

Information Technology Job Skills for Workplace Success

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Abstract - Almost all organizations today depend upon information technology (IT) for nearly all aspects of their business. Information technology involves multiple components and its complexity has only increased in last few years. There is a current need to improve IT curriculum at various education levels to meet modern day challenges. Authors of this paper explore the ways in which educational institutions can provide the necessary skills for success at workplace to future IT employees. This research suggests that in addition to project management and communication skills, students should be provided with hands-on, practical and technical skills in areas such as systems and networking, along with software development.

Keywords- *Information technology skills, information system education*

I. INTRODUCTION

There is no doubt that pace of technological changes have been accelerating throughout this century; therefore, colleges, and technology-related programs, have been struggling to provide the skills and training needed at the fast-changing workplace. A major inflection point occurred in the IS/IT (information systems/ information technology) area before the turn of the century when role of information technology departments changed from back office support to a strategic component of the business strategy. With that change, along with the rise of the Internet/World Wide Web, need for IT skills increased tremendously. There is a necessity to improve curriculum at various education levels to meet modern day challenges. Instead of performing just the routine tasks of help-desk and support, IT employees today help achieve the organizational goals [1]. Lee and Han [1] analyzed the gaps between the IS 2002 model curriculum and the industry requirements in the Fortune 500 companies and suggested that knowledge of technological trends, knowledge of business functions and general problem-solving skills be taken into account by the IS/IT curricula developers.

Most organizations nowadays depend upon the technology for virtually all aspects of business. Information systems/technology involves multiple components that have only increased in last few years. These components fall into categories of hardware, software, data, and procedures, in addition to the users. This set of components requires that an IT employee to have a broad spectrum of possible skills to be competitive in the workforce. According to a CompTIA report published in 2012 [2], more than 15 million businesses rate the skill levels of their IT staff as below optimal. In its 2012 *State of the IT Skills Gap report*, the computing

technology association cites the top industry skills gap areas to include network infrastructure, server and data center management, storage and data back-up, cyber security, database and information management, and web design/development. The dynamic nature of the IT field is a primary cause of talent shortages, as the employee skills become outdated quickly. Additionally, organizations, due to competitive pressure, past recession and other reasons, are not able to provide resources for continual professional development to its employees. In addition to technical skills, it has been suggested that communication and business skills should also be provided to the IT employees [3].

II. MOTIVATION AND PURPOSE

In the CompTIA world-wide survey discussed above, about 93% of respondents indicated a skills gap, defined as the difference between existing and desired IT skill levels of the IT staff [2]. Also, by 2020, employment in all computing occupations is projected to increase by 22% based on the Bureau of Labor Statistics (BLS) report [4]. This indicates a need for a concerted effort by academia and industry to increase the likelihood that future IT employees will have the skills needed to succeed at the workplace.

The research question in this study is: what are the specific IT skills needed in the marketplace at this time and how the academicians ensure that those skills are provided to potential employees. The objective of this proposed study is two-fold, the first purpose is to evaluate the current needs of IT employee skills as identified by managers and employers. This would be followed by identifying the ways in which educational institutions can provide the necessary skills to future IT employees. Since the purpose of the research is to provide guidance that employers and educators can use to better prepare graduates and develop the needed skill sets to fill IT skills gaps, the researchers have used a survey approach in this study to gain insights from industry and academic experts.

III. RESEARCH METHOD AND RESULTS

The focus of this research was on the IT organizations and job market in Metro Atlanta area. The Metro Atlanta area ranks sixth in the nation in terms of information technology jobs [5] with numerous businesses needing modern IT skills. The purpose of the research would be to determine ways in which educational institutions can provide the necessary skills to future IT employees. The authors sought opinion of the employers, and academicians regarding the current set of skills that

each graduating college student should have to succeed in today's IT market in the target area. Using a structured survey, the researchers solicited opinions of managers concerning the importance and significance of each skill. Some of the skills are absolutely essential for graduates while others can be learned on the job. It is expected that the knowledge gained from the employer feedback would help plan out the curriculum. Some of the questions to be answered included: is there a need for developing skills to be a specialized IT employee (networking, software development, enterprise resource, etc.), how much, and what type, of the business skills and knowledge is important to have for IT graduates, how important are the skills to interact with customers and end-users, and how important are soft-skills to employers.

To answer the research questions in this study, a survey was designed and administered. The study involved data collection from experienced IT professionals within Atlanta, Georgia. And the means of data collection used were structured questionnaires. The areas of focus in the study included software design and development along with systems and security field. The number of professionals who contributed to data collection was fifteen.

In today's organization, technology outranks all other external factors as the top driver impacting organizations [6]. According to past studies, there are four pivotal information technologies are rapidly reshaping enterprise operations: mobile technology, business analytics, cloud computing and social business [6]. Almost all areas within IS/IT have been impacted by these trends, and only one in ten organizations has all the needed skills [6].

Computer Systems Analysts have to consider how social business and business analytics impacts the organization. Software Developers of both application and systems must include mobile and social computing in the development. Web Developers are heavily involved in mobile and social computing, in addition to analytics that helps organization in improving business. Information Security Analysts have to deal with new threats posed by mobile, social and cloud computing. Computer Network Architects must consider how to leverage cloud computing. Similarly, Network and Computer Systems Administrators need skills in dealing with cloud computing and social business aspects of modern technology. Computer and Information Systems Managers also need skills in mobile and cloud computing, as well as business analytics. Database Administrators who were just dealing with systems and servers, now need skills in all, mobile, cloud, and social computing in addition to be able to leverage big data and analytics.

Based on the study, some of the issues that have gained significance during last few years within Atlanta area include: A) Bring Your Own Device (BYOD), this approach has created significant challenges across business

organizations, specifically personnel dealing with systems and security, particularly in the area of security and IT support. B) Big Data and Analytics has been a major growth industry in the recent years, and offers some unique challenges associated with its growth. C) Cloud Computing and virtualization, this development has some specific challenges for IT employees in the areas of software design and databases along with those dealing with systems and security. More and more companies are taking advantage of relatively economical cloud hosting solutions. There is a big market for such solutions including AWS, Windows Azure, Google App Engine, etc. Availability of such services have allowed small businesses to provide solutions that previously would require large initial investments in data centers. These cloud hosting services require IT employees with advanced skill set of both a software engineer and a systems administrator.

Based on the information collected from the professionals in this research, some of the specific technology skills needed within systems and security are identified (Table 1). Most of these skills require some background in hardware, like the server itself and networking technologies. Most of the skills listed in the table, require students to gain hands-on training and experience. In many instances, employees learn such skills on the job. However, based on this research, curriculum should offer an opportunity for educational institutions to provide such hands-on training in the information technology courses. A balance of hardware background along with practical software experience can help in getting ready for the real-world. Most information technology curriculum should focus on developing active-learning strategies throughout their curriculum.

As far as software development is concerned, there is a need of some technology skills within the area (Table 2). It is advisable to provide experience in programming using modules that mimic real-world activities. Far too often, students learn programming but most such experience involves very basic concepts. The programming experience that can prepare students to develop mobile programs would require skills beyond the basic concepts. According to Meadows [7], the major industry sectors employing IT professional within Atlanta metropolitan area are: Software development, Mobility, Internet security, Digital media & gaming, financial transactions processing, Healthcare IT, Supply chain IT/Software and Logistics & Distribution. The top ranked technology skills include [7]:

- Programming, Development and Engineering
- Databases and Data Warehousing
- Web design and related technologies
- Operating Systems
- Network administration and security
- Business Intelligence
- Digital media, including development and design

Table 1. System and security related skills

Technology Category	Specific Tools
Virtualization	Server-side virtualization Client-side virtualization vSphere, ESX server
Virtual Private Networks	PPTP, L2TP, SSTP protocols VPN Setup and securing
Networking Infrastructure	Sub-netting Virtual Local Area Networks (VLAN) Network Topology design
Router/Switch configuration	Packet Tracer Network Design and configuration
Networking Operating Systems	Windows Server 2012 Windows Server 2008
Security protocols and skills	Encryption Wireless security

Table 2. Software development related skills

Skill Area	Technologies
Programming and development	Java programming C++ programming
Network Application development	Mobile Applications Communications
System and security applications	Operating Systems Security Applications

In addition to the technical skills in the area of hardware and software development, organizations need employees that possess business and soft skills. Within Atlanta area, respondents have provided a specific set of skills that fall in this business and soft skills category (Table 3). Most respondents emphasized needs for project planning, communication (written, verbal and presentation skills), along with the emphasis of critical and logical thinking.

Although some of these skills can be learned at the work place, it is necessary to provide some training in these areas within an information technology educational program. Requiring students to work in teams and in a collaborative setting, and ensuring that they develop communication skills through written papers and presentations throughout the curriculum would enhance their marketability at the work place.

Table 3. Business and soft skills

Skill Category	Specific Skills
Communication skills	Writing Presentation, oral and written Organization
Organization skills	Project planning and management
Problem solving	Logical thinking and deduction Troubleshooting

IV. CONCLUSIONS

In this research, authors collected data from industry experts regarding the needs of employers within the technology sector within Metropolitan Atlanta area. Educators in information technology programs can use the results from this study to prepare students for technology sector jobs of today. In addition to providing students with soft skills, this work suggests that there is a need to provide hands-on training to students so that they can be successful employees. Many other researchers have also highlighted the importance of workers having not just technical skills, but also having critical thinking, collaboration, and communication skills. Since most businesses represented in the study report that there is a lack of needed skills in IT employees today, it is important that educational institutions push for active-learning strategies in classrooms, while also encouraging collaborative, project-based, communication-oriented learning.

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