

# A Descriptive Study of Information Technology Needs in Toledo Area Businesses and Professions



2/28/ 05

## **Paul Fritz, Ph.D.**

Associate Professor, Department of Communication  
Faculty Research Associate, The Urban Affairs Center

## **Patrick McGuire, Ph.D.**

Associate Professor, Department of Sociology  
Director, The Urban Affairs Center



The Urban Affairs Center is a partner in the Ohio Urban University Program. The Urban University Program is a unique network linking the resources of Ohio's urban universities with the communities and students they serve. The UUP partners work in a cooperative effort to improve Ohio's urban regions

Prepared for Public Release  
2/05

By The University of Toledo Urban Affairs Center

**Paul Fritz, Ph.D.**

Associate Professor, Department of Communication  
Faculty Research Associate, The Urban Affairs Center

**Patrick McGuire, Ph.D.**

Associate Professor, Department of Sociology  
Director, The Urban Affairs Center

**And**

**Svetlana Beltyukova, Ph.D.**

Visiting Assistant Professor, Department of Social Foundations  
Faculty Research Associate, The Urban Affairs Center

**The University of Toledo  
Urban Affairs Center  
2801 W. Bancroft St.  
Toledo, Ohio 43606  
419-530-3591  
E-Mail: [uac@utoledo.edu](mailto:uac@utoledo.edu)**

**This publication is available for download at the Urban Affairs Center website:  
[HTTP://uac.utoledo.edu](http://uac.utoledo.edu)**

This project was underwritten by funding from the Ohio Board of Regents UUP program, the University of Toledo, and the Regional Growth Partnership.

# Table of Contents

Table of Contents.....	1
Executive Summary.....	2
Background.....	3
Introduction.....	5
Research Questions .....	5
Methodology .....	6
Analysis .....	8
<i>Theme A: What types of IT personnel do local firms believe that they need? .....</i>	<i>8</i>
Summarizing theme A – Perceived Personnel Needs.....	15
<i>Theme B: Respondents’ satisfaction with their Internet connections .....</i>	<i>16</i>
Summarizing theme B -- Respondents’ satisfaction with their Internet connections.....	18
<i>Theme C: The Respondents’ Climate for Training.....</i>	<i>19</i>
Summarizing theme C – Respondent’s climate for training .....	23
<i>Theme D: Respondents’ need for personnel with formal degrees and experience in IT24</i>	
Summarizing theme D – Respondent’s need for Personnel with formal degrees and experience in IT.....	35
<i>Theme E: Respondents’ belief in the role of IT in firm “success”.....</i>	<i>36</i>
Summarizing theme E -- Respondent’s belief in the role of IT in firm “success” .....	39
Findings.....	40
Conclusion .....	44
Policy Implications and Recommendations .....	44
For Economic Development .....	44
For IT Training Providers .....	46
References .....	48

## **Executive Summary**

This study examines how a broad cross-section of local firms (in various sectors and industries) are addressing their IT needs. Looking at their existing technology, their perceived needs, their strategy of hiring, their existing and potential skill levels, and their goals, we come to several conclusions about the IT needs of local firms;

- 1. A vague apprehension about future growth appeared to bridle respondents' ardor for IT development. Respondents don't seem to perceive IT technology as a decisive component of their economic mission.**
- 2. Respondents have blurred expectations of new hires' educational levels.**
- 3. Respondents appear reticent to allow IT staff to solve advanced problems in security, product tracking, and connectivity needs.**
- 4. Sample respondents apparently hesitate to include the use of IT technology in strategic planning.**
- 5. Training occurred when "someone bought new software" or at the caprice of the employer**
- 6. Firms "reacted to" change rather than "anticipated" change.**
- 7. Respondents apparently have few plans to anticipate clients' needs or to cultivate relationships with clients to gain a better understanding of future business trends.**

**In sum, local firms want the benefits of IT, but the vast majority lack the training, knowledge, personnel, resources, and strategies needed to effectively participate in the "new economy." In each thematic section are indicators that they treat IT personnel training, and equipment as an expense to be addressed by cost containment strategies, rather than as an investment to maintain competitiveness and expand their business.**

The implications of this study for economic development efforts in our region are significant. While some of the large firms recognize and are prepared/preparing/ to integrate IT techniques and application so as to enhance their operations and revenues, most are firms lack the most rudimentary preparations. Responses do not reflect a realistic understanding of the breadth of IT penetration of business, recognition of the opportunities for redefining their firms' operations, supply chains, and markets, nor a willingness to invest in their workers or businesses in ways needed to participate effectively in the new economy. In a world of global competition and when a generation of consumers and other businesses rely on IT as a source of information, consumption, production, networking, problem-solving, and even community, and when businesses increasingly embrace workers as "human capital" and active partners helping to advance firm interests, failure to embrace these innovations emerges as a major hurdle impeding Lucas County's future growth. These conditions signal a need for more effective partnership between area businesses and area universities and colleges.

## **Background**

Are NW Ohio businesses at a competitive advantage or disadvantage as we increasingly engage in dynamics of the information economy? Do they have a plan, resources, and are undertaking actions, to participate in these new market opportunities?

This study has two important components. Critics argue that colleges are generally out of step with the needs of local businesses. On the other hand, familiar with the changing expectations of modern markets and the emerging norms of professional activities, college faculty often observe that local firms are systematically under-prepared to meet the expectations and needs of the emerging international market.

Evidence of the later is frequently cited in reference to the mid-west in general and Ohio in particular, when many describe the underlying source of the “brain drain” not as a problem of labor supply, but due to insufficient demand by local firms that have not adapted to the new dynamics of, nor availed themselves of the opportunities, of e-commerce, on-line purchasing and inventory, systems, etc.

Such criticism often has two elements, claims that the firms don’t sufficiently emphasize technical skills, and that they don’t want to pay for such skills. An earlier UAC report (2002) and a study by the Toledo Area Chamber of Commerce and Regional Growth partnership, each found area firms interested in technical and information skills, but willing to settle for minimally or self-trained high school graduates at low wages (Dwyer & Bodin 2002, Toledo CC/RGP 2000).

An Ohio IT Alliance study of information technology (IT) study which included a section by UAC researchers on NW Ohio in 2001 found that while IT employment had increased in the region, it lagged significantly behind the rate in other Ohio urban regions and the national trends. We lagged in the number of IT workers, relative to the size of our workforce and that sector was growing more slowly than in other areas.

Payment to local IT workers was low (lowest in Ohio except for the Appalachian region) and growing slower than any part of the state and below the national rate (LeSage 2001). Exacerbating the significance of this, Ohio has only 1.8% of its workforce in the information sector, compared to 2.6% in the US generally. At the same time, many analysts noted that Ohio lagged behind the national norm in college completion, progress toward participation in the information economy, and no Ohio city ranked in the top 50 on “high tech” economy (Chu 2000). A 2003 Milken report New Economy Index, shows Ohio in the bottom half of the state rankings on almost every one of the 24 categories, and the 2004 Best Cities index shows that Toledo ranks 166<sup>th</sup> and 170<sup>th</sup> (among the 200 major US cities) on its two indicators of effective participation in the high-tech economy (Milken 2004).<sup>1</sup> While this information is distressing, it told only part

---

<sup>1</sup> During the 1997-2001 period Toledo had ranked about 120th among the two hundred cities in previous Milken Best Cities reports, using essentially the same criteria. It is improbable that Toledo “slipped” in their level of IT activity; rather firms in other cities have increased and improved their IT involvement.

of the story, since it focused on IT professionals, not on local firms and their use of IT. Equally as disturbing was a 2000 report from the Greater Cleveland Growth Association which showed that small businesses were slow to reaction to new technologies. It indicated that Cleveland firms were not engaged in strategic decision-making regarding new technologies and that while supportive of Internet technologies, few had designated budgets for hiring sufficient tech workers, and that many were concerned about the quality of service received from local IT support and service providers (Kleinhenz 2000).

At the same time, a study by the Toledo Area Chamber of Commerce and Regional Growth Partnership (2000) showed that local executives valued continuous learning and were emphasizing their need for computer skills as crucial to their firm. Paradoxically, many saw high schools, community colleges, technical certificates, and private training as sufficient sources of computer skills and continuous learning. They portrayed self-directed computer training as their most desired method of creating workforce readiness, and argued that personal referral and local classified ads were their principal methods of recruiting.

While emphasizing the need for new and higher technology, firms were looking in the same places, seeking minimal and self-taught skills, and eschewing better educated and more professionally trained employees. Whether due to isomorphic habit or seeking to “cheap” their way to a new future, their purported goals and their admitted actions constituted a “disconnect” that rendered the types of outcomes noted in the IT Alliance study of the area.

Building on Kleinhenz’ findings that small and medium firms were insufficiently prepared and only minimally integrating IT skills and technology into their businesses, and the general economic context of information technology in NW Ohio, we initiated this study to learn what members of the local business community are doing, and what they seek to do regarding their specific training needs, skills, resources, methods of building capacity, and strategic development relative to IT opportunities. We seek a clearer understanding of how NW Ohio employers are preparing to meet their firms IT needs now and in the future, and where limits and deficiencies may be.

As individuals involved in training of IT professionals, we seek also to find ways to help them meet those needs. Thus, while the principal focus of this study will be on the responses and needs of local firms for training, capacity building, and IT support, we will reflect on the implications of these responses relative to these larger issues of career preparation in universities, as teachers we know the only way to move students forward is to assess accurately what holds them back. Clearly much work awaits both business and universities..

## **Introduction**

A tension separates colleges preparing students for professional tasks duties in the “information age” and employers hiring those graduates. Post-secondary educators tend to construct courses from an abstract, theory-driven model. They argue such courses enhance students’ abilities to solve a wide range of work-related problems by equipping them with “core cognitive skills” that fit a wide range of contexts and issues.

By contrast, employers prefer students with a practical orientation. They argue students should arrive at personnel offices experienced in specific computer programs and applications: spreadsheets, database management, Web site construction, and basic literacy or computational skills. The National Association of Manufacturers (2003) states that educators “...are largely out of step with the career opportunities emerging for young people in today’s economy.”

This tension has implications for curriculum planners whose courses dance dangerously close to ‘vocational training’ and employers who fret that 60% of employers rate new hires’ skills in English and basic math as “poor or fair.” (Barrett 2004). Curriculum designers in higher education need specific knowledge of tasks employers require of new hires.

To reduce this tension in the area of information technology (IT), this research questioned NW Ohio employers to learn the specific IT skills graduates would need. Learning these specifics could help college curriculum planners to create more relevant courses for undergraduates.

## **Research Questions**

Five themes were explored in this analysis. The themes described firms’ IT personnel needs, firms’ perceptions of the Internet, their needs for developing talent in their separate staffs, needs for educated workforce, and the firms’ perceived needs for IT technology to fulfill their economic missions.

THEME A: The Firms’ IT Needs as Evidenced by Personnel Needs. Expanded, this theme could be stated: The types of IT personnel firms currently employ and the firms’ perceived needs for more of these personnel.

THEME B: Respondents’ satisfaction with their Internet connections. This theme explored the firms’ plans for enriching client services and the firms’ confidence in personnel to make this happen via the Internet.

THEME C: The respondents’ climate for training personnel to use IT resources to respond to changing client needs.

THEME D: Respondents’ need for personnel with formal degrees in IT expertise.

**THEME E:** Respondents' interest and belief in the role of IT to keep firms competitive and save money. This theme also explored firms' budgetary commitments for IT spending and for hiring more IT workers.

Viewed as a whole, these themes describe respondents' personnel, connectivity, training, and (highly educated) workforce needs, and the desire for IT to enhance a firms' economic mission.

## **Methodology**

The researchers prepared a survey for local businesses and professions asking about their current use of IT, their anticipated needs, and their levels of satisfaction with current employees hired to use IT products. Data for this study came from a computer-assisted telephone survey (CATI) conducted in spring 2003. The survey population (896 initial names—124 actual participants, 13.8% response rate) was drawn at random from a business phone book. The interviews were conducted by trained and monitored undergraduate and graduate students in the Communication Department and the Sociology Department at the University of Toledo. In each case, pollsters asked to speak to a firm's CIO or his/her designate. Respondents answered an 80 item questionnaire via telephone. Each interview lasted approximately 20 minutes. The target population was the universe of businesses existing in the area; a cross section of for-profit activity (not simply IT firms, or those in IT-intensive industries, or well-financed firms engaged in nation-wide or international commerce).

Our sample profile approximated economic factors of Lucas County in terms of the service industry (sample profile) 27.8% vs. (Lucas Country profile) 28.3%; health care, (11.4% vs. 10.2) and in a lesser sense, durable goods (16.3% vs. 11.1%). By contrast, we over sampled the number of manufacturing firms (18% vs. 4.3%) and "technology" firms (14.7% vs.9.5%) compared with the actual number in Lucas County. Our sample appeared to under-represent firms engaged in the consumer goods business (5.7% vs. 11.5%), retail stores (4% vs. 17.3%) and financial services (.8% vs. 21.7%).

Many of these discrepancies may be explained by the random method (table of random numbers) used in subject selection. Further, the differences may also be explained with the fact many CIOs or their designated officers in services, health care and durable goods, appeared to be more willing to answer the pollsters' questions than CIOs in other economic sectors.



**Table #1 Sample Attributes by Industry Category**

	<b>Sample profile # of businesses</b>	<b>Lucas County profile number &amp; percent of businesses</b>
<b>Services</b>	34/27.8%	6,256/28.3%
<b>Industrial</b>	22/18.0%	968/4.3%
<b>Durable Goods</b>	20/16.3%	2,468/11.1%
<b>Technology</b>	18/14.7%	2,096/9.5%
<b>Health Care</b>	14/11.4%	2,262/10.2%
<b>Consumer Goods</b>	7/5.7%	2,558/11.5%
<b>Retail</b>	5/4.0%	3,831/17.3%
<b>Energy</b>	1/.8%	NA
<b>Financial Services</b>	1/.8%	4,804/21.7%
<b>Total</b>	Total: 122	Total: 22,055

Of significance are the economic segments that comprise the top 88.5% of the sample: services, industrial applications, durable goods, technology, and health care. These apparently “high tech” economic sectors, excluding services, would lead one to assume they wanted persons of rich computer training to perform complex information management tasks. The analysis detailed in this study belies this assumption. Many “high tech” firms needed persons who could perform management tasks using the most basic and uniform computer programs such as Microsoft’s Office Suite. Apparently the complexities of jobs performed by services, industries, durable goods, technology and health care require only “main line” computer capacities as opposed to “cutting edge” applications.

Prior to analysis the 124 responses were re-coded under the following two independent variables; firm size, and technology threshold.

1. “SIZE”: The size of the firm reflected in the number of full-time employees: “Small firms” (seven or fewer employees), N = 30 or 24.2 % of the sample; “Medium firms” (8 to 70 employees) N= 54 or 43 % of the sample; and “Large firms” (71 to 400 employees). N = 38 or 30.6 % of the sample

2. “THRESHOLD”: The technology threshold for employees to gain access to the firm: “Non-Technical Threshold” (NTT) if the firm needed personnel skilled in delivering social services and skilled in solving civic issues such as in education, law, medicine and human resources management -- N = 91 or 73.4 % of the sample

Or

“Technical Threshold” (TT) if a firm were classed as a technical enterprise such as engineering firms, high tech manufacturing, or electronic research firms.

The first phase of the analysis examined the open-ended questions of the instrument. The responses were content analyzed in an effort to identify and collect salient themes. These themes were then examined with the responses to closed questions within those themes. This process rendered a parameter of needs for IT services, personnel and perceived uses of IT among the sample population. N = 32 or 25 % of the sample.

## Analysis

This section of the report “reads through” the majority response levels. After each “analysis” section is a summary of the responses. A separate cumulative “discussion” section will explore implications arising from these themes after the initial review of the five themes and their summaries have occurred.

### **Theme A: What types of IT personnel do local firms believe that they need?**

Researchers’ intent here was to learn the basic categories of IT personnel in use in this sample. These categories roughly echo CIO categories of: application development, database management, Help desk/user support, open source development, networking, project management, security, Website development, Web services (Ware, 2004). The need for Personnel to install PCs at work stations and desks was perceived as low by all size firms and those at various threshold levels. The SIZE variable indicated that Small-Sized Firms (77.1%), Medium-Sized Firms (84.6%) and Large-Sized Firms (64.3%) perceived this work as a low need. This type of worker at Non-Technical Threshold Firms (80.0%) and Technical Threshold Firms (71.0%) received a “low” rating for need.

**Table # 2 -- Title: Company’s Need for PC Installers by Firm Size**

Theme / question: A 48a

Size	Low	Medium	High	Total
<b>Small</b>	27/ 77.1 %	4/ 11.4 %	4/ 11.4 %	35
<b>Medium</b>	44/ 84.6 %	2/ 3.8 %	6/ 11.5 %	52
<b>Large</b>	18/ 64.3 %	4/ 14.3 %	6/ 21.4 %	28
<b>Missing cases</b>	1		1	2
<b>Total</b>	90	10	17	117

**Title: Company’s Need for PC Installers by Technology Level**

Theme / question: A 48a

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	68/ 80.0 %	7/ 8.2 %	10/ 11.8 %	85
<b>Technical Threshold</b>	22/ 71.0 %	3/ 9.7 %	6/ 19.4 %	31
<b>Total</b>	90	10	16	116

The need for repair or support persons also appeared low: Small Firms (71.4%), Medium Firms (63.5%) and Large Firms (46.4%). However, 39.3% of Large-Sized Firms indicated that this type of personnel was a ‘medium’ need. Non-Technical Threshold Firms\_(62.4%) and Technical Threshold Firms (61.3%) echoed this response.

**Table # 3 --Title: Company’s Need for IT repair / support persons by Firm Size  
Theme / question: A 48c**

SIZE	Low	Med	High	Total
<b>Small</b>	25/ 71.4 %	5/ 14.3 %	5/ 14.3 %	35
<b>Medium</b>	33/ 63.5 %	10/ 19.2 %	9/ 17.3 %	52
<b>Large</b>	13/ 46.4 %	11/ 39.3 %	4/ 14.3 %	28
<b>Missing cases</b>	1	1		2
<b>Total</b>	72	27	18	117

**Title: Company’s IT: Need for IT repair / support persons by Technology Level  
Theme / question: A 48c**

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	53/ 62.4 %	20/ 23.5 %	12/ 14.1 %	85
<b>Technical Threshold</b>	19/ 61.3 %	6/ 19.4 %	6/ 19.4 %	31
<b>Total</b>	72	26	18	116

The need for PC maintenance workers was ranked as low in both Small-Sized Firms (71.4%), and Medium-Sized Firms (67.3%). However, a plurality of Large-Sized Firms (39.3%) perceived PC maintenance workers as a ‘medium’ need and 28.6% as a high need. Most Non-Technical Threshold Firms\_(64.4%) and Technical Threshold Firms (54.8%) each perceived of PC maintenance workers as a “low” need.

**Table #4—Title: Company’s Need for PC Maintenance Workers by Firm Size  
Theme / question: A 48 b**

Size	Low	Medium	High	Total
<b>Small</b>	25/ 71.4 %	7/ 20.0 %	3/ 8.6 %	35
<b>Medium</b>	35/ 67.3 %	9/ 17.3 %	8/ 15.4 %	52
<b>Large</b>	9/ 32.1 %	11/ 39.3 %	8/ 28.6 %	28
<b>Missing cases</b>	1		1	2
<b>Total</b>	70	27	20	117

**Title: Company's Need for PC Maintenance Workers by Technology Level**  
**Theme / question: A 48 b**

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	53/ 62.4 %	20/ 23.5 %	12/ 14.1 %	85
<b>Technical Threshold</b>	17/ 54.8 %	7/ 22.6 %	7/ 22.6 %	31
<b>Total</b>	70	27	19	116

Was there a need for IT training personnel to train other IT workers? Table #5 shows a "low" priority was expressed by over 3/4ths of firms in each size and threshold category.

**Table # 5-- Title: Company's Need for IT workers to train other IT workers by Firm Size**

**Theme / question: A 48 d**

Size	Low	Medium	High	Total
<b>Small</b>	29/ 82.9 %	5/ 14.3 %	1/ 2.9 %	35
<b>Medium</b>	40/ 76.9 %	12/ 23.1 %		52
<b>Large</b>	21/ 77.8 %	4/ 14.8 %	2/ 7.4 %	27
<b>Missing cases</b>	2			2
<b>Total</b>	92	21	3	116

**Title: Company's Need for IT workers to train other IT workers by Technology Level**

**Theme / question: A 48 d**

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	64/ 75.3 %	18/ 21.2 %	3/ 3.5 %	85
<b>Technical Threshold</b>	27/ 90.0 %	3/ 10.0 %		30
<b>Total</b>	91	21	3	115

Was there a need for software developers? \_Again, all size and threshold of firms ranked the need for this staff member as “low.” But again a substantial number of Large firms saw need for this position.

**Table #6–Title: Company’s Need for IT workers as software developers by Firm Size**

**Theme / question: A 48 h**

<b>Size</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>	<b>Total</b>
<b>Small</b>	27/ 79.4 %	3/ 8.8 %	4/ 11.8 %	34
<b>Medium</b>	40/ 76.9 %	10/ 19.2 %	2/ 3.8 %	52
<b>Large</b>	19/ 67.9 %	8/ 28.6 %	1/ 3.6 %	28
<b>Missing cases</b>	2			2
<b>Total</b>	88	21	7	116

**Title: Company’s Need for IT workers as software developers by Technology Level**

**Theme / question: A 48 h**

<b>Threshold</b>	<b>Low</b>	<b>Med</b>	<b>High</b>	<b>Total</b>
<b>Non-Technical Threshold</b>	63/ 75.0 %	15/ 17.9 %	6/ 7.1 %	84
<b>Technical Threshold</b>	24/ 77.4 %	6/ 19.4 %	1/ 3.2	31
<b>Total</b>	87	21	7	115

The need for Web designers–for personnel to design Web pages for clients’ or staff members’ use – was given low priority by over 70% of firms in all three size levels and among the various threshold levels.

**Table #7-- Title: Company’s Need for Web page Designers by Firm Size**

**Theme / question: A 48 e**

<b>Size</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>	<b>Total</b>
<b>Small</b>	26/ 74.3 %	3/ 8.6 %	6/ 17.1 %	35
<b>Medium</b>	38/ 73.1 %	9/ 17.3 %	5/ 9.6 %	52
<b>Large</b>	20/ 71.4 %	7/ 25.0 %	1/ 3.6 %	28
<b>Missing cases</b>	2			2
<b>Total</b>	86	19	12	117

**Title: Company's Need for Web page Designers by Technology Level**  
**Theme / question: A 48 e**

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	62/ 72.9 %	12/ 14.1 %	11/ 12.9 %	85
<b>Technical Threshold</b>	23/ 74.2 %	7/ 22.6 %	1/ 3.2 %	31
<b>Total</b>	85	19	12	116

Was there a need for ISP specialists to correct carrier problems? Over 80% of respondents in all three size groups and in both threshold groups saw this as a "low" priority.

**Table #8-- Title: Company's Needs for ISP specialists by Firm Size**  
**Theme / question: A 48 g**

Size	Low	Medium	High	Total
<b>Small</b>	29/ 85.3 %	4/ 11.8 %	1/ 2.9 %	34
<b>Medium</b>	44/ 84.6 %	6/ 11.5 %	2/ 3.8 %	52
<b>Large</b>	24/ 85.7 %	4/ 14.3 %		28
<b>Missing cases</b>	2			2
<b>Total</b>	99	14	3	116

**Title: Company's Needs for ISP specialists by Technology Level**  
**Theme / question: A 48 g**

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	71/ 83.5 %	13/ 15.3 %	1/ 1.2 %	85
<b>Technical Threshold</b>	27/ 90.0 %	1/ 3.3 %	2/ 6.7 %	30
<b>Total</b>	98	14	3	115

All three size groups saw little need for system design and integration specialists. Some publications classify this task as “IT project management.” Perhaps not surprisingly, some of the larger firms did see this as a slightly higher (medium) priority.

**Table #9-- Title: Company’s Needs for IT workers as system design / integration specialists by Firms Size**  
**Theme / question: A 48 f**

Size	Low	Medium	High	Total
<b>Small</b>	27/ 79.4 %	4/ 11.8 %	3/ 8.8 %	34
<b>Medium</b>	38/ 73.1 %	9/ 17.3 %	5/ 9.6 %	52
<b>Large</b>	19/ 67.9 %	7/ 25.0 %	2/ 7.1 %	28
<b>Missing cases</b>	2			2
<b>Total</b>	86	20	10	116

**Title: Company’s Needs for IT workers as system design / integration specialists by Technology Level**  
**Theme / question: A 48 f**

Threshold	Low	Medium	High	Total
<b>Non-Technical Threshold</b>	64/ 76.2 %	13/ 15.5 %	7/ 8.3 %	84
<b>Technical Threshold</b>	21/ 67.7 %	7/ 22.6 %	3/ 9.7 %	31
<b>Total</b>	85	20	10	115

Apparently when a firm encountered a task it could not handle, it outsourced the job. Here responses indicated ambivalence and a difference by firm size. Most Small firms did not outsource, Medium firms were evenly split on whether to outsource, and over 2/3 of Large firms reported repeatedly outsourcing projects. Non-Technical Threshold Firms (52.4% = ‘no’ with 47.6% = ‘yes’) differed from Technical Threshold Firms (43.3% = ‘no’ and 56.7% = ‘yes’), with the more tech savvy firms again being more likely to outsource.

**Table #10-- Title: Company’s Need to outsource projects by Firm Size**  
**Theme / question: A 47**

Size	No	Yes	Total
<b>Small</b>	20/ 58.8 %	14/ 41.2 %	34
<b>Medium</b>	28/ 54.9 %	23/ 45.1 %	51
<b>Large</b>	9/ 32.1 %	19/ 67.9 %	28
<b>Total</b>	57	56	113

**Title: Company's Need to outsource projects by Technology Level**  
**Theme / question: A 47**

Threshold	No	Yes	Total
<b>Non-Technical Threshold</b>	44/ 52.4 %	40/ 47.6 %	84
<b>Technical Threshold</b>	13/ 43.3 %	17/ 56.7 %	30
<b>Total</b>	57	57	114

Somewhat surprisingly, despite this ambivalence about outsourcing to complete projects, responses in Table #11 show that firms overwhelming (nine out of 10 in each category) felt their IT workers' qualifications were high enough to keep their firms competitive.

**Table #11-- Title: Company's believe IT workers skills sufficient to keep their firm competitive by firm size**

**Theme / question: A 38**

Size	No	Yes	Total
<b>Small</b>	1/ 3.6 %	27/ 96.4 %	28
<b>Medium</b>	5/ 10.4 %	43/ 89.6 %	48
<b>Large</b>	2/ 8.0 %	23/ 92.0 %	25
<b>Total</b>	8	93	101

**Title: Company's believe IT workers skills sufficient to keep their firm competitive by Technology Level**  
**Theme / question: A 38**

Threshold	No	Yes	Total
<b>Non-Technical Threshold</b>	6/ 7.9 %	70/ 92.1%	76
<b>Technical Threshold</b>	2/ 8.0 %	23/ 92.0%	25
<b>Total</b>	8	93%	101

What type of workers did firms anticipate hiring in the next twelve months? Three-fourths of firms, regardless of size were 'Not sure' what types of workers they would need. Interestingly, as the size of the firms increased, so did its need for "experts" or individuals with baccalaureate degrees. Small-Sized Firms (7.9%), Medium-Sized Firms (11.1%) and Large-Sized Firms (16.7%). And, 80%+ of the NTT and TT firms were unsure of their future labor needs.



**Table #12-- Title: Type of IT worker firm will hire in 12 months by firm size**  
**Theme / question: A 46**

Size	Not sure	BS/BA	Expert	Total
<b>Small</b>	33/ 86.8 %	2/ 5.3 %	3/ 7.9 %	38
<b>Medium</b>	44/ 81.5 %	4/ 7.4 %	6/ 11.1%	54
<b>Large</b>	23/ 76.7 %	2/ 6.7 %	5/ 16.7%	30
<b>Missing cases</b>	1			
<b>Total</b>	102	8	14	123

**Title: Type of IT worker firm will hire in 12 months by Technology Level**  
**Theme / question: A 46**

Threshold	Not sure	BS/BA	Expert	Total
<b>Non-Technical Threshold</b>	75/ 82.4 %	7/ 7.7 %	9/ 9.9 %	91
<b>Technical Threshold</b>	26/ 81.3 %	1/ 3.1 %	5/ 15.6 %	32
<b>Total</b>	101	8	14	123

**Summarizing theme A – Perceived Personnel Needs**

The sample’s firms responded as ‘low’ a need for PC installers, repair/support persons, maintenance workers, trainers, software developers,, Web designers, ISP specialists, design and integration specialists. Firms were apparently satisfied with the quality of current staff members to perform IT duties to maintain acceptable profit margins. However, a significant but less than a majority of larger firms expressed an interest in PC repair, maintenance, IT specialists, and other high skilled IT workers. And over 2/3 of Large firms saw the need for PC maintenance as a medium or high need. Given that large firms commonly had to outsource projects, perhaps it is not surprising that (unlike Small and Medium firms) they recognized the need to secure a greater number of, and more broad skill set among, their IT staff.

Firms, when encountering IT problems called in outside help and assistance. This reliance on outside assistance was not troublesome enough to prompt most respondents to hire specific personnel to correct this problem. However, Large firms (16.7%) and TT firms (15.6%) indicated they would consider hiring IT “experts” in the next twelve months. Thus for Large firms, despite significant numbers noting needs for more skill and by extension, identifiable deficiencies within their firm, relatively few were intending to hire additional skilled IT professionals.

**Theme B: Respondents’ satisfaction with their Internet connections**

In this section researchers sought to ascertain the depth of a respondents’ understanding of the Internet and its effect on standard business practices. Clarifying this theme’s intent: Do firms perceive a need for an improved quality of their Internet connection with customers, suppliers, or other partners? Also, were the firms confident in their employees to keep the firm’s connection ‘up and running’?

First, is the firm satisfied with its current ISP connection? A majority in the Firm Size group were satisfied (Small: 55.3%; Medium: 70.4%; Large: 90.0%). This question was consistent for the NTT (68.1%) and TT (75.0%) groups. Variance in response among firm sizes begs the question, what types of connections did firms have?: phone lines, DSL, cable? Unfortunately, we did not explore this aspect of the technology.

**Table #13-- Title: Company’s Satisfaction with current ISP connection by firm size**  
**Theme / question: B 15**

Size	Satisfied	Only OK	Dissatisfied	Total
<b>Small</b>	21/ 55.3 %	13/ 34.2 %	4/ 10.5 %	38
<b>Med</b>	38/ 70.4 %	12/ 22.2 %	4/ 7.4 %	54
<b>Large</b>	27/ 90.0 %	3/ 10.0 %		
<b>Missing Cases</b>	1	1		2
<b>Total</b>	87	29	8	124

**Title: Company’s Satisfaction with current ISP connection by technology level**  
**Theme / question: B 15**

Threshold	Satisfied	Only OK	Dissatisfied	Total
<b>Non-Technical Threshold</b>	62/ 68.1 %	22/ 24.2 %	7/ 7.7 %	91
<b>Technical Threshold</b>	24/ 75.0 %	7/ 21.9 %	1/ 3.1 %	32
<b>Total</b>	86	29	8	123

Table # 14 explores whether the connection was reliable? Most firms answered positively regardless of size or technology level. Apparently firms were not handicapped by interrupted service, and could conduct their principal transactions without interruption.

**Table #14-- Title: Company's Satisfaction with the reliability of the current service by firm size**

**Theme / question: B 16**

Size	Satisfied	Only OK	Dissatisfied	Total
<b>Small</b>	24/ 64.9 %	10/ 27.0	3/ 8.1 %	37
<b>Med</b>	39/ 73.6 %	8/ 15.1 %	6/ 11.3 %	53
<b>Large</b>	26/ 86.7 %	4/ 13.3 %		30
<b>Missing Cases</b>	2			2
<b>Total</b>	91	22	9	122

**Title: Company's Satisfaction with the reliability of the current service by technology level**

**Theme / question: B 16**

Threshold	Satisfied	Only OK	Dissatisfied	Total
<b>Non-Technical Threshold</b>	65/ 72.2 %	17/ 18.9 %	8/ 8.9 %	90
<b>Technical Threshold</b>	25/ 80.6 %	5/ 16.1 %	1/ 3.2 %	31
<b>Total</b>	90	22	9	121

Was the firm satisfied enough with an apparently speedy and reliable connection to use their Internet connection to converse with clients using CRM (customer relations management) software? A resounding number in each Size category rejected this notion: Small, 89.5%; Medium, 77.4% and Large, 60.0% responded negatively, as did 84.4% of NTT firms and 53.1% of TT firms. Significantly, in the most tech-savvy firms (TT), roughly 40% did feel comfortable enough to use CRM, as did about 1/3 of the largest firms. This is the first category in which the differing technology level of the firms varied in patterned manners. And, it shows us that there is a seemingly significant split in the use of this more elaborate software, specific to technical savvy and firm size.

**Table #15-- Title: Company's Satisfaction with use of CRM software by firm size**

**Theme / question: B 32**

Size	yes	no	Not sure	Total
<b>Small</b>	4/ 10.5 %	34/ 89.5 %		38
<b>Medium</b>	7/ 13.2 %	41/ 77.4 %	5/ 9.4 %	53
<b>Large</b>	10/ 33.3 %	18/ 60.0 %	2/ 6.7 %	30
<b>Missing Cases</b>	1	1		2
<b>Total</b>	22	94	7	123

**Title: Company's Satisfaction with use of CRM software by technology level**  
**Theme / question: B 32**

Threshold	yes	no	Not sure	Total
<b>Non-Technical Threshold</b>	9/ 10.0 %	76/ 84.4 %	5/ 5.6 %	90
<b>Technical Threshold</b>	13/ 40.6 %	17/ 53.1 %	2/ 6.3 %	
<b>Total</b>	22	93	7	122

Table # 16 shows that regardless of size or technology level, firms were overwhelmingly satisfied with the qualifications of their workers to perform needed IT duties.

**Table #16-- Title: Company's Satisfaction with qualifications of workers by firm size**

**Theme / question: B 37**

Size	no	yes	Total
<b>Small</b>	5/ 17.9 %	23/ 82.1 %	28
<b>Med</b>	5/ 10.4 %	43/ 89.6 %	48
<b>Large</b>	1/ 3.7 %	26/ 96.3 %	27
<b>Total</b>	11	92	103

**Title: Company's Satisfaction with qualifications of workers by technology level**  
**Theme / question: B 37**

Threshold	no	yes	Total
<b>Non-Technical Threshold</b>	8/ 10.5 %	68/ 89.5 %	76
<b>Technical Threshold</b>	3/ 11.1 %	24/ 88.9 %	27
<b>Total</b>	11	92	103

**Summarizing theme B -- Respondents' satisfaction with their Internet connections**

Firms in this sample were satisfied with their current Internet connection and its reliability level. Respondents were also satisfied with their personnel's qualification to maintain the connection. The majority of the sample was not interested in 'venturing' into the most primitive of connectivity techniques for anticipating client needs by building relationships with the clients (CRM software), but a significant portion of the more tech-savvy firms and the larger firms had done this. Apparently the other firms perceived their mission assisted by IT with simple connectivity methods.

### **Theme C: The Respondents' Climate for Training**

Researchers' intent with these series of inquiries was to learn: Did these respondents see their educational mission in terms of training people to operate the existing system or did it see its mission as one of 'developing' talents for advanced needs?

This theme explored five components of IT training:

1. The firm's initial need perception for training: did the firm feel a need to instruct workers in the 'basics' of computer use?
2. Firms were asked how they assessed these needs.
3. How many work hours were spent in training?
4. How did firms assess the quality of their training?
5. How did training affect productivity?

What training do firms need to offer to new hires? In the SIZE category, Small, Medium and Large firms stated they were satisfied with personnel hired with minimal computer skills (18.4%; 22.2%, 35.5% respectively) or that they would train hires after they began working (10.5%, 24.1%; 26.7%) respectively. Apparently these firms were content to hire people who were novices in IT usage. This same sentiment was sounded by the NTT/TT factor (NTT 22.0%; 19.8%) respectively. The same sentiment was reflected in the TT group--34.4% and 21.9% respectively. In a pattern that will recur throughout this section, a majority of Small firms had no answer to this query, suggesting an absence of precedent and/or consideration of their firm's needed IT skill level(s).

**Table #17-- Title: Company's training needs by firm size**  
**Theme / question: C 44d**

<b>Size</b>	<b>Lowest training</b>	<b>Specific software</b>	<b>Advanced packages</b>	<b>Certification</b>	<b>Train after employ</b>	<b>Missing cases</b>	<b>Total</b>
<b>Small</b>	7/ 18.4 %	1/ 2.6 %	2/ 5.3 %	2/ 5.3 %	4/ 10.5 %	22/ 57.9 %	38
<b>Medium</b>	12/ 22.2 %	8/ 14.8 %	3/ 5.6 %	1/ 1.9 %	13/ 24.1 %	17/ 31.5 %	54
<b>Large</b>	11/ 35.5 %	1/ 3.3 %	4/ 13.3 %		8/ 26.7 %	6/ 20.0 %	30
<b>Missing cases</b>	1					1	2
<b>Total</b>	31	10	9	3	25	46	124

**Title: Company's training needs by firm size**  
**Theme / question: C 44d**

Threshold	Lowest training	Specific software	Advanced packages	Certification	Train after employ	Missing cases	Total
<b>Non-Technical Threshold</b>	20/ 22.0 %	7/ 7.7 %	7/ 7.7 %	2/ 2.2 %	18/ 19.8 %	37/ 40.7 %	91
<b>Technical Threshold</b>	11/ 34.4 %	3/ 9.4 %	2/ 6.3 %	1/ 3.1 %	7/ 21.9 %	8/ 25.0 %	32
<b>Total</b>	31	10	9	3	25	45	123

What motivated firms to engage in training sessions? Among the Size group, the Small firms said the stimulus came from bosses or outside consultants (10.5%), 7.9% of them said they had no clear idea of why they started training, and over 2/3 offered no information on this topic. The Medium size firms reported that the biggest influences were they bought new software or the push came from bosses (but again many reported they had no clear picture of why they began training. One interesting note, 9.3% of Medium firms reported that the push came from workers themselves. In Large firms 23.3% reported the push came from the purchase of new software; 23.3% indicated they had no clear picture of why training was done, and 10.0% said it emanated from the bosses or consultants.

In the NTT/TT and TT firms too, the distribution of responses varied widely among the variable options. Large numbers of firms in each category of both tables providing no response and thus no insight into a firm's need for training.

**Table #18-- Title: Company's engagement in IT training-evidenced by: Ways to identify those needs by firm size**

**Theme / question: C 44e**

Size	Bought new software	Client requests	Ran a survey	No clear picture	Worker initiative	Boss/ consultant initiative	Missing cases	Total
<b>Small</b>	2/ 5.3 %	2/ 5.3 %		3/ 7.9 %	1/ 2.6 %	4/ 10.5 %	26/ 68.4 %	38
<b>Medium</b>	10/ 18.5 %		2/ 3.7 %	8/ 14.8 %	5/ 9.3 %	10/ 18.5 %	19/ 35.2 %	54
<b>Large</b>	7/ 23.3 %	1/ 3.3 %	1/3.3 %	7/ 23.3 %	1/ 3.3 %	3/ 10.0 %	10/ 33.3 %	30
<b>Missing cases</b>				1			1	2
<b>Total</b>	19	3	3	19	7	17	56	124

**Title: Company's engagement in IT training-evidenced by: Ways to identify those needs by technology level**

**Theme / question: C 44e**

Threshold	Bought new software	Client requests	Ran a survey	No clear picture	Worker initiative	Boss/ consultant initiative	Missing cases	Total
<b>Non-Technical Threshold</b>	12/ 13.2 %	2/ 2.2 %	3/ 3.3 %	13/ 14.3 %	4/ 4.4 %	13/ 14.3 %	44/ 48.4 %	91
<b>Technical Threshold</b>	7/ 21.9 %	1/ 3.1 %		6/ 18.8 %	3/ 9.4 %	4/ 12.5 %	11/ 34.4 %	32
<b>Total</b>	19	3	3	19	7	17	55	123

Table # 19 shows how many hours were devoted to training. The plurality of firms responding in each size and the threshold categories indicate that they provide less than 10 hours per training event. However, roughly 80% of Small firms and almost half of Large firms provided no information or did not know how much training their firm performed. The distribution of time between the NTT and more tech savvy TT firms was essentially the same, with about one-third of each providing ten hours or less per year, one-fifth providing 11-40 hours, and almost half of each group reporting providing no information.

**Table #19-- Title: Company's Numbers of hours per year for training by firm size**

**Theme / question: C 44j**

Size	1-4	5-10	11-20	21-40	Unknown	Missing cases	Total
<b>Small</b>	4/ 10.5%	3/ 7.9 %	1/ 2.6 %		3/ 7.9 %	27/ 71.1 %	38
<b>Medium</b>	9/ 16.7%	15/ 27.8%	3/ 5.6 %	7/ 13.0%	3/ 5.6 %	17/ 31.5 %	54
<b>Large</b>	5/ 16.7%	5/ 16.7%	3/ 10.0%	3/ 10.0%	6/ 20.0 %	8/ 26.7 %	30
<b>Missing cases</b>				1/ 50.0%		1/ 50.0 %	2
<b>Total</b>	18	23	7	11	12	53	124

**Title: Company's Numbers of hours per year for training by technology level**

**Theme / question: C 44j**

Threshold	1-4	5-10	11-20	21-40	Unknown	Missing cases	Total
<b>Non-Technical Threshold</b>	14/ 15.4%	16/ 17.6%	3/ 3.3 %	8/ 8.8 %	7/ 7.7 %	43/ 47.3 %	91
<b>Technical Threshold</b>	4/ 12.5%	7/ 21.9%	4/ 12.5%	2/ 6.3 %	5/ 15.6 %	10/ 31.3 %	32
<b>Total</b>	18	23	7	10	12	53	123

In Table #20 we ask how firms assessed the outcomes of IT training. Small firms generally lacked concrete indicators, but about 1/5 of Medium and Large firms could identify specific outcomes, and another 20-25% had some identifiable evaluation as to how the courses were evaluated. Almost half of the Large-size firms identified some kind of specific outcome.

Only about one-third of Non-Technical threshold and of Technical threshold firms were able to identify specific assessments applied to personal after a training activity. Again, the more tech savvy firms were surprisingly similar to non-technically oriented firms.

**Table # 20-- Title: Company's Ways to assess the training by firm size**

Theme / question: C 44h

Size	Specific outcomes	Test at end of training	Got it or didn't	A person evaluated	Unknown	Dysfunctional answer	Missing cases	Total
Small	4/ 10.5 %			4/ 10.5 %	2/ 5.3 %		28/ 73.7 %	38
Medium	11/ 20.4 %	3/ 5.6 %	4/ 7.4 %	4/ 7.4 %	5/ 9.3 %	6/ 11.2 %	21/ 38.9 %	54
Large	7/ 23.3 %	2/ 6.7 %	4/ 13.3%	3/ 10.0 %	3/ 10.0 %	6/ 11.1 %	5/ 25.6 %	29
Missing cases					1/ 50.0 %		1/ 50.0 %	2
<b>Total</b>	22	5	8	11	11	12	55	123

**Title: Company's Ways to assess the training by technology level**

Theme / question: C 44h

Threshold	Specific outcomes	Test at end of training	Got it or didn't	A person evaluated	Unknown	Dysfunctional answer	Missing cases	Total
Non-Technical Threshold	15/ 16.5 %	4/ 4.4 %	6/ 6.6 %	10/ 11.0 %	5/ 5.5 %	5/ 5.5 %	46/ 50.5 %	91
Technical Threshold	7/ 21.9 %	1/ 3.1 %	2/ 6.3 %	1/ 3.1 %	6/ 18.8 %	2/ 6.3 %	13/ 40.6 %	32
<b>Total</b>	22	5	8	11	11	7	59	123

What effect did training have on the firm? Most firms who responded to this question indicated that they benefit from training, and the larger the firm, both the more benefit and more specific benefits were identified. But again roughly 2/3 of Small, 1/3 of Medium and 1/4 of Large firms did not answer this question. Non-Technical Threshold Firms and Technical Threshold Firms had similar levels of perceived general and specific increased benefit.



**Table #21-- Title: A Company's Training's effect on productivity by firm size**  
**Theme / question: C 44g**

Size	'increased' no elaboration	'increased' named specific services	Not sure	Missing cases	Total
Small	4/ 10.5 %	7/ 18.4 %	1/ 2.6 %	26/ 68.4 %	38
Medium	18/ 33.3 %	12/ 22.2 %	7/ 13.0%	17/ 31.5 %	54
Large	11/ 36.7 %	8/ 26.7 %	3/ 10.0%	8/ 23.3 %	30
Missing case		1		1	2
<b>Total</b>	33	28	11	52	124

**Title: A Company's Training's effect on productivity by technology level**  
**Theme / question: C 44g**

Threshold	'increased' no elaboration	'increased' named specific services	Not sure	Missing cases	Total
Non-Technical Threshold	24/ 26.4 %	21/ 23.1 %	4/ 4.4 %	42/ 45.1 %	91
Technical Threshold	9/ 28.1 %	7/ 21.9 %	7/ 21.9%	10/ 28.1 %	32
<b>Total</b>	33	28	11	51	123

**Summarizing theme C – Respondent's climate for training**

Our respondents indicate that systematic and strategic development' of IT skills by firms is absent from this sample. In terms of the current crop of applicants, firms were willing to hire people with minimal IT training and/or would train them once they were hired. The needs for training were left to superiors in an organization or as an *ex post facto* issue, most often when new software had been installed, and sometimes at the encouragement of a boss or consultant.

Training times ranged from 1-4 hours (half a day) to 10 hours (two half-day sessions) per year (!). Apparently firms expect a quick grasp of a new procedures and/or software. Many but not most firms used specific skills levels for assessing the success of the training with little focus on the difference these techniques would make within the total firm. Almost ½ of Large firms and 80% of Small firms could not effectively identify how their firms assessed the effectiveness of training sessions. Despite being unable to identify how assessment occurred, many respondents could name a productivity benefit, and assumed the introduction of the training cause the effect. Planning (organizational, hierarchical, and/or strategic) and measurable benefits or benchmarks appears to be essentially absent from the firms that constitute this sample. What is surprising is that this is the case not only for firms of different sizes, but for the firms from the more tech savvy industries where one would expect a greater knowledge of, and more targeted application of IT training activities.

**Theme D: Respondents' need for personnel with formal degrees and experience in IT**

What type of IT worker does the firm currently employ? In the Size categories, Small and Medium size firms had relatively similar distributions of current IT expertise across the five identified occupational categories. Large-Sized Firms were different in that 40.0% hired a 'system manager' and 23.3% more hired an office worker/sales/paperwork employee.

NTT firms hired across the occupational categories, while almost 1/3 of the more tech savvy TT Firms hired a 'system manager.' Large and TT firms' patterns may imply that they sub-contracted or outsourced their web development and specialized software applications, and focused on hiring someone to oversee such activities. This also implies that they may have sought centralized control of their IT operations.

**Table #22-- Title: Company's need for and expectations of IT workers: Type of IT workers currently employed by firm size**

Theme / question: 'D': 36

Size	System Manager	Web Developer	Specialized software tech	Office worker/ Sales/ paperwork	Outside help	None	unknown	Missing cases	Total
<b>Small</b>	4/ 10.5 %	4/ 10.5 %	2/ 5.3 %	7/ 18.4 %	1/ 2.6 %	10/ 26.3 %	2/ 5.3 %	8/ 21.1 %	38
<b>Medium</b>	7/ 13.0 %	4/ 7.4 %	6/ 11.1 %	11/ 20.4 %	4/ 7.4 %	8/ 14.8 %	3/ 5.6 %	11/ 20.4 %	54
<b>Large</b>	12/ 40.0 %	1/ 3.3 %	1/ 3.3 %	7/ 23.3 %		2/ 6.7 %	2/ 6.7 %	5/ 16.7 %	30
<b>Missing Cases</b>						1		1	2
<b>Total</b>	23	9	9	25	5	21	7	25	124

**Title: Company's need for and expectations of IT workers: Type of IT workers employed by technology level**

**Theme / question: 'D': 36**

Threshold	System Manager	Web Developer	Specialized software tech	Office worker/ Sales/ paperwork	Outside help	None	unknown	Missing cases	Total
<b>Non-Technical Threshold</b>	13/ 13.4 %	9/ 9.9 %	8/ 8.8 %	23/ 25.3 %	3/ 3.3 %	14/ 15.4 %	5/ 5.5 %	16/ 17.6 %	91
<b>Technical Threshold</b>	10/ 31.3 %		1/ 3.1 %	2/ 6.3 %	2/ 6.3 %	6/ 18.8 %	2/ 6.3 %	9/ 28.1 %	32
<b>Total</b>	23	9	9	25	5	20	7	25	123

Table # 23 indicates what level of formal education that the firm requires. Almost half of the Small and Medium businesses thought they could get adequate IT work from people with only a high school diploma as their formal education. About 15% of each group believe that their IT people needed to have at least a baccalaureate degree. By contrast, almost half of the Large-Sized Firms expected their IT workers to have at least a baccalaureate, while surprisingly ¼ thought that the high school diploma was sufficient.

In the Threshold categories, almost 1/3 of tech savvy TT firms wanted the baccalaureate minimum, but 43% of TT and 47% NTT firms thought a high school education sufficient. Interestingly, the relative desirability of people with an Associates degree was low regardless of firm size or technology level.

**Table #23-- Title: Company's need for and expectations of IT workers: formal education by firm size**

**Theme / question: 'D': 39**

Size	High school	hs + training certif.	hs + assoc.	b.s./b.a.	b.s./b.a. + certif	BS/BA Assoc	BS/BA/ Master	Don't know	Missing Case	Total
<b>Small</b>	16/ 42.1%	2/ 5.3 %	2/ 5.3 %	3/ 7.9 %			2/ 5.3 %		13/ 34.2%	38
<b>Medium</b>	24/ 44.4 %	3/ 5.6 %	1/ 1.9 %	7/ 13.0 %	2/ 3.7 %		1/ 1.9 %	1/ 1.9 %	15/ 27.8%	54
<b>Large</b>	6/ 20.0%	1/ 3.3 %	2/ 6.7 %	7/ 23.3 %	5/ 16.7%	1/ 3.3%	1/ 3.3%		7/ 23.3%	30
<b>Missing Cases</b>							1			1
<b>Total</b>	46	6	5	17	7	1	5	1	35	123

**Title: Company's need for and expectations of IT workers: formal education by technology level**

**Theme / question: 'D': 39**

Size	High school	hs + training certif.	hs + assoc.	b.s./b.a.	b.s./b.a. + certif	BS/BA Assoc	BS/BA/ Master	Don't know	Missing Case	Total
<b>Non-Technical Threshold</b>	34/ 37.4%	5/ 5.5 %	4/ 4.4%	13/ 14.3%	5/ 5.5%	1/ 1.1%		1/ 1.1%	28/ 30.8%	91
<b>Technical Threshold</b>	12/ 37.5%	1/ 3.1%	1/ 3.1%	4/ 12.5%	2/ 6.3%		5/ 15.6%		7/ 21.9%	32
<b>Total</b>	46	6	5	17	7	1	5	1	35	123

What job experience does a firm require for their IT workers? In the Size categories, Small and Medium size firms (42% and 28% respectively) felt comfortable hiring IT workers with no experience.. In fact, 13% of Large firms felt the same.

Fully 1/3 of all TT firms expressed the same response. Other responses were widely dispersed among all sizes and technology levels. This suggests that few firms of any size have had long-term IT personnel. This implies that either such expertise was new to firms, that firms laid off their more experienced (and better paid employees?), that many experienced workers left the in-house IT workforce of the area firms to either become hired IT consultants, or they moved to other locales where pay and benefits may be greater.

**Table #24-- Title: Company's need for and expectations of IT workers: job experience by firm size**

**Theme / question: 'D': 40**

Size	None	Gen office experience	1-2 yrs	3-4 yrs	5+ yrs	Specific experience	General Description	Missing cases	Total
<b>Small</b>	16/ 42.1%	3/ 7.9%	1/ 2.6%	1/ 2.6%	1/ 2.6%	4/ 10.5%	1/ 2.6%	11/ 28.9%	38
<b>Medium</b>	15/ 27.8%	6/ 11.1%	8/ 14.8%	3/ 5.6%		6/ 11.1%	2/ 3.7%	14/ 25.9%	54
<b>Large</b>	4/ 13.3%	4/ 13.3%	4/ 13.3%	4/ 13.3%		2/ 6.7%		12/ 40.0%	30
<b>Missing cases</b>							1		2
<b>Total</b>	35	13	13	8	1	12	4	37	123

**Title: Company's need for and expectations of IT workers: job experience by technology level**

**Theme / question: 'D': 40**

	None	Gen office experience	1-2 yrs	3-4 yrs	5+ yrs	Specific experience	General Description	Missing cases	Total
<b>Non-Technical Threshold</b>	24/ 26.4%	12/ 13.2%	10/ 11.0%	6/ 6.6%	1/ 1/1%	7/ 7.7%	3/ 3.3%	28/ 30.8%	91
<b>Technical Threshold</b>	11/ 34.4%	1/ 3.1%	3/ 9.4%	2/ 6.3%		5/ 15.6%	1/ 3.1%	9/ 28.1	32
<b>Total</b>	35	13	13	8	1	12	4	37	123

What types of jobs do you expect workers with a High School diploma to undertake? This response is interesting. Despite earlier expressing an interest in hiring high school graduates for their IT workforce needs, the majority of firms of all sizes offered no insight into what work people with only a high school degree could or should perform and a small number in each size recognized that there was no work they could be expected to do. Among those who did believe they could do work, the expectations expressed were widely diverse. The most tech savvy firms were most pronounced in their belief that persons with such educational attainment could not be expected to work on IT projects. While over ¾ of Small and NTT firms had no opinion on what high school graduates might do in the IT area, despite many firms having identified a willingness to hire someone with that level of education to perform IT work.

**Table #25-- Title: What types of jobs do you expect workers with a High School diploma to undertake by firm size**

**Theme / question: D: 42a**

Size	None	Minimum skill	Installer	Web Design/ spreadsheet	Not sure	Missing cases	Total
<b>Small</b>	3/ 7.9%			2/ 5.3%	2/ 5.3 %	31/ 81.6%	38
<b>Medium</b>	8/ 14.8%	7/ 13.0%	2/ 3.7%	2/ 3.7%	2/ 3.7%	33/ 59.3%	54
<b>Large</b>	3/ 10.0%	5/ 16.7%	3/ 10.0%		2/ 6.7%	17/ 56.7%	30
<b>Missing cases</b>	1				1		2
<b>Total</b>	15	12	5	4	6	82	124

**Title: What types of jobs do you expect workers with a High School diploma to undertake by technology level**

**Theme / question: D: 42a**

Threshold	None	Minimum skill	Installer	Web design/ spreadsheet	Not sure	Missing cases	Total
<b>Non-Technical Threshold</b>	7/ 7.7%	9/ 9.9%	1/ 1.1%	4/ 4.4%	5/ 5.5%	65/ 71.4%	91
<b>Technical Threshold</b>	8/ 25.0%	3/ 9.4%	4/ 12.5%		1/ 3.1%	16/ 46.9%	32
<b>Total</b>	15	12	5	4	6	81	123

Table # 26 examines what types of jobs that firms expect workers with a BS/BA to undertake. Among Large and TT firms there is some focus on business application, web design, and network activities appropriate for a person with a BA/BS. A small number of firms of all size would want this person to “do it all.” And again, the majority of Small and Medium, and a plurality of Large firms offered no responses. In an interesting departure, over 1/5 of the TT firms said there was no work that would be appropriate for people with this degree—a finding that implies a need for graduate training.<sup>2</sup>

**Table #26-- Title: What types of jobs do you expect workers with a BS/BA to undertake by firm size**

**Theme / question: D: 42b**

Size	None	Minimum skills	Installer	Business application	Web design/ network	Do it all	Not sure	Missing cases	Total
<b>Small</b>	3/ 7.9%			1/ 2.6%	2/ 5.3%	3/ 7.9%	2/ 5.3%	27/ 71.1%	38
<b>Medium</b>	3/ 5.6%	3/ 5.6%		6/ 11.1%	4/ 7.4%	3/ 5.6%	2/ 3.7%	33/ 61.1%	54
<b>Large</b>	1/ 3.3%	2/ 6.7%	2/ 6.7%	4/ 13.3%	5/ 16.7%	2/ 6.7%	2/ 6.7%	12/ 40.0%	30
<b>Missing cases</b>	1								1
<b>Total</b>	8	5	2	11	11	8	6	72	123

<sup>2</sup> Significantly, almost the same numbers of such firms indicate a need for graduate level training when asked directly (see below)—suggesting an internal consistency in our responses.

**Title: What types of jobs do you expect workers with a BS/BA to undertake by technology level**

**Theme / question: D: 42b**

Threshold	None	Minimum skills	Installer	Business application	Web design/network	Do it all	Not sure	Missing cases	Total
<b>Non-Technical Threshold</b>	1/ 1.1%	3/ 3.3%	1/ 1.1%	7/ 7.7%	6/ 6.6%	7/ 7.7%	5/ 5.5%	61/ 67.0%	91
<b>Technical Threshold</b>	7/ 21.9%	2/ 6.3%	1/ 3.1	4/ 12.5%	5/ 15.6	1/ 3.1%	1/ 3.1%	11/ 34.4%	32
<b>Total</b>	8	5	2	11	11	8	6	72	123

We asked respondents: What types of jobs do you expect workers with an Assoc. degree to undertake? While there was some uncertainty about the skills and tasks to be assigned to people with high school and baccalaureate degrees, there is little insight into what one should expect from (or of) a person with an Associate degree. A majority of all sized firms and technology levels provided no response to this question. Adding no response, “not sure” and “none” accounted for ¾ to 90% of responses from various categories of respondents.

**Table #27-- Title: What types of jobs do you expect workers with an Assoc. Degree to undertake by firm size**

**Theme / question: D: 42c**

Size	None	Minimum skills	Installer	Business application	Web design/network	Do it all	Not sure	Missing cases	Total
<b>Small</b>	2/ 5.3%				2/ 5.3%	2/ 5.3%	4/ 10.5%	28/ 73.7%	38
<b>Medium</b>	6/ 11.1%	2/ 3.7%		2/ 3.7%	4/ 7.4%	1/ 1.9%		39/ 72.2%	54
<b>Large</b>	2/ 6.7%	5/ 16.7%	1/ 3.3%		2/ 6.7%	1/ 3.3%	2/ 6.7%	17/ 56.7%	30
<b>Total</b>	10	7	1	2	8	4	6	84	122

**Title: What types of jobs do you expect workers with an Assoc. Degree to undertake by technology level**

**Theme / question: D: 42c**

Threshold	None	Minimum skills	Installer	Business application	Web design/network	Do it all	Not sure	Missing cases	Total
<b>Non-Technical Threshold</b>	4/ 4.4%	4/ 4.4%	1/ 1.1%	1/ 1.1%	6/ 6.6%	3/ 3.3%	5/ 5.5%	67/ 73.6%	90
<b>Technical Threshold</b>	7/ 21.9%	3/ 9.4%		1/ 3.1%	2/ 6.3%	1/ 3.1%	1/ 3.1%	17/ 53.1%	32
<b>Total</b>	11	7	1	2	8	4	6	84	122

What types of jobs do you expect workers with a Certificate to undertake? Again, missing responses were a majority of response of each firm size and tech threshold, and when combined with responses “none” and “not sure” constitute 75% of responses; further indicate uncertainty and/or ambiguity about expectations for people with certification similar to that indicated in regard to employees with Associate degrees—which makes sense since many times it is Community and Proprietary colleges that offer the classes for both types of curricular programs.

**Table #28-- Title: What types of jobs do you expect workers with a Certificate to undertake by firm size**

**Theme / question: D: 42d**

Size	None	Minimum skills	Installer	Business application	Web design/network	Do it all	Not sure	Missing cases	Total
<b>Small</b>	3/ 7.9%				1/ 2.6%	1/ 2.6%	3/ 7.9%	30/ 78.9%	38
<b>Medium</b>	6/ 11.1%	1/ 1.9%	1/ 1.9%	2/ 3.7%	3/ 5.6%	2/ 3.7%		39/ 72.2%	54
<b>Large</b>	3/ 10.0%	2/ 6.7%	2/ 6.7%	3/ 10.0%	2/ 6.7%		2/ 5.7%	16/ 53.3%	30
<b>Missing cases</b>	1								2
<b>Total</b>	13	3	3	5	6	3	5	85	123



**Title: What types of jobs do you expect workers with a Certificate to undertake by firm size**

**Theme / question: D: 42d**

<b>Threshold</b>	<b>None</b>	<b>Minimum skills</b>	<b>Installer</b>	<b>Business application</b>	<b>Web design/network</b>	<b>Do it all</b>	<b>Not sure</b>	<b>Missing cases</b>	<b>Total</b>
<b>Non-Technical Threshold</b>	6/ 6.6%	1/ 1.1%	1/ 1.1%	3/ 3.3%	4/ 4.4%	3/ 3.3%	4/ 4.4%	69/ 75.8	91
<b>Technical Threshold</b>	7/ 21.9%	3/ 6.3%	2/ 6.3%	2/ 6.3%	2/ 6.3%		1/ 3.1%	16/ 50.0%	32
<b>Total</b>	13	3	3	5	6	3	5	85	123

Given the required educational levels firms of employees, and the types of tasks firms expected of workers, we asked the five major software packages they used and we to rank by importance. Many firms named only three packages, and often told us software functions instead of brand names. For example, "Web site development" instead of "Commence" or "Sales Logix." We recoded respondents' answers to the following sixteen categories of software:

1. Microsoft Word Office Suite
2. Microsoft Word
3. Microsoft Excel
4. Microsoft Access
5. Microsoft Outlook
6. Microsoft Great Plains
7. Word Perfect
8. Proprietary software
9. Lotus
10. Graphics packages (Front Page, Dream Weaver, Adobe Photoshop, etc.)
11. Open Access platforms
12. Database software (Filemaker Pro; SQL Server, ArcView, etc.)
13. Web software (Telnet/Reflections, IntraLearn, Dynamics Software, etc.)
14. Server software (AS400, Microsoft Exchange, ERP StyleLine, etc.)
15. Accounting software
16. Cad Cam software

In the "first-choice category," 30 of the non-Technical Threshold (NTT) firms selected either Microsoft Office Suite, or Microsoft Word as their primary software. Fifteen of the Technical Threshold (TT) firms had made the same selection.

Nine of the NTT firms had also selected a graphics package as a first choice. Eight of the NTT firms selected a custom-made proprietary software package for their first choice, but none of the TT firms selected a proprietary package. By combining responses on the "Lotus" with the "accounting" category, the NTT firms indicated that they used both computational and report tasks of software designed for the accounting profession: NTT firms = 8; TT firms = 1. Three NTT firms said "Outlook" was their preferred package. These data would indicate firms are either satisfied with the task capacity of standard edition software, or that the tasks of many firms do not require specialized software. <sup>3</sup>

---

<sup>3</sup> All these responses are good news for recent college graduates and course planners. If students have experience and an overview assignment in each of Microsoft's main programs: Word, Access, Excel, Outlook, PowerPoint, and Publisher, and an assignment in electronic editing of photographs or layout designs, they should be well positioned when looking for employment in Lucas County.

Course planner and professors would find they have an additional pedagogical tool for enriching students' classroom experiences. Instructors routinely could assume students can; create a displayed demonstration/explanation of a project (PowerPoint), accomplish routine descriptive research (Excel), arrange divergent information into discrete categories (Access), layout the design of a research project (Publisher), cast it to a web site (Word) and communicate with colleagues about that publication

**Table #29—First choice of Software Used by Firms**

	Non-Technical Threshold	Technical Threshold
Microsoft Office	24/64.9%	13/35.1%
Word	6/75%	2/25%
Excel	2/100%	0/0%
Access	0/0%	0/0%
Outlook	3/100%	0/0%
Microsoft Great Plains	2/66.7%	1/33.3%
WordPerfect	1/33.3%	2/66.7%
Proprietary software	8/72.7%	3/27.3%
Lotus	4/80%	1/20%
Graphics software	9/100%	0/0%
Open Access platforms	2/100%	0/0%
Database programs	2/100%	0/0%
Web software	3/100%	0/0%
Server software	0/0%	2/100%
Accounting software	4/100%	0/0%
CadCam software	2/100%	0/0%

Employers’ “second choice” for software, the most common response duplicated the “first choice” category: Twenty-two NTT and 4 TT employers cited Microsoft Office or Word. Of particular interest in this category, however, are the second-most frequently cited “second choice” packages: Those organizing information for multiple-client servers and databases. Some firms, interestingly enough, in the NTT category (9 firms combining the “database” and “server” categories ) are using customer-relations management software, data warehouse software and data mining software. It is interesting to see that in this sample, only one TT employer saw the need to extend themselves into this valuable and vital branch of information management.<sup>4</sup>

(Outlook). The systematic and uniform nature of Microsoft Office Suite can give rise to a wide range of teaching opportunities that can easily be translated to readable documentation of a student’s learning skills for employers in Portfolio projects.

<sup>4</sup> Keeping track of existing resources, finding results of past surveys, asking questions of existing databases would be a highly valuable skill for college graduates to hold as they begin a job search. Instructors could assign projects to students to assess the quality of corporations such as AdverPages [http://www.adverpages.com/results.aspx?c=dedicated+server&1=1&p=5&p2=admanager\\_email.203&f=3](http://www.adverpages.com/results.aspx?c=dedicated+server&1=1&p=5&p2=admanager_email.203&f=3) who connect demographic information with market research. At the very least, students could prepare for rewarding careers in this line of information management by managing their own “data banks” of their personal career oriented clippings from professional publications.

Currently, this skill is of growing importance as the health care profession, and the government’s insistence, begins to move toward digitalization of medical information. Storage, retrieval, and access to the immense medical records database will require information management skills from both technical and non-technical medical information specialists. Students preparing for positions in this area would be well advised to begin their own “data banks” of firms positioning themselves at this medical threshold.

**Table #30-- Second Choice of Software Used At The Firm:**

	Non-Technical Threshold	Technical Threshold
1 Microsoft Office	16/ 88.9%	2/ 11.1%
2 Microsoft Word	6/ 75%	2/ 25%
3 Microsoft Excel	6/ 54.5%	5/ 45.5%
4 Microsoft Access	1/ 100%	0/ 0%
5 Microsoft Outlook	3/ 100%	0/ 0%
6 Microsoft Great Plains	1/ 100%	0/ 0%
7 WordPerfect	0/ 0%	0/ 0%
8 Proprietary software	1/ 100%	0/ 0%
9 Lotus	2/ 50%	2/ 50%
10 Graphics software	8/ 100%	0/ 0%
11 Open Access platforms	1/ 50%	1/ 50%
12 Database programs	4/ 80%	1/ 20%
13 Web software	6/ 75%	2/ 25%
14 Server software	5/ 100%	0/ 0%
15 Accounting software	3/ 60%	2/ 40%
16 CadCam software	0/ 0%	3/ 100%

In the “third choice” category, the most frequently mentioned software packages fell into the “graphics” editing categories: 9 for NTT and 0 for TT. As the Web ascends to marketplace legitimacy, more firms will present products and services in visual-video formats.<sup>5</sup>

A second program mentioned in this category was the need for Excel or a spreadsheet format; NTT firms cited this eight times; TT, 2. The ‘spreadsheet’ metaphor, or the possibility of multiple contingency tables, has become useful in a wide range of disciplines. The technique is not only useful in accounting, but in modeling contingencies for organizational development, and even in qualitative analysis of language variables.<sup>6</sup>

<sup>5</sup> The need to manipulate images, store and access video files, and edit visual information will be a highly marketable skill for college graduates.

<sup>6</sup> As this software finds a greater number of applications in professional circles, college students should be challenged with creative problems in their classes using spreadsheets. Many corporations who battle for dominance in Web browsing capabilities base their search results on spreadsheet analysis of sites’ contents.

**Table #31-- Third Choice of Software Used At The Firm:**

	Non-Technical Threshold	Technical Threshold
1 Microsoft Office	5/ 83.3%	1/ 16.7%
2 Microsoft Word	2/ 66.7%	1/ 33.3%
3 Microsoft Excel	8/ 80%	2/ 20%
4 Microsoft Access	1/ 100%	0/ 0%
5 Microsoft Outlook	3/ 50%	3/ 50%
6 Microsoft Great Plains	1/ 50%	1/ 50%
7 WordPerfect	1/ 100%	0/ 0%
8 Proprietary software	2/ 50%	2/ 50%
9 Lotus	1/ 100%	0/ 0%
10 Graphics software	9/ 100%	0/ 0%
11 Open Access platforms	0/ 0%	1/ 100%
12 Database programs	3/ 75%	1/ 25%
13 Web software	4/ 66.7%	2/ 33.3%
14 Server software	3/ 75%	1/ 25%
15 Accounting software	4/ 100%	0/ 0%
16 CadCam software	1/ 50%	1/ 50%

**Summarizing theme D – Respondent’s need for Personnel with formal degrees and experience in IT**

This section shows that most firms need ‘office workers (except the Large and Technical Threshold firms where a ‘system manager’ is needed). Some firms in all classes of firms held open the possibility of hiring a high school employee. Medium firms included a BA/BS and Large firms accepted all three: high school diploma, BA/BS and a certificate. The Large and TT firms were most interested in hiring individuals with at least a bachelor’s degree.

In job experience, all firms hired applicants with ‘no’ experience. In terms of IT duties, all firms identifying preferences would limit new hires to the ‘none’ category unless they have minimal skills. The BA/BS was expected to have minimal business applications experience. This held true for the Associate’s degree and a certificate—although interest in hiring people with this background was minimal. Apparently very little IT training is required for employment as an IT person in most the businesses that responded, but those who were interested in credentialed workers were much more interested in hiring people with at least a Bachelor’s degree. A substantial percentage of Large firms in particular had specific ideas and intentions for their new IT hires, and Large and TT firms were less willing to hire the inexperienced, and more interested in hiring people with advanced degrees.

Further, it is evident that many of the firms could not identify appropriate skills or tasks for people with any level of degree attainment. This suggests that they do not know what to expect from people with various degrees, and/or that they had experiences so varying that they believed that the degree was not a pertinent factor, focusing instead

on whatever applied skills a person might have regardless of degree. This may be in part to having few trained IT professionals, especially experts with more than 5 years of experience. Either the firms are relatively new to IT, or they have turned over staff so rapidly that their training and educational expectations are so low. On the other hand, it may also indicate that firms view their IT activities in general as a business cost, rather than a market opportunity and so to obtain minimal entry, they are employing people with relatively minimal skills and education to fulfill very basic IT functions—an insight supported by the selections of software identified by respondents.<sup>7</sup>

**Theme E: Respondents’ belief in the role of IT in firm “success”**

Table #32 shows that the responding firms believe that IT application will increase their competitiveness. Across the board, and with few exceptions, firms recognize that their company’s success depends on IT and that IT will increase their firm’s competitiveness.

**Table #32-- Title: INTEREST AND BELIEF IN IT’S ROLE IN COMPANY’S SUCCESS AS EVIDENCED BY: IT application will increase competitiveness by firm size**

**Theme / question: E : 19**

Size	Yes	No	Not sure	Total
<b>Small</b>	27/ 71.7 %	6/ 15.8 %	5/ 13.2 %	38
<b>Medium</b>	44/ 81.5 %	5/ 9.3 %	5/ 9.3 %	54
<b>Large</b>	27/ 90.0 %	2/ 6.7 %	1/ 3.3 %	30
<b>Missing cases</b>	1			1
<b>Total</b>	99	13	11	123

**Title: INTEREST AND BELIEF IN IT’S ROLE IN COMPANY’S SUCCESS AS EVIDENCED BY: IT application will increase competitiveness by technology level**

**Theme / question: E : 19**

Threshold	Yes	No	Not sure	Total
<b>Non-Technical Threshold</b>	72/ 79.1 %	10/ 11.0%	9/ 9.9%	91
<b>Technical Threshold</b>	27/ 84.4 %	3/ 9.4 %	2/ 6.3 %	32
<b>Total</b>	99	13	11	123

<sup>7</sup> Another version of this “cost of business” approach may arise from firms relying on minimal staff until there is a problem, then outsourcing the maintenance, repair, and/or reprogramming to outside vendors. In this case, they actually see IT as an on-going expense, but gain none of the advantages of having skilled employees making suggestions as to how to take advantage of IT to build new relationships, markets, and revenues.

The firm's strongly belief in IT is based on their perception that it is a means for reducing costs. From 2/3 to ¾ of firms in each size category believe that IT can cut their costs. This position is held by almost 90% of the TT firms.

**Table #33—Title: INTEREST AND BELIEF IN IT'S ROLE IN COMPANY'S SUCCESS AS EVIDENCED BY: IT as a means for reducing costs by firm size**

**Theme / question: E: 21**

Size	Yes	No	Not sure	Total
<b>Small</b>	25/ 65.8 %	12/ 31.6 %	1/ 2.6 %	38
<b>Medium</b>	41/ 75.9 %	11/ 20.4 %	2/ 3.7 %	54
<b>Large</b>	22/ 73.3 %	6/ 20.0 %	2/ 6.7 %	30
<b>Missing cases</b>	1			1
<b>Total</b>	89	29	5	123

**Title: INTEREST AND BELIEF IN IT'S ROLE IN COMPANY'S SUCCESS AS EVIDENCED BY: IT as a means for reducing costs by technology level**

**Theme / question: E: 21**

Threshold	Yes	No	Not sure	Total
<b>Non-Technical Threshold</b>	61/ 67 %	26/ 28.6 %	4/ 4.4 %	91
<b>Technical Threshold</b>	28/ 87.5 %	3/ 9.4 %	1/ 3.1 %	32
<b>Total</b>	89	29	5	123

The firm's belief in IT is underscored by budgeting for future information technology. Small and Medium firms have an ambivalent response to this question, while almost ¾ of Large firms believe they have budgeted for IT in their future. Surprisingly, it is size of firm, and not the extent of their technology savvy that is the principal factor in response, as evidenced by the similar answers of the TT and NTT firms

**Table #34-- Title: INTEREST AND BELIEF IN IT'S ROLE IN COMPANY'S SUCCESS AS EVIDENCED BY: budgeting for future information technology by firm size**

**Theme / question: E: 33**

Size	Yes	No	Not sure	Total
<b>Small</b>	15/ 42.9 %	17/ 48.6 %	3/ 8.6 %	35
<b>Medium</b>	29/ 54.7 %	15/ 28.3 %	9/ 17.0 %	53
<b>Large</b>	21/ 72.4 %	6/ 20.7 %	2/ 6.9 %	29
<b>Missing cases</b>		1		
<b>Total</b>	65	39	14	118

**Title: INTEREST AND BELIEF IN IT'S ROLE IN COMPANY'S SUCCESS AS EVIDENCED BY: budgeting for future information technology by technology level**

**Theme / question: E: 33**

Threshold	Yes	No	Not sure	Total
<b>Non-Technical Threshold</b>	47/ 53.4 %	29/ 33.0 %	12/ 13.6 %	88
<b>Technical Threshold</b>	18/ 60.0 %	10/ 33.3 %	2/ 6.7 %	30
<b>Total</b>	65	39	14	118

Another indicator of a firm's commitment to IT would be the number of IT workers which it anticipated hiring in the next 12 months. Such a commitment appears relatively weak. However, given the depth of the jobless recession in the US and Ohio and NW Ohio in general, one could construe the intent to hire any IT person as a relatively positive response.

**Table #35-- Title: INTEREST AND BELIEF IN IT'S ROLE IN COMPANY'S SUCCESS AS EVIDENCED BY: number of IT workers anticipated hiring in the next 12 months by firm size**

**Theme / question: E: 45**

Size	0	1-2	3-5	Don't know	Missing Cases	Total
<b>Small</b>	27/ 71.1 %	5/ 13.2 %	1/ 2.6 %	1/ 2.6 %	4/	38
<b>Medium</b>	40/ 74.1 %	9/ 16.7 %		3/ 5.6 %	2/ 3.7 %	54
<b>Large</b>	18/ 60.0 %	7/ 23.3%	2/ 6.7 %		3/	30
<b>Missing cases</b>	1					1
<b>Total</b>	86	21	3	4	9	123

Threshold	0	1-2	3-5	Don't know	Missing cases	Total
<b>Non-Technical Threshold</b>	64/ 70.3 %	13/ 14.2 %	3/ 3.3 %	4/ 4.4 %	7/ 7.7 %	91
<b>Technical Threshold</b>	22/ 68.8 %	8/ 25.0 %			2	32
<b>Total</b>	86	21	3	4	9	123



**Summarizing theme E -- Respondent's belief in the role of IT in firm "success"**

All firms seemed confident in the ability of IT to increase competitiveness and to reduce costs. All firms, except for Small firms (where ambivalence reigned) were planning to increase their firm's budget for IT outreach in the coming year. But all firms were emphatic in the fact they intended to hire no new workers for the future. The firms apparently believed the 'myth' of IT applications, but see little use in exploring the implications of these applications.

There is a significant disconnect between the views expressed in this section, and the responses indicated in the previous sections. Firms want the benefits of IT, but especially the small and medium firms won't plan or make an investment in new equipment or workers. This is similar to findings in earlier sections where they wanted skilled workers but hired people with a high school degree and self-trained individuals. Some small firms live "on the edge,": continually bootstrapping their firm for immediate survival and not engaging in any long-term planning, but this does not apply to all firms. It seems that generally, local firms approach IT with a cost containment logic rather than recognizing that IT software and personnel are an investment that can increase and improve their firm's business.

## **Findings**

### **1. The use of IT technology may not be perceived as a decisive component of the economic mission of the respondents**

Economic mission is defined as a transaction between a firm's environment and the resources of the firm. Traditionally firms assess the need for goods or services in their perceived client environment, then offer solutions for sale to clients (Rubin & Brown, 1974; Farace, et al., 1977). In this small survey it appeared firms had minor interest in using IT technology to adjust to changing patterns of client's needs. Respondents to this survey viewed ISP as a way for clients to approach them. Developing a long-term, continuing relationship with clients was seemingly deemed unnecessary. As long as clients had a reliable ISP connections for contacting the vendors with requests, respondents saw little need to contact clients to develop, explore and expand exchanges with clients. This skewed perception may cast the sales component of a business not as a transaction, but a one-way action. The Internet may be perceived as one channel among many by which clients made these needs known to the firms. The traditional channels of face-to-face requests, sales calls, informal informational exchanges when contract bids were published and first-time approaches by new clients were sufficient to serve the respondents' abilities to detect changes in the economic climate of the region. IT may be perceived only as a tool to make the traditional sales interaction "go faster."

Such a view may dim respondents' perspectives on two points:

1. National and International customers might be ignored in an economic climate when customers world-wide frequently post their needs in various types of Internet auctions—lowest vendor bid capturing the client's business. Without sophisticated ISP connectivity to interact with foreign markets, local vendors may be left with fewer 'takers' from global clients. Thus, local firms, far from an international point of sale, have little way to broadcast their expertise to developing nations, interested clients of the European Union, and goods-starved regions of the former Communist block or Latin American nations (McDougall, 2004), or even outside of the upper Midwest region of the U.S..

2. Firms' existing systems might be overlooked. There appeared to be little interest in hiring "project management" personnel, to integrate the multiple existing systems into firms' economic missions. The firms apparently overlooked savings in labor and overhead with an integrated IT system. Judging from other answers in this instrument, systems were installed throughout the firms ("because the bosses decided to") in reaction to individual departmental needs with little planning for efficient use of existing equipment. Redundancy of systems may cost firms a portion of their profits and render them "uncompetitive" in races for new customers. An increasingly sophisticated client base concerned about security, intellectual property, tracking software and telephony needs may demand uniformity of systems and simplification of the processes of doing

routine business with vendors (ACSIS, 2004; Microsoft, 2004; McDougall, 'Outsourcing'; Avalanche).

More troubling were the responses to "training needs" identified in the survey. The need to listen to sources outside their own firms may be ignored. The choice to install new software was frequently left to "superiors" in the firms. Little evidence was found where software was installed arising from customers' requests. Worse, 18.8% of respondents had no idea where the push came from for additional training. Still worse, respondents saw little need for additional trainers and were "satisfied" with existing trainers.

This feature is troubling. Instead of a "climate of learning" the respondents were in a "emergency bandage" response toward education where training was viewed as a type of "damage control" to stay minimally competitive with rival firms. Just as public education in the community may be given short shrift, so education in the IT mechanisms to enhance the firm's earning stature was awarded little importance. This is confusing in light of experiences in Euclid, Ohio (Lincoln Electric) and Owensboro, Kentucky (Scott Paper), where ongoing education was a "given" for economic success in increasingly technical manufacturing firms (Narisetti 1995). Such a mind-set may contribute to an underlying assumption that a firm can "get along" and yet retain its economic viability with a minimum commitment to skilled staff, equipment purchasing, staff expansion, and budgeting for IT expenses and operations

## **2. Low educational expectations of new hires**

Most firms appeared to prize "office workers, salespersons, paperwork specialists." Yet workers in this layer of skills were given few significant tasks—a point verified by the types of software firms reported running. The more a firm used IT, the more "secretaries" the firm needed to implement technical tasks. This may contradict the experience of Scott Paper Company above where "line workers" were expected to perform high tech manufacturing tasks, customer contacts and complex physical labors with strength-assisted technical devices (loading trucks, retrieving inventory from warehouses, delivery of finished product to packaging). One begins to perceive the IT personnel in this survey as "too good" to interact with clients. Very little is expected of employees with such a limited repertoire of interpersonal skills and public interaction abilities. Firms in this survey might achieve greater customer satisfaction and profits if "traditional" roles of personnel were re-examined. Firms might find a greater client response if "high tech" workers actually interacted with the public purchasing the firms' goods.

Further, a high school credential is all that is needed for entry to many of these firms. There seems to be little interest in demanding academic credentials—especially graduate degrees which are often essential for state-of-the-art IT work. A willingness to spend time-on-task, ability to abstract information so data may be "cleaned" for access to multiple applications, ability to envision the consequences of a chain of events, or abilities to explain process to a range of audience and information processing modes, seem beyond the interests of most firms. There appeared to be little concern for

“certificate” or AA degrees. A majority of the firms required the minimal level of experience with a computer and many firms promised to train personnel in IT use once workers were hired. The exception to these trends was among larger firms. This may be due to the later being better capitalized, or to the recognition that “counting pennies is more expensive than counting dollars”—that failing to invest has substantial costs in reducing revenues and lost firm growth.

Further, there appeared to be few specific plans for the development of employees’ talents. Apparently management did not perceive of new hires as talent to nurture for future needs. This may sound a troubling theme that IT personnel are not perceived as real colleagues but only technical people “to run the computers” and no real insight as to a firm’s mission. If talent is not cultivated, IT people may soon move on to more promising exercises or grow complacent to challenges of information management. Such a practice may ignore workers’ skills to detect warning signals from hackers, identity thieves, or opportunities to save money. Ware (2004) in a similar survey of CIOs learned the most valuable “perk” for retaining valuable IT personnel was the offer of additional in-depth IT training.

Another troubling sub-theme detected here is that IT workers, once trained, were expected to do an often unreasonable variety of IT tasks. The BA/BS holders were often expected to know business applications and Web design. These are highly divergent skills. Students attracted to the former probably have little interest in the latter. Graphic artists and presentation software skills require literacy skills; business applications such as Access or Excel may require richer mathematics skills. Problematic, however, is when these two application teams need to communicate with each other to plan for ‘user-friendly’ portals for clients’ use and access to a firm’s resources. Apparently little thought has been given to leading new employees to work together (National Association of Manufacturing, 2003).

### **3. Low expectations of IT staff members’ abilities to solve advanced problems in security, product tracking, and connectivity needs.**

Compounding problems of lowered expectations for hires was the apparent impatience in the surveyed firms with actually solving problems themselves. Jobs were outsourced if there were no immediate solutions arose from staff. Perhaps firms thought they saved money by exporting problems to third-party vendors. Given the “top-down” management styles of most firms in this study, just explaining the problem to an outside vendor may cost more than asking staff to pool their expertise for a solution. In all these cases, a dreadful portrait appears to emerge of IT workers who are marginalized from the main mission of the firm and feel little indication that what they do contribute to the greater good of the firm.

### **4. Respondents apparently do not “plan” their use of IT technology. Training occurred when someone bought new software, or at the caprice of the boss. Firms “reacted to” change rather than “anticipate” change.**

A predominant theme here is a ‘lack of planning’ for hiring IT personnel. A majority of the respondents indicated they would hire no new personnel, and if new hires were anticipated, firms frequently were unsure of the types of workers to be hired. Planning for future needs requires management who assess future trends; listen to existing staff, and who can partition goals into achievable tasks. Apparently this sample felt little compulsion for systematically guiding their firms to new levels of service. Such attitudes may contribute to defeatist mind-sets...a pariah for a community’s self-image. Apparently, management is using a tired model of planning as they hope to sustain a tenuous economic viability in the national and international market.

#### **5. Respondents apparently have little interest in clients’ needs and little interest in cultivating relations with clients to gain a better understanding of future business trends**

Apparently respondents in this survey perceived minimal pressure or urgency in developing relationships of significant depth with clients. There was low interest in CRM (Customer Relations Management) software development to reach new customers more efficiently. Respondents expressed low need for Web designers. Apparently the firms were oblivious to the ability to attract customers through Web site persuasion. Respondents gave low priority to client requests for better service as a prompt to begin staff training. Only three respondents (13.6%) focused on “client satisfaction” and “client comments” for assessing the need for additional staff training.

Since many respondents indicated they had substantial confidence in their ISP connections and the connection’s reliability, we ask what were these firms using the Web for? Such satisfaction is difficult to understand given the onslaught of hackers, denial of access codes, and security breaches prevalent and pervasive on the Internet today. If the Web was not being used to reach out to the client base, perhaps respondents in this survey used the Web only to respond to clients ordering in to the separate firms. This may indicate that the Web is little more than sophisticated e-mail technique—an insight supported by the preferred software programs that firms identified.. They seemingly expect the client will come to the vendor instead of the reverse. Firms have confidence that such limited IT applications will keep them competitive and reduce costs in doing business. Yet it is unclear how firms can maintain this one-way style of mission without giving attention to shifting clients needs, a without a willingness to extend themselves to clients, and commitment to the long-terms task of building client relations. Ironically, without an upgrade in technology and the implementation of specialized software, and improvement in the skills of their IT staff, it is also not clear what many of these firms could share with their customers.

## **Conclusion**

The firms of NW Ohio who responded to our survey recognize the need for IT technology and believe it could advantage them. However, their knowledge of the technology, of the skills and training needed to be competitive, and their understandings of the advantages of a coherent strategy of IT development and integration into their business is insufficiently developed and insufficiently supported. The one theme that is indicated and reflected in each of the sections is that local firms seek the benefits of IT, but that their knowledge, personnel, training, equipment, and strategic decisions reflect the primacy of cost containment, rather than viewing IT as an investment in business development and expansion.<sup>8</sup> While some of the Large firms recognize and are prepared/preparing to integrate IT techniques and applications so as to enhance their operations and revenues, most area firms lack the most rudimentary preparations. Their responses do not reflect a realistic understanding of the breadth of IT penetration of business, recognition of the opportunities for redefining their firm's operations, supply chains, and markets, nor a willingness to invest in their workers or businesses in ways necessary to participate effectively in the new economy. In a world of global competition and when a generation of consumers rely more on IT as a source of information, consumption, production, networking, problem-solving, and even community, failure to embrace these innovations is short-sighted and ultimately self-destructive.

There is a significant need for quality training, for exposure to the gamut of technology and their implications, and to securing support for technical upgrades to enable local firms and trainers to help local firms retain or regain their competitive position. It is incumbent upon the local economic development agencies and universities to assist such firms if they expect their community (and their future markets) to thrive.

## **Policy Implications and Recommendations**

### **For Economic Development**

Telling us what one expects from their employees, suppliers, and your infrastructure, tells us a great deal about regional firms. We can see that they have accepted the prevailing wisdom about IT, and several say they want to hire in that area. However, the breadth and depth of understanding of IT, the different levels and forms of IT applications, and the requisite level of training needed to effectively compete in the workforce are in short supply in all but the largest firms and most tech savvy firms. While it is nice that people talk about the information age, on-demand service, seamless production, e-commerce, automated supply chain management, and internationalization of competition, there little evidence that the firms that responded to this survey had the

---

<sup>8</sup> This finding is consistent with the findings of the 2000 study by the TCC/RGP, and the IT study by James LeSage 2001, and the ranking of the Milken Institute 2003, 2004 cited in the Introduction.

depth of understanding, strategic insight, budgets, or recruiting practices that would help them to effectively compete in the new economy.

Economic development has two principal components—luring companies from elsewhere, and cultivating local firms to increase their attempts to thrive. Most of these firms are not ready for a world where “tier one” firms only accept on-line bids and require “tier two” suppliers to force “tier three” firms to have direct access to inventory and pricing information, etc., despite the fact that such a world is upon them. They are unprepared for commerce where there is an increased use of websites, on-line ordering, customer identification and recruitment, and business to business sales via electronic commerce. The economic development community needs to pay attention to the status of IT development in local firms of all sizes, since it is such a crucial element of the emerging economy. Clearly (as indicated by Toledo’s slippage in the Milkin Institute 2003 rankings over the last 8 years) their competitors in other locales rely on technology to provide them with an advantage, and cultivating such an approach across this community could be a significant lure to outside businesses.

Much to their credit, the Regional Growth Partnership, Port Authority, City of Toledo and Lucas County economic developers, and regional universities have executed an industry cluster study and implementation strategy.<sup>9</sup> A central focus of this group will be to upgrade the IT capacity in the region. One component of this effort includes improving the relations among IT firms, increasing their operational capacity, and pursuing their common needs—including creating an understanding of the opportunities, benefits, and necessity of IT development for non-IT firms so that they can become competitive in the new economy.

Promoters of local business and economic development should consider the following as part of their attempts to cultivate existing firms;

- Creating short courses to teach groups of firms the contemporary applications of the web and the various types of IT technologies that are available.
- Providing some customized training to help firms recognize the breadth and depth of computer application in their sectors, and to make them aware of the potentials of various IT technologies.
- Identify the relative levels of skill reflected in various levels of education and various forms of training, since firms seem unclear as to what to expect from people with various backgrounds.
- Promote the idea of hiring IT experts as a firm investment in human capital which can contribute to the success and innovation of a firm, rather than using a cost minimization strategy seeking to hire the least expensive person to do the minimum work needed to hopefully get by.
- Promote a new business model and culture. This survey suggests an adherence to the hierarchical, often adversarial, mass production model of minimum skill

---

<sup>9</sup> This work was performed by the UT Urban Affairs Center in collaboration with BGSU’s Center for Regional Policy and Public Service. [http://uac.utoledo.edu/nwoerc/uac-nwo-erc\\_files/v3\\_document.htm](http://uac.utoledo.edu/nwoerc/uac-nwo-erc_files/v3_document.htm)  
Dr.’s Neil Reid and Michael Carroll, and Sue Wuest—UAC Assistant Director--led this effort.

and dependence upon the leaders, still pervades our regional economy. Increasingly the business model of high tech firms promotes taking the employee into the creative process, seeking input and greater integration, and encouraging innovation inside of the firm, and between the firm and its environment. Toward this end, executives need to learn to cultivate talent and integrate IT workers into the firms processes.

### **For IT Training Providers**

How then could curriculum planners equip students with skills they need for work in this organizational context?

1. Each discipline should require a course in information management where students are required to begin an ongoing portfolio (as soon as they declare a major) of IT skills and emerging trends in their specific discipline.
2. Students need courses on dyadic and organizational communication using non-traditional\_organizational models. Topics like “turf protection”, “equivocally reduction” and data mining relative to the structure of an organization should be presented in detailed case studies and on-site visitations (Weick, 1979).
3. Students in all courses should be linked to larger national and international trade associations where they may gain helpful assistance to organizational challenges. The Center for Workforce Success ([http://www.nam.org/s\\_nam/sec.asp?TRACKID=&CID=86&DID=84](http://www.nam.org/s_nam/sec.asp?TRACKID=&CID=86&DID=84)) sponsors several Web sites and discussion groups for solving organizational problems in manufacturing. Many of these projects are underwritten by the U.S. Commerce Department. Of specific interest is a project for a middle-school Web site ([www.nam.org/s\\_nam/doc1.asp?CID=184&DID=224703&rcss=print](http://www.nam.org/s_nam/doc1.asp?CID=184&DID=224703&rcss=print)) to promote manufacturing careers among middle-school students, and the creation of a teaching kit for grades 7-12 ([www.nam.org/s\\_nam/doc1.asp?CID=184&DID=224173&rcss=print](http://www.nam.org/s_nam/doc1.asp?CID=184&DID=224173&rcss=print)) to promote manufacturing careers. Most professions maintain similar sites. The object of these exercises is to prevent “provincial” mind-sets and climates of perceived isolation which may erode students’ career goals after graduation.
4. Each course needs to focus on case studies of career development, morale problems, increased productivity projects, and in-service education (Ip, 2004; National Association of Manufacturers, 2003; Ware, 2004). The aim here is to increase a sense of life-long learning for young professionals.
5. Each discipline should install a qualitative research course in its curriculum. Such a course would help student’s document exciting and novel organizational environments emerging in technology-rich firms. These should be explored with e-learning courses (McCain 2002) and would give students a



sense of control over the progress of their careers.

## References

ACSIS and SAP Partner for RFID. (2004). Industry News from ARC Advisory Group.  
[http://www.arcweb.com/arcwire/english/pop-up/news\\_win.asp?ID=5469](http://www.arcweb.com/arcwire/english/pop-up/news_win.asp?ID=5469)

Avalanche Corporate Technology Cooperative.  
<http://www.avalanchecorporatetechnology.net/>

Barrett, C. R. (2004). Education SOS. Wall Street Journal, Online Edition, Thursday, March 04, 2004.

Center For Workforce Success. Sponsored by the National Association of Manufacturers. [http://www.nam.org/s\\_nam/sec.asp?TRACKID=&CID=86&DID=84](http://www.nam.org/s_nam/sec.asp?TRACKID=&CID=86&DID=84)

Chu, Roderick. (2000). "ITEC-Ohio" The Ohio Economy, Toledo: UAC. Winter.  
<http://uac.utoledo.edu/Publications/OhioEconomy/oh-econ-winter-00.htm>

Dwyer, Dale and Richard Boden; 2002. Where Will the Next Jobs Be?" Toledo: UAC  
<http://uac.utoledo.edu/Publications/next-jobs-nwohio.pdf>

Farace, R. V., Monge, P. R., and Russell, H. (1977). Communicating and Organizing. Reading, MA: Addison-Wesley.

Ip, G. (2004). Greenspan warns trade standards will harm U.S.; Fed Chief pushes education improvements. Wall Street Journal, Online Edition, March 12.

Kleinhenz, Jack. 2000. "Internet Business Practices." The Ohio Economy, Toledo: UAC. Fall. <http://uac.utoledo.edu/Publications/OhioEconomy/oh-econ-fall-00.htm>

LeSage, James. (2001). "The Toledo Region," in The Information Technology Industry in Ohio and its Regions, 1989-2000. Dayton: IT Alliance, Pgs. 83-98.  
<http://uac.utoledo.edu/Publications/ohitfinal.pdf>

McCain, M. (2002). E-Learning: Are we in transition or are we stuck? Paper commissioned by Center for Workforce Success of the Manufacturing Institute.  
[http://www.nam.org/s\\_nam/bin.asp?TrackID=&SID=1&DID=225125&CID=184&VID=2](http://www.nam.org/s_nam/bin.asp?TrackID=&SID=1&DID=225125&CID=184&VID=2)

McDougall, P. (2004). Offshore presence could be good for U.S. services firms. InformationWeek, Online Edition, March 8.  
<http://www.informationweek.com/shared/printableArticle.jhtml?articleID=18300093>

\_\_\_\_\_. (2004). Brave New World: Outsourcers answer customers' demands for change by offering new service and pricing models, expanding geographically, and standardizing technology. InformationWeek, Online Edition, May 10, 2004.  
<http://www.informationweek.com/story/showArticle.jhtml?articleID=20000264>

Microsoft and SAP Collaborate for Web Services. (2004). Industry News from ARC Advisory Group. [http://www.arcweb.com/arcwire/english/pop-up/news\\_win.asp?ID=5467](http://www.arcweb.com/arcwire/english/pop-up/news_win.asp?ID=5467)

Milken Institute, 2004. Best Performing Cities: Where America's jobs are being created. <http://bestcities.milkeninstitute.org/>

Nariseti, R. (1995). Manufacturers decry a shortage of workers while rejecting many. Wall Street Journal, (Friday), September 8, A1 & A4.

National Association of Manufacturing. (2003). [Keeping America Competitive -- How a Talent Shortage Threatens U.S. Manufacturing -- Executive Summary](#) - 5/29/2003 (PDF)

[http://www.nam.org/s\\_nam/bin.asp?TrackID=&SID=1&DID=226576&CID=84&VID=2](http://www.nam.org/s_nam/bin.asp?TrackID=&SID=1&DID=226576&CID=84&VID=2)

Regional Growth Partnership and Toledo Area Chamber of Commerce. (2000). Workforce Needs Survey. Toledo: Regional Growth Partnership.

Rubin, J. Z. & Brown, B. R. (1975). The social psychology of bargaining and negotiation. NY: Academic Press.

Toledo Area Chamber of Commerce and Regional Growth Partnership. 2000. Workforce Needs Assessment. October

Ware, L. C. (2004). January 2004 IT Staffing Update. CIO.com: The Resource for Information Executives. <http://www2.cio.com/research/surveyreport.cfm?id=69>

Weick, C. (1979). The social psychology of organizing. Reading, MA: Addison-Wesley.