soft skills". Bynum goes on to say, "Many information-technology companies put a huge emphasis on skills like project management, interpersonal communication, and just overall business acumen…colleges and universities need to put more emphasis around that." (Foster, 2005, p. A31).

Chapter III: Methodology

Introduction

The Methodology section addresses how the e-business needs of employers located within and around the Gateway Technical College district were assessed. Included are descriptions of the purposive sample selection, the custom designed survey, data collection procedures, and data analyses.

Subject Selection and Description

The population was determined to consist of those businesses most likely to employ program graduates, based on both commuting distance and employment opportunity. Thus, the population consisted of a total of 237 potential employers for graduates of the IBM ACE program; 87 located within the district and 150 outside of the district. Businesses outside of the district included those located in the counties of Fond du Lac, Dane, and Milwaukee, Wisconsin; and Lake County, Illinois. Businesses were comprised of several types of industry including finance, insurance, and legal services; government, education; healthcare; and manufacturing. Surveys were sent to 87 businesses within the Gateway Technical College district (which comprises the counties of Kenosha, Racine, and Walworth, Wisconsin) and 45 surveys were sent to businesses outside of the Gateway Technical College district. The nonrandom purposive sample consisted of 52 total respondents, comprising 39% of those solicited to participate, almost 22% of the total population.

Instrumentation

The data collection instrument was a custom designed 20 item survey created by the Gateway Technical College Associate Vice President of Research, Planning, and Development as one of the requirements for program approval by the Wisconsin Technical College System.

The survey began with a description of the purpose of the ACE program. This was followed by a description of the proposed job functions of potential program graduates. The survey also included a listing of job titles deemed to be apropos for program graduates. This content was included to reduce potential extraneous variation due to instrumentation. Several survey items included open-ended response opportunities, as well as an option to provide comments so that respondents could clarify their responses. Please refer to Appendix 1 for a complete listing of response items and aggregated responses.

Data Collection Procedures

As described above, the 20 item custom survey was distributed to 87 businesses within the Gateway Technical College district and 45 outside of the district. There were 52 total respondents, most of whom were employed in human resources positions. Data primarily consisted of closed-ended responses, supplemented by some open-ended responses, as well as by narrative comments. Please refer to Appendix A: Survey Results for a complete listing of response items and aggregated responses.

Data Analysis

Analyses included calculations of absolute numbers and percentages of respondents from within and outside of the district for appropriate response items; absolute number and percent of responses for current and projected employment related data; relative rankings of potential employee qualifications; measures of central tendency (including median and mean as appropriate), measures of variability (range), and trend analysis. Due to the exploratory nature of the study, no correlations or inferential statistical analyses were deemed appropriate.

Limitations

Generalization of study findings was intentionally proscribed to only the population described above. Caution should be used in extrapolating findings to other geographic regions as the needs of local businesses could be widely disparate from those described herein. The purposive sample was nonrandom by design, however, the influence of extraneous variation due to selection cannot be ruled out. Despite the relatively large and heterogenous sample, those businesses choosing to respond to the survey could have included a common factor skewing representativeness of the resulting sample data. Use of the survey instrument data does represent a secondary data analysis, and should be considered to include all the possible issues attendant to such data, despite efforts to increase operationalization and reduce instrumentation.

Chapter IV: Results

In general, survey results indicate that there is a local demand for ICT professionals, and that the ACE program is well aligned with the needs of respondents. Complete survey data are available in Appendix A: Survey results.

Local demand for ICT professionals

Current workforce. (Please refer to Table 1, page 23.) Survey results indicate that 71% of businesses employ or plan to employ individuals for e-business duties. Of the 32 total number of respondents who provided data regarding current full-time ICT employees, 14 (nearly 44%) indicate that they employ seven or more persons. Over 130 full-time e-business positions were identified. However, of the 11 total respondents who provided data regarding current part-time ICT employees, only two businesses (~18%) have four to six part-time employees. The median hourly wage for e-business application developers is $22.84, which is higher than the median wage for graduates of Gateway Technical College's associate degree programs.

Table 1

Businesses Employing ICT Professionals

Response	Number	Percentage
Yes	32	61.5%
No, but plan to add	5	9.6%
No, and no plans to add	15	28.8%
Total	52	100.0%
Full-time ICT employees		
0	0	0.0%
1	6	18.8%
2-3	8	25.0%
4-6	4	12.5%
7+	14	43.8%
Total	32	100.0%
Part-time ICT employees		
0	6	54.5%
1	2	18.2%
2-3	1	9.1%
4-6	2	18.2%
7+	0	0.0%
Total	11	100.0%

Over the past three years, the local full-time ICT workforce has shown a net gain of more than 50 positions, with only seven respondents reporting a decrease in full-time positions. (Please see Table 2, page 25.) In regards to part-time ICT positions, six employers increased the number of those positions over the past three years, while only two such positions were lost.

There are far more current full-time ICT positions than current part-time positions. In addition, plans to increase positions also favor the creation of more full-time than part-time positions.

The top two reasons cited by respondents for a change in the number of ICT positions over the past three years were "business growth" (50%) and "technological changes" (40.6%) accounting for more than 90% of the reported causes for change.

Table 2

Changes in ICT positions in Past Three Years

Response	Number	Percentage
Increases in full-time positions		
0	6	22.2%
1	7	25.9%
2-3	5	18.5%
4-6	3	11.1%
7+	6	22.2%
Total	27	100.0%
Decreases in full-time positions		
0	8	53.3%
1	3	20.0%
2-3	2	13.3%
4-6	0	0.0%
7+	2	13.3%
Total	15	100.0%
Increases in part-time positions		
0	9	60.0%
1	3	20.0%
2-3	2	13.3%
4-6	1	6.7%
7+	0	0.0%
Total	15	100.0%
Decreases in part-time positions		
0	9	81.8%
1	2	18.2%
2-3	0	0.0%
4-6	0	0.0%
7+	0	0.0%
Total	11	100.0%

Future workforce needs. Full-time ICT positions are expected to increase within the next three years; 62% of those surveyed report that they plan to increase full-time ICT positions while 33% expect to increase part-time positions. (Please see Table 3, pp. 32-33.) Employers report a need for at least 68 full-time new and replacement positions annually over the next three years, and at least 9 part-time new and replacement positions.

According to the CC Benefits Community College Strategic Planner, which compiles labor market data from a variety of sources into its projections, 26% growth is anticipated in the Gateway District for the Computer Software Engineers, Applications occupation between 2005 and 2010. This translates to a total of 84 jobs.

Table 3

Three Year Projection for ICT Position Changes

Response	Number	Percentage
Full-time positions		
No change	11	34.4%
Increase	20	62.5%
Decrease	1	3.1%
Total	32	100.0%
Part-time positions		
No change	11	61.1%
Increase	6	33.3%
Decrease	1	5.6%
Total	18	100.0%

Response	Number	Percentage
Replacement of existing full-time positions		
1-2	11	45.8%
3-4	4	16.7%
5-6	2	8.3%
7-8	1	4.2%
9-10	2	8.3%
11-12	1	4.2%
13-14	1	4.2%
15+	2	8.3%
Total	24	100.0%
Replacement of existing part-time positions		
1-2	3	75.0%
3-4	0	0.0%
5-6	0	0.0%
7-8	0	0.0%
9-10	0	0.0%
11-12	0	0.0%
13-14	0	0.0%
15+	1	25.0%
Total	4	100.0%

Alignment of ACE program with local business needs

Respondents indicate they are satisfied with the educational preparation of their workforce, with 80% reporting that their workforce is adequately trained. (Please see Table 4, page 29.) 56% of respondents report that they "sometimes" have difficulty finding qualified candidates, and 25% said they "usually" or "always" have difficulty.

Employers rate "previous work experience," "associate degree," and "bachelor's degree" as the most important qualifications, in that order. Ratings for the bachelor's degree and associate degree were nearly the same.

Table 4

ICT Employee Qualifications

Response	Number	Percentage
Employees have adequate educational preparation		
Yes	26	81.3%
No	5	15.6%
Unsure	1	3.1%
Total	32	100.0%
Difficulty finding qualified candidates		
Always	4	12.5%
Usually	4	12.5%
Sometimes	18	56.3%
Rarely/never	6	18.8%
Total	32	100.0%
Response	Number[1]	Average Rating[2]
Importance of qualifications		
Previous related work experience	27	1.59%
Associate degree	21	1.90%
Bachelor's degree	23	1.97%
Database specialization	16	2.17%
WebSphere specialization	14	2.21%
Java certification	14	2.27%
Application Security specialization	14	2.41%
Dot.net specialization	8	2.54%
Internship experience	15	2.58%
Sun certification	9	2.62%
MCSE	11	2.60%

[a] rating as very important or important

[b] (1 = very important, 4 = not important)

Fully 97% of respondents would hire a graduate of a Gateway Technical College e-business program. (Please see Table 5, page 31.) 67% would hire a graduate who had no related paid work experience. 65% would encourage their current employees to take specific courses from a Gateway Technical College program, and 27% would encourage completion of an entire program.

While labor market data indicates that most individuals currently employed in this occupation have attained a bachelor's degree, the needs assessment results show that employers would be willing to hire associate degree graduates of this program. In fact, only one respondent indicated that the business would not hire a graduate of the program.

Table 5

Program Utilization and Hiring

Response	Number	Percentage
Willingness to enroll current employees		
Yes, I would encourage program completion	10	27.0%
Yes, I would encourage specific course completion	24	64.9%
No, I would not encourage my employees to attend.	3	8.1%
Total	37	100.0%
Willingness to hire GTC program graduate		
Yes	36	97.3%
No	1	2.7%
Total	37	100.0%
Willingness to hire GTC graduate with no related paid experience		
Yes	36	97.3%
No	1	2.7%
Total	37	100.0%
Willingness to hire any graduate with no related paid experience		
Yes	25	67.6%
No	12	32.4%
Total	37	100.0%

Chapter V: Summary, Conclusions and Recommendations

Summary

Information Technology is the fastest growing industry in the nation's economy, ranking second in Wisconsin. The IT industry has evolved from careers solely focused in computer science to those that combine formal IT training with training in a selected business sector. The lack of recognition of this evolution in the industry has resulted in a misconception of a decline in IT employment. To the contrary, reviewed research projects an increase in IT budgets. The range of evolving and increasing IT related occupations help businesses to gain the greatest advantage from their investments in equipment, human resources, and business practice. The positive outcomes of the evolution from IT to ICT/e-business include increases in: multi-tasking, competency, skill diversity, work place efficiency, career opportunities, and pay.

This transition calls for higher educational institutions to partner with IT industry leaders to create programs that will prepare the workforce to meet the local need for ICT/e-business professionals. An e-business program curriculum driven by the skill needs of local stakeholders and developed in partnership with industry leadership ensures that industry needs are met while fostering economic development. These partnerships have been characterized by educational and government leaders as an extension of the college's mission to serve the local community. Previous studies demonstrated that many efforts to address this emergent need only involved additional course offerings at the graduate level, and that when comprehensive programs had been created that tbey lacked consistency.

This study examined the IBM Advanced Career Education e-business certificate training program partnership with Gateway Technical College which was designed to train participants to become e-Business Application Developers. The goal of the IBM ACE program is to provide the

theoretical and practical training necessary to expand participants' skills to the level of an IT professional.

This study sought to determine the extent of the demand for ICT professionals and the e-business needs of key employers in the Gateway Technical College District and surrounding area. The exploratory study is largely based on analysis of data gathered through a custom designed 20 item survey conducted as one of the requirements for program approval by the Wisconsin Technical College System. Analyses included attributes of respondents from within and outside of the district, employment related data, rankings of potential employee qualifications and trend analysis.

Conclusions

In its attempt to determine the extent of the demand for ICT professionals and the e-business needs of key employers in the Gateway Technical College District and surrounding area, the study asked two questions: "What is the extent of the local demand for ICT professionals?", and "How could the program be aligned with local business needs?"

1. What is the extent of the local demand for ICT professionals?

Local businesses have been employing ICT professionals and project that they will increase both the number of ICT positions and persons hired. Over 97% of local employers surveyed stated that they would be willing to hire an ACE program graduate, demonstrating a very close alignment of the program to business needs.

The importance and complexity of these ICT positions which cut across traditional occupational boundaries may be underscored by the demand for full-time over part-time positions, both in the current workforce and in the projections for new positions. More than 90% of the reported causes for change in the increase of ICT positions were "business growth" and

"technological changes" which supports the Department of Labor's assertion that IT is the fastest growing industry. Program graduates should be able to quickly gain full-time employment paying more than that earned by the average associate degree graduate. The demand for these graduates is supported by the fact that over 80% of local businesses report that they sometimes, usually or always have difficulty finding qualified candidates.

There is a substantial local demand for ICT professionals, and the ACE program is well aligned with the needs of local businesses that will seek an increasing number of graduates of such programs. Survey results indicate that 71% of businesses employ or plan to employ individuals for e-business duties (please refer to Table 1, page 23). Of the 32 total number of respondents who provided data regarding current full-time ICT employees, 14 (nearly 44%) indicate that they employ seven or more persons.

The local demand appears to be indicative of government assertions regarding the continued growth of the IT industry, and the need for educational institutions and businesses to continue partnerships that enable this economic growth.

2. How could the program be aligned with local business needs?

The ACE program partnership between Gateway Technical College and IBM does appear to fit the local need created by the transition from careers previously based solely in IT to those which combine IT with other business functions, the evolving ICT profession. Respondents indicate they are satisfied with the educational preparation of their workforce, with 80% reporting that their workforce is adequately trained (please see Table 4, page 29). However, 56% of respondents report that they "sometimes" have difficulty finding qualified candidates, and 25% said they "usually" or "always" have difficulty. Fully 97% of respondents would hire a graduate of a Gateway Technical College e-business program (please see Table 5, page 31). 67%

would hire a graduate who had no related paid work experience; 65% would encourage their current employees to take specific courses from a Gateway Technical College program; and 27% would encourage completion of an entire program.

Limitations

Despite attempts to operationally define key terms such as job titles and job functions, terms such as *ICT* are relatively new, and respondents' interpretations of ICT job functions likely had some variation. Similarly, the term *e-business* may have a range of nuanced meanings for various sectors of the industry.

The study population was narrowly defined, limiting the ability to generalize findings to other communities. Only specific employers primarily located within the southeastern quadrant of Wisconsin and extreme northern Illinois were surveyed in a purposive sampling technique. The influence of selection cannot be ruled out, and in fact, there is reason to believe that employers having established relationships with Gateway Technical College would have a response bias providing a favorable image of the institution and its programs.

The data collection instrument primarily assessed the current and projected local ICT business workforce. The brief description of the ACE program may not have been sufficient for an adequately informed response to items 15 through 17, again raising concerns about response bias.

The indirect secondary data was provided in grouped frequency distribution tables which limited the extent of analysis and interpretation that could be performed. However, the face validity of the instrument and resultant data is adequate to ensure that the essential conclusions regarding demand and program alignment are sound.

Recommendations

1. Additional studies should be conducted promptly.

This study is based on a limited local geography, the economy of which is still struggling to evolve from a manufacturing base. However, as demonstrated in Table 1, page 23, a large majority of local businesses already employ or plan to employ individuals for e-business duties. In addition, the pay for those existing positions is higher than the median wage for Gateway Technical College associate degree graduates. Therefore, it is possible that other local economies are already experiencing a similar or perhaps even greater need, indicating that local partnerships and programs may need to be developed promptly.

2. Future studies should operationally define job titles and functions.

Due to terms such as *ICT* coming into use only recently, and the rapidly evolving nature of the field, future studies should operationally define job titles and job functions. This standardization will help to reduce the influence of instrumentation as an extraneous variable.

3. Items in data collection instruments should be prospective.

Due to the rapid changes in the number and types of ICT positions, data collection instruments that seek to assess past hiring trends may provide data that could lead to incorrect conclusions. Instrument items which are prospective in nature are more likely to gather data truly indicative of future demand.

4. ICT program curricula should closely reflect the needs of the local economy.

The needs for ICT professionals and the programs to train them are undoubtedly highly disparate based on the local economy. The study area is undergoing a difficult and dramatic transition out of a "rust belt" manufacturing economy to an advanced manufacturing and service based economy. Future studies should carefully consider: boundary issues as determined by

commuting distance and the strength of employment opportunity, business heterogeneity, and a truly representative sampling.

5. Programs should provide a wide range of experiences for participants.

Despite the fact that more than two-thirds of the employers reported that they would be willing to hire a program graduate lacking related paid work experience, some of the respondents' comments indicate that experience can be a deciding factor in employment. In fact, surveyed employers rate previous work experience as the most important job qualification. Given the complexity of the ICT position, and the increasing demand for full-time ICT employment, attention should be devoted to providing a wide range of business experience for the program participant. Providing this range of experience, particularly for inexperienced program participants, could possibly be accomplished through field placements, internships, multiple majors, and/or articulation agreements between educational institutions.

6. Dissemination of future research results should be both prompt and broadly inclusive.

Due to the unique nature of rapidly evolving occupations based on cutting edge technological developments that cut across traditional occupational boundaries, dissemination of research results will need to be both rapid and inclusive. Institutions involved in workforce development and industry leaders must be among those informed, not merely traditional academia. This also implies that research findings must be presented in a form familiar to business leaders. Simply transmitting an APA formatted document may not convey meaning and even alienate some the very people most critical to include in dissemination. This again points to the importance of true partnership between academia and industry in both the study and design of programs. Essential findings must be summarized briefly using meaningful graphics and should be transmitted through a wide range of media including listservs, business newspapers,

trade journals and newsletters, but perhaps even more importantly through networking related events that involve face-to-face contact such as conferences and conventions.

References

Boreham, N.C., Lammont, N. (2000). *The need for competencies due to the increasing use of information and communication technologies*. Retrieved June 8, 2005, from EBSCO Host database.

Caine, D., Price, K., & Sanderson, M. (2001). *An assessment of skill needs in information and communications technology. ICT skills dialogue.* Department for Education and Skills (DfES), the Department for Trade and Industry (DTI) and the sector National Training Organisations. Retrieved November 30, 2005 from http://www.dfes.gov.uk/skillsdialogue reports/.

Clark, A. (2004). ICT, a new skill for life [Electronic version]. *Adults Learning*, September. 26-27.

Clark, A. (2004). Preparing for change [Electronic version]. *Adults Learning*, December. 7.

Commission of the European Communities (2001). *Generic ICT skills profiles: Future skills for tomorrow's world.* Retrieved June 8, 2005, from EBSCO Host database.

Day, P. R. (1998). *The role of America's community colleges commission on workforce and community development*, American Association of Community Colleges. Retrieved May 31, 2005, from EBSCO Host database.

Department for Education and Skills. (2004). *An Assessment of Skill Needs in Information and Communication Technology*. Retrieved on December 10, 2005 at http://www.dfes.gov .uk/research/data/uploadfiles/SD5.PDF.

Etheridge, H. L., Hsu, K. H., & Wilson, T. E. (2001). E-business education at AACSB-affiliated business schools: A survey of programs and curricula [Electronic version]. *Journal of Education for Business*, July/August, 328-331.

Fedorowicz, J., & Gogan, J. (2001). Fast-cycle curriculum development strategies for e-Business programs: The Bentley college experience [Electronic version], *Journal of Education for Business*, 318-327. Retrieved June 8, 2005, from EBSCO Host Database.

Foster, A.G. (2005). Student interest in computer science plummets [Electronic Version]. *The Chronicle of Higher Education*, 51 (38), A31.

Hart, A. J., Kriz, K. I., Ward, D. J., Winters, D. (2001). *Northstar economics incorporated Wisconsin high tech opportunities.* Retrieved May 31, 2005, from http://www.northstar economics.com/northstar_publications.htm.

Hernandez, G., Victor, M., Sorensen, R. R., Nieri, A. H. (1995). *Fostering economic development: opportunities and challenges in postsecondary education.* Retrieved June 1, 2005 from EBSCO Host database.

King, C. G., Frank, S. L., & Platt, R. G. (2001). E-commerce courses: overview of nature and content [Electronic version]. *Journal of Education for Business*, July/August, 332-337. Retrieved December 1, 2005 from EBSCO Host database.

Levison, M. (January 1, 2003). Jack, Be Quick. *CIO.* Retrieved June 9, 2005, from http://www.keepmedia.com/pubs/CIO/2003/01/01/294049/?extID=10047&data=agile_programming.

Liston, C., Jacobs, J., Rosenfield, S. (2003). *Cluster-Based Workforce Development: A Community College Approach.* Retrieved on June 1, 2005 from EBSCO Host database.

Mcgee, M. K. (October 1, 2001). Employers get choosey with skills. *InformationWeek.* Retrieved on December 14, 2005, from http://www.informationweek.com/.

Mees, R. L. (1997). *American community colleges: Leading the way to the future.* Retrieved on June 1, 2005 from EBSCO Host database.

Norris, D. M., Olson. M. A. (1999). National Association of College and University Business Officers. *E-business in Education. What you need to know: Building competencies for tomorrow's opportunities.* Retrieved on June 8, 2005, from EBSCO Host database.

Novitzki, J.E. (December 13-15, 2002). *E-business education: A quantitative review of program attributes and offerings*, 35-39. Paper presented at the International Academy for Information Management (IAIM) Annual Conference, Barcelona, Spain. Retrieved on June 9, 2005 from EBSCO Host database.

O'Grady, J., (2000). *Survey of IT occupations, 2002: Part II, employee survey.* Retrieved December 2, 2005 from http://www.ogrady.on.ca/engineering.htm.

Rubery, J., Grimshaw, D. (2001) ICTs and employment: The problem of job quality. *International Labour Review*, 140 (2), 165-92. Retrieved June 1, 2005 from EBSCO Host database.

Selwyn, N., Gorard, S. (2003). Reality Bytes: Examining the Rhetoric of Widening Educational Participation via ICT. *British Journal of Educational Technology,* 34 (2), 169-81. Retrieved June 1, 2005 from EBSCO Host database.

The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company retrieved June 8, 2005, from, ttp://dictionary.reference.com/search?r=2&q=Information%20technology.

The IBM ACE program. Retrieved June 9, 2005, from http://ace.gtc.edu/.

Connor H, Hillage J, Millar J, & Willison R, (2002). *ICT skills dialogue report. An assessment of skill needs in information and communications technology.* Retrieved December 10, 2005 from http://www.dfes.gov.uk/ skillsdialoguereports/.

U. S. Department of Labor Employment and Training Administration. *Advanced manufacturing*. Retrieved June 8, 2005, from http://www.doleta.gov/BRG/Indprof/Manufacturing _profile.cfm.

U. S. Department of Labor Employment and Training Administration. *Information technology: industry snapshot*. Retrieved on May 31, 2005, from http://www.doleta.gov/BRG/ indprof/IT_profile.cfm.

U.S. Department of Labor Bureau of Labor Statistics. *Tommorrow's Jobs*. Retrieved May 31, 2005, from http://www.bls.gov/oco/oco2003.htm.

Waite, S. (2004) Tools for the job: a report of two surveys of information and communications technology training and use for literacy in primary schools in the West of England [Electronic Version]. *Journal of Computer Assisted Learning*, 20, 11-20.

Appendix A: Survey Results

Response rate = 39% (52 of 132)

The proposed program would prepare graduates to develop, manipulate, design and integrate computer based business models. They develop application systems in which execution of real-time business processes take place with the assistance of various network technologies (e.g., intranets, extranets, and/or the Internet using the World Wide Web). This includes servicing customers and collaborating with business partners as well as buying and selling (e-commerce transactions) within a service-oriented architecture.

Job titles for these individuals include Web Developer, Object-oriented Programmer, E-Business Solutions Advisor, E-Business Application Developer, or Software Developer. **Throughout this survey please consider the job(s) in your organization that most closely align with the above description.**

1. Do you currently employ individuals who perform the duties described on the previous page?

Response	Number	Percent
Yes	32	61.5
No, but we plan to add this position in the future	5	9.6
No, we have no plans to create such positions	15	28.8
Total	52	100.0

Respondents who said no, stopped here.

2. Please list the job titles your organization uses for individuals performing the functions described above.

- Application Developer
- Application Support Administrator
- Application Support Specialist
- Architect
- Assistant Marketing Manager
- Associate Systems Analyst
- Bus. Programmer Analyst
- Business Analyst (2)
- Computer System Specialist
- Computer Support Specialist
- Customer Service E-Business Manager
- Developer
- e business analyst
- E-business Director
- eBusiness Manager
- EC Analyst
- EC Coordinator
- esales admin
- GIS Programmer Analyst
- IS Network Support Tech-Inter

- IS Systems Devmnt Services Prof
- IS Technical Services Prof
- IT and Project Coordinator
- IT Administrator
- IT Applications Consultant
- IT Director
- IT Manager
- IT Specialist
- Lead Analyst
- MIS Manager
- Programmer
- Programmer Analyst (2)
- Project Managers
- Sales Analyst
- Senior Developer
- Software Developer (2)
- Software Engineer
- Solutions Architect
- Sr Systems Analyst/Coordinator
- Systems Analyst
- Systems Analyst/Coordinator
- Systems Manager
- Web Applications Developer
- Web Content Technician
- Web Developer
- Web Developer/Programmer
- Web Master

3. How many of these employees (including all the job titles references in the previous question) are currently employed in your company?

Full-time positions (136-152+ total)

Response	Number	Percent
0	0	0.0
1	6	18.8
2-3	8	25.0
4-6	4	12.5
7+	14	43.8
Total	32	100.0

Part-time positions (12-17 total)

Response	Number	Percent
0	6	54.5
1	2	18.2
2-3	1	9.1
4-6	2	18.2
7+	0	0.0
Total	11	100.0

4. During the past three years, how has the number of these positions changed at your company?

Full-time positions increased by: (71-82+ total)

Response	Number	Percent
0	6	22.2
1	7	25.9
2-3	5	18.5
4-6	3	11.1
7+	6	22.2
Total	27	100.0

Full-time positions decreased by: (21-23+ total)

Response	Number	Percent
0	8	53.3
1	3	20.0
2-3	2	13.3
4-6	0	0.0
7+	2	13.3
Total	15	100.0

Part-time positions increased by: (11-15 total)

Response	Number	Percent
0	9	60.0
1	3	20.0
2-3	2	13.3
4-6	1	6.7
7+	0	0.0
Total	15	100.0

Part-time positions decreased by: (2 total)

Response	Number	Percent
0	9	81.8
1	2	18.2
2-3	0	0.0
4-6	0	0.0
7+	0	0.0
Total	11	100.0

5. If you experienced a change in the number of positions, please indicate the reasons. (Check all that apply.)

Response	Number	Percent
Technological changes	13	40.6
Licensing/certification	3	9.4
Decrease in business	2	6.3
Economic environment	2	6.3
Labor costs	3	9.4
Business growth	16	50.0
Staff retirements	8	25.0
Staff turnover	3	9.4
Other	3	9.4

Other:
Outsourcing
Project reassignments
Reorganization

6. During the next three years, how do you expect the number of positions performing e-business functions will change at your company?

Full-time positions

Response	Number	Percent
No change	11	34.4
Increase	20	62.5
Decrease	1	3.1
Total	32	100.0

Part-time positions

Response	Number	Percent
No change	11	61.1
Increase	6	33.3
Decrease	1	5.6
Total	18	100.0

7. If you expect a change during the next three years, please indicate the reasons. (Check all that apply.)

Response	Number	Percent
Technological changes	12	37.5
Licensing/certification	1	3.1
Decrease in business	0	0.0
Economic environment	4	12.5
Labor costs	1	3.1
Business growth	21	65.6
Staff retirements	6	18.8
Staff turnover	4	12.5
Other	2	6.3

Other:

- Change in business strategy in the 'e' space
- Reorganization

8. During the next three years, how many of these employees do you expect to hire?

Replacement of existing full-time positions: (112-134+ total or 37-45+ per year)

Response	Number	Percent
1-2	11	45.8
3-4	4	16.7
5-6	2	8.3
7-8	1	4.2
9-10	2	8.3
11-12	1	4.2
13-14	1	4.2
15+	2	8.3
Total	24	100.0

Replacement of existing part-time positions: (18-21+ total or 6-7+ per year)

Response	Number	Percent
1-2	3	75.0
3-4	0	0.0
5-6	0	0.0
7-8	0	0.0
9-10	0	0.0
11-12	0	0.0
13-14	0	0.0
15+	1	25.0
Total	4	100.0

New full-time positions: (93-106+ total or 31-35+ per year)

Response	Number	Percent
1-2	3	20.0
3-4	4	26.7
5-6	2	13.3
7-8	1	6.7
9-10	2	13.3
11-12	0	0.0
13-14	1	6.7
15+	2	13.3
Total	15	100.0

New part-time positions: (9-14 total or 3-5 per year)

Response	Number	Percent
1-2	4	80.0
3-4	0	0.0
5-6	1	20.0
7-8	0	0.0
9-10	0	0.0
11-12	0	0.0
13-14	0	0.0
15+	0	0.0
Total	5	100.0

9. Please indicate the typical annual starting salary for an entry level employee performing these e-business functions at your place of work.

Range: $30,000 – 104,000
Mean: $54,863

10. Do you think that individuals currently performing these functions in your establishment have adequate educational preparation for the duties they are performing?

Response	Number	Percent
Yes	26	81.3
No	5	15.6
Unsure	1	3.1
Total	32	100.0

11. If no, what skills are lacking?

- .net
- He is currently in the program.
- Lack the intuitive and creative ability that we would like to have.
- Need more understanding of the 'business.' When what they are solving are 'business problems' using technology, they first need to understand the business and the challenges it faces. Technology is an enabler, not a means to an end.
- Understanding of Structured Programming not just language and syntax. Also a proper understanding of the full SDLC and process methodologies.

12. Do you have difficulty finding qualified candidates for these positions?

Response	Number	Percent
Always	4	12.5
Usually	4	12.5
Sometimes	18	56.3
Rarely/never	6	18.8
Total	32	100.0

13. When you hire an individual to perform these functions, how important are the qualifications below for job candidates to have?

Response	Number rating as Very Important or Important	Average rating (1= very important...4=not important)
Previous related work experience	27	1.59
Associate degree	21	1.90
Bachelor's degree	23	1.97
Database specialization	16	2.17
WebSphere specialization	14	2.21
Java certification	14	2.27
Application security specialization	14	2.41
Dot.net specialization	8	2.54
Internship experience	15	2.58
Sun certification	9	2.62
MCSE	11	2.60

14. What other IT knowledge or skills do you look for when hiring for this type of work?

- Attention to detail and good communication and customer service skills.
- Collaborative project experience
- In no particular order: communication skills, written and oral; proven problem solver; good social skills; team oriented; strong work ethic; solid experiential analysis/programming knowledge.
- Infrastructure knowledge such as network understanding and operating system knowledge or at least understanding that they are playing a part of an overall ERP system and must consider those issues and security. Their application is not an island.
- Network experience/knowledge
- Experience in web design
- Object-oriented/service-oriented application design (OOAD) and object-oriented software engineering (OOSE) skills; understanding of standard coding conventions; usage of a development/SDLC methodology
- Overall IT knowledge
- System integration experience. Functional and Technical Specification Development, understanding of Project Management Principles
- We have the ability to train through our corporate office so basic skills are fine for our location. Any advanced skills are a plus.
- Ability to pick up new technologies. Software development skills. Ability to write clean, concise, legible code. Ability to work well with clients and other programmers. Can design functional, pleasant user interfaces. Strong understanding of web-based technologies and where they are heading.
- Bioinformatics
- General network infrastructure (firewalls and switches).
- Networking knowledge of subnets, tcp/ip
- More and more we look for leadership, communication and project management skills. Many technical skills are outsourced locally or offshore.
- Object-oriented software engineering (OOSE) skills; understanding of standard coding conventions; usage of a development/SDLC methodology.
- Teamwork
- Teamwork and collaboration skills. Some leadership potential. Project management awareness.

15. Would you be willing to hire a graduate who has successfully completed an e-business associate degree program at Gateway Technical College?

Response	Number	Percent
Yes	36	97.3
No	1	2.7
Total	37	100.0

Comments:

- Depending on the open position. In some cases, I would want experience; in others, that might not be so critical.
- I have one that will be graduating.
- It would be nice that they receive exposure on how to use these technologies on the AS400 platform as well as windows. Sometimes we think that the overall technology is the same, but don't understand the idiosyncrasies of the individual platform.
- Pending open position available.
- The answers to these questions were based on Wisconsin State Service which Gateway gets their job postings. I have been the only IT staff at my facility but the state has been on a reorganization of their IT departments and under the Department of Administration, are hiring several new staff as well as implementing previous staff within new positions. Many of the jobs are posted in Madison at this time.
- This would be on a per project level.
- Typically I only hire experienced individuals. College hires are almost always through our college internship program which is primarily 4 year degree programs.
- While we typically look for four-year degreed hires, I would never turn down an opportunity to interview a good candidate regardless of educational background. If the associate degree were coupled with other work experience in business, that can mean more than a four-year degree in terms of having the ability to add value from day 1 at the company.
- Dependent on the caliber of the program.
- If the person has some good experience.
- Typically our IT hires have 4 year degrees, but some have 2 year and some have no degree. The people without a 4-year degree are hired primarily because they have good experience. A two year degree would be extremely helpful for someone without a 4-year degree, and would greatly improve the likelihood that they would get hired.
- Job experience would be required.
- Real experience comes from outside the classroom. In the classroom, students are taught concepts and how to think. I'd like to see a program like this focus on strong fundamentals before layering on additional e-business models that are only going to change in a few years. There is a significant difference between a programmer and a true developer, and unfortunately neither are being produced to any great degree.
- We would need to find places for them to fit in the organization but they could add real value.
- With internship experience or experience.

16. Would you hire a graduate of an e-business program who had no related paid work experience?

Response	Number	Percent
Yes	25	67.6
No	12	32.4
Total	37	100.0

Comments:

- Again, we have situational considerations, but my answer works well as a general statement.
- As previously stated, I would hire them if they were a good candidate with a vision/passion for eBusiness regardless of educational background; HOWEVER, a four-year degree and/or related work experience certainly helps when determining which applicants make it to the interview stage.
- If they demonstrated a good foundation in the aforementioned areas, I would happily hire someone eager to learn and gain experience.
- If we have an experienced person as a lead person.
- It would depend on previous experience.
- Only for entry level
- Pending position responsibilities and ability to be mentored.
- Would depend on the person but this would be unlikely.
- Less likely because we would like to leverage the experience rather than only for entry level.
- Potentially for an internship program. However, most of our interns and/or leadership development program hires have 4 year degrees.
- Starting salary may be less because of no previous work experience.

17. Would you encourage your current employees to enroll in such a program if it were offered through Gateway Technical College?

Response	Number	Percent
Yes, I would encourage them to complete the entire program.	10	27.0
Yes, I would encourage them to complete specific courses.	24	64.9
No, I would not encourage my employees to attend.	3	8.1
Total	37	100.0

Comments:

- At very least we would encourage to take classes. Entire program would be best if they had time.
- Based on the assessed needs of the employee.
- Continuing education is a personal decision; we typically have employees go to seminars & symposiums for current industry trends, not necessarily formal education such as a degreed program. Degreed programs are absolutely encouraged here, but they are typically thought of as separate than the programs we go to as part of our jobs.
- Depending on the courses; depending on the learning habits of the specific staff member; depending on our needs.
- In the case where a certification course would advance their career goals, I would encourage them. However, most of my employees already have 4 year degrees, and when they look at more schooling, want an MBA.
- Provided it is a good program.
- We always encourage our employees to continue their education.

18. Which of the following titles would you most closely associate with the individuals performing this type of work?

Response	Number	Percent
E-Business Technology Specialist	6	16.7
E-Commerce/Web Administration	6	16.7
E-Business Application Developer	22	61.1
Other	2	5.6
Total	36	100.0

Other:

- eBusiness Technical Architect or eBusiness Application Developer
- Systems Analyst/Coordinator
- Application Developer

19. Please make any additional comments to assist us in determining whether there is a need for an associate degree e-business application development program.

- Expand into Milwaukee
- More and more our company is developing web applications for both internal users and customers. Web applications work well in the Radio Frequency environment.
- Not knowing Gateway's current offerings, I cannot say either way. I do know that we are just going to become more and more Internet reliant as time goes on. If you already have an application development degree of any sort, it might just make sense to morph it into this.
- We are doing less and less development work on shore with employees. More and more will go off-shore. The program would be helpful for specific technical certifications or skills, but programming will increasingly go off shore and more work here will focus on project and program management.

20. Please indicate the category that best describes your organization.

Response	Number	Percent
Finance, insurance, and legal services	1	2.7
Government/education	5	13.5
Healthcare	5	13.5
Information Technology	1	2.7
Manufacturing	19	51.4
Other	6	16.2
Total	37	100.0

Other:

- Service/tourism
- Warehousing and retail
- Hotel management
- Service
- Utility
- Wholesaler/distributor