Non-Technical Skills for Success in a Technical World

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Abstract

The U.S. Census Bureau estimates that by 2018, the country will require nearly one million new information technology workers and the U.S. Bureau of Labor Statistics predicts the need for nearly one and a half million by 2022 when considering new positions and retirements. Corporations need employees to fill these positions who have the correct mix of technical, soft, and business skills. More than three hundred industry professionals participated in a study to identity the most important non-technical skills for success in technical jobs. The skills highest ranked across all categories were problem solving, team work, listening, the ability adapt to new technologies and languages, time management, the ability to transfer knowledge to application, multi-tasking, verbal communication, visualize and conceptualize, "be the customer" mentality, interpersonal skills, understand business culture, inter-team communication, and give and receive constructive criticism.

Key Words: Soft skills, business skills, technical skills, non-technical skills, IT job categories

1. Introduction

The U.S. Census Bureau estimates that by 2018, the country will require nearly one million new information technology (IT) workers (U.S. Census Bureau, 2012) and this doesn't take into account positions that will be vacated as baby-boomers retire from the field. The U.S. Bureau of Labor and Statistics predicts nearly 1.4 million job openings by 2022 due to growth and replacements (U.S. Bureau of Labor and Statistics, 2013). Given that there are significantly less than a quarter of a million students enrolled in information-technology related programs in the US despite five straight years of increases in enrollment (Zweben, 2013), it stands to reason that students graduating with a major in the area stand a good chance at employment. However, as all academicians have experienced, organizations will leave positions unfilled until such time as they can either find the right person for the job and one of the greatest challenges is finding employees with the desired mix of skills.

The most productive IT specialists possess a mix of technical as well as non-technical skills (Trauth, Farwell, & Lee, 1993) and comprehensive research is necessary to determine how industry and academia can ensure that the right kinds of training are available to develop them. Over the past four decades, IT literature has reported studies dealing with the importance of non-technical skills. A 1974 study concluded that people, organizational, and systems skills were more important than technical skills (Henry, Dickson, & LaSalle, 1974). In 1980, yet another study found behavioral skills to be more important (Benbasat, Dexter, & Mantha, 1980); a study that was validated by Vitalari (Vitalari, 1985). Research in the mid-1990s found that business, soft, and analytical skills are more important than technical skills (Lee, Trauth, & Farwell, 1995). While lists of desired non-technical skills have been developed (Parker, Bailey, & Mitchell, 1999; Beard, Schwieger, & Surendran, 2008; Aasheim, Shropshire, Lixin, & Kadlec, 2012; Lieger, Woodward, & Martin, 2012; Robles, 2012), literature is either too general or limited in scope to be applicable in the development of comprehensive programs for the different job categories that make up the IT industry.

Most industry observers agree that innovative private and public initiatives are needed to increase the supply of qualified workers. In keeping with this philosophy, a joint initiative between industry and academia was formed to conduct the present study. The purpose of this study was to identify the most important non-technical knowledge, skills, and abilities (KSAs) that are needed by employees in different IT categories so academic/training curricula can be developed accordingly.

Identifying the most important non-technical KSAs and developing responsive university curriculum for each job category are the first steps in addressing one of the IT industry's major challenges: shortage of IT professionals with a less than optimum mix of skills. This research is an initial phase toward the development of a more successful fit between academic programs and industry needs in the IT job categories for which the entry-level education is a bachelor's degree: computer programmers, computer support specialists, web developers, computer systems analysts, software developers, database administrators, and network and computer system administrators. Table One shows the Bureau of Labor Statistic's 2012 projected growth and number of jobs added for each of these categories for the time period between 2012 and 2022 highlighting the opportunities and responsibility academia has to prepare students to fill these upcoming positions (Bureau of Labor Statistics United States Department of Labor, 2013).

2. The Study

The data for this study was collected through web-research of IT job descriptions, site interviews with CEOs and other executives at five IT companies, focus groups of IT managers from various divisions within the IT companies, and a web-based survey of IT professionals with varying levels of knowledge, skills, and abilities. The web-research, site interviews, and focus groups identified, defined, and categorized for each of the entry-level positions, 32 desirable non-technical skills: 12 business skills and 20 soft skills. Focus group participants determined whether a skill were business or soft skills. Survey participants were divided by job category and asked to indicate on a Likert scale from one to five whether they found each skill to be extremely important (5), very important (4), important (3), somewhat important (2), or not important (1).

Thus, a four-tiered approach was used in the development of this study. Data from each tier was analyzed and applied toward the next tier. Industry members examined and validated the results after each step. Although 325 participants responded to the survey, too few responded to the categories of computer network architects and information security analysts for those categories to be included in this report.

3. Results

Tables Two through Eight list business (B) and soft (S) non-technical skills by their overall order of industry importance for each of the respective job categories. Skill importance for individual job categories appears as mean scores. Mean scores of 4.0 or better indicate that the non-technical skills are clearly desired. Mean scores of 4.5 or better indicate that the skills are highly desired.

To indicate the desired non-technical skills needed by new graduates, job positions are further grouped by "always entry-level positions" and "sometimes entry-level positions". Job categories listed as "sometimes entry-level" require a higher level of technical competency and thus are most frequently filled by graduates with baccalaureate degrees in computer science, systems engineering, or business information systems. "Always entry-level positions", according to the study participants, could be filled by individuals with some college. The participants further indicated that all new hires would likely receive additional technical training but not business or soft-skill training which they expected and needed graduates to already possess.

3.1 Always Entry Level Positions

3.1.1 Computer Programmers

Computer programmers take program designs created by software developers and convert it into code to create software programs. The majority of today's entry-level programmers develop application software. As Table Two illustrates, there are nine non-technical skills clearly desired for computer programmers. Of these, one skill is highly desired: problem solving.

Highly Desired. Problem-solving skills are needed to develop and maintain modules. Programming maintenance jobs are the most challenging because the code is most likely inherited, written by another programmer who may no longer be with the company. Documentation for the code is often unavailable, inadequate, or inaccurate.

Additionally, many programs contain a myriad of lines that are no longer necessary but remain in the program because no one knows what they actually do. As a result, problem-solving skills are imperative to determine what was done and how to modify the program without adversely affecting other applications.

Clearly Desired. Skills indicated as clearly desired for computer programmers are team work, listening, adaptability to new technology and new languages, visualization and conceptualization, time management, transferring knowledge to application, ability to multi-task, and verbal communication. Programmers work in teams due to the size and complexity of systems.

To be an effective team member, an individual must be able to listen to others, visualize, and conceptualize what is being communicated, and provide verbal feedback. Furthermore, a programmer must be able to merge and apply user specifications with their knowledge of business, hardware, and existing software. Programmers are responsible for computer applications comprised of a multitude of modules, many of which must be completed in a particular sequence. When modules are delayed, the completion time of an entire project is affected. Frequently application components will be written in multiple languages. Additionally, hardware and software technologies change rapidly. Thus, to be successful, programmers must adapt quickly. They must multi-task a myriad of activities: development, modifications, maintenance, meetings, multiple modules, etc.

3.1.2 Computer Support Specialists

Computer support specialists provide assistance to end users on software or equipment. Some, referred to as technical support specialists, support information technology (IT) employees within their organization. Others, called help-desk technicians, assist non-IT users who are having computer problems. Most frequently this support is done over the phone. Professionals in this category need to possess a large number of non-technical skills. As Table Three illustrates, there are 18 non-technical skills clearly desired for computer support specialists. Of these, two skills are highly desired: problem solving and listening.

Highly Desired. Providing assistance to users with varying levels of computer competency is challenging. End users may have little, if any, formal computer training and as such can generate problems in a variety of logical and illogical ways. From a problem-solving perspective the computer support specialist must first identify what the user has done before the action can be corrected. This is compounded by the fact that specialists frequently solve problems over the telephone and are forced to rely on verbal rather than visual communication. The ability to listen to what is and is not said by a client is often the key to quick and accurate problem resolutions.

Clearly Desired. Due to the nature of their job, the computer support specialist needs a complex skill set. They must possess the ability to multi-task, be adaptable to new technology and languages, transfer knowledge to application, assume a "be the customer" mentality, manage time, investigate, understand business culture, and manage stress. Further, they must possess team work, inter-team communication, verbal communication, general writing, organizational, visualization and conceptualization, idea initiation, and interpersonal skills. A computer support specialist requires a generalist background. The professional must simultaneously support multiple users who are likely to have a variety of software packages running on different types of hardware. Furthermore, each user differs in personality and idiosyncrasies. The computer support specialist must, therefore, be able to multi-task, adapt to different technologies, see issues from the customer's viewpoint, and assist the user in adapting to new hardware and software. For solving problems, a specialist must be talented at investigating the situation, visualizing what the user sees and is trying to communicate, transfer the knowledge into application, and communicate through verbal or written instructions in such a way that the user can follow the specialist accurately. Idea initiation and interpersonal skills are also important in determining how to handle daily issues. In addition to working with users, computer support specialists must work well in intra-team as well as inter-team environments. They must be aware of differing business cultures and work well with each culture. Due to the number of constituents and issues, computer support specialists must also be adept at time management, stress management, and possess strong organizational skills.

This is the one area where the Bureau of Labor Statistics indicates that some college but no degree is required for placement. While participants in this study concurred with that assessment, they did indicate that a degree was desirable. Additionally, they indicated that the combination of the degree and the strength of the individual's soft skills were key for movement to a position in one of the other categories.

3.1.3 Web Developers

Web developers design, create and maintain websites to help firms both large and small have a public online face. Typical web developer jobs include responsibilities for all technical aspects of a web site, design and creation of web sites, as well as coding. A web developer may perform all three tasks or specialize in a particular area. As Table Four illustrates, there are 18 non-technical skills that are clearly desired for web developers. Of these, five skills are highly desired: ability to multi-task, adaptability to new technology and languages, organizational skills, team work, and the ability to visualize/conceptualize.

Highly Desired. Due to the rapidly changing nature of the Internet due to cloud computing, mobile web, social networking, etc., web developers are frequently involved in multiple projects that use new, innovative languages and/or development packages that run on varying hardware platforms. As a result, strong multi-tasking and adaptability skills are necessary.

Web developers also require visualization and conceptualization skills because the Internet is a highly visual medium. Furthermore, web developers must be able to organize screen content as well as have traditional organization skills for handling projects and tasks. Finally, due to the complexity of the technology, many Internet professionals specialize in a specific technical area and, thus, need to work in teams to bring those specializations together.

Clearly Desired. Skills identified as clearly desired for web developers are problem solving, listening, time management, verbal communication, understanding business culture, transferring knowledge to application, inter-team communication, interpersonal skills, "be the customer" mentality, idea initiation, general writing skills, project management, and constructive criticism. New technologies such as cloud computing, social media, and access by mobile devices cause complex, rapid changes in the environment. Time management is critical in this fast-paced world. Projects must be completed and implemented on time. The rate of technological change, increased demand, multiplicity of needs, and variety of clients makes it understandable why problem solving, listening, verbal communication, transferring knowledge to application, "be the customer" mentality, and interpersonal skills are very important to the web developer. Once an understanding of user requirements has been reached, web developers need a mix of writing skills and creativity to design web pages that are readable and have aesthetic appeal. It is challenging to create and optimize web designs that communicate a business culture while running effectively on multiple browsers and platforms including mobile. Web developers must recognize design flaws and be able to accept constructive criticism. To optimize and manage a system, web developers often work in teams which cooperate with other teams from various business units. This necessitates inter-team communication and project management skills.

3.1.4 Computer Systems Analysts

Computer systems analysts study an organization's current computer systems and procedures and design information solutions intended to make the organization operate more efficiently and effectively. These are the individuals who bring business and technology together by understanding the needs of both. Historically, computer systems analysts, sometimes referred to as business analysts, were once programmers who were promoted to analysts. However, the IT focus groups unanimously agreed that while some of the old analyst icons exist, the IT industry is now hiring entry-level people for analyst positions when the applicants have the appropriate mix of non-technical skills. As Table Five illustrates, there are 16 non-technical skills considered to be clearly desired for computer systems analysts. Of these, two skills are highly desired: problem solving and listening.

Highly Desired. The two most highly desired non-technical skills for systems/business analysts are problem solving and listening. Computer systems analysts act as liaisons between users and technical support people. They work closely with users to determine what is needed to successfully perform a task, design solutions, and communicate resulting designs to the technical support team. Problem solving is critical to systems analysts because they need to determine the best way to computerize and/or restructure tasks. Effective listening is an underlying skill needed to understand user requirements and, thus, problem solving.

Clearly Desired. Additional skills identified as clearly desired for computer systems analysts are verbal communication, transferring knowledge to application, team work, ability to multi-task, adaptability to new technology and new languages, time management, investigative skills, "be the customer" mentality, visualize and conceptualize, understanding business culture, interpersonal skills, constructive criticism, inter-team communication, and organizational skills.

The length of this list is understandable because computer systems analysts interact with a wide variety of individuals from a wide variety of environments who possess various levels of technical ability and often use different hardware and/or software platforms. An effective computer systems analyst must be able to work with a team of technical and non-technical people, a fact that encompasses the need for team work, interpersonal, and inter-team communication skills. Computer systems analysts must also be able to investigate problems and communicate with users in accurate and understandable ways, to transfer knowledge into application, and then communicate that understanding to the technical staff developing the solutions. Computer systems/business analysts must be able to see the issues from the user's perspective, within the context of the business culture, and visualize what the user wants on screens and in reports. As part of this process, while clarification and understanding is being sought, these analysts must be able to give and receive constructive criticism. In short, computer systems analysts must accept innumerable responsibilities that require multi-tasking skills, time management skills, organizational skills, and ability to adapt to new and different technologies.

3.2 Sometimes Entry Level Positions

3.2.1 Software Developers

Software developers may develop applications or they may develop the underlying system software necessary to the infrastructure. Software developers are considered to be the creative minds behind computer software. As Table Six illustrates, there are 15 non-technical skills clearly desired for computer engineers. Of these, one skill is highly desired: problem-solving.

Highly Desired. Problem-solving skills are highly desired for software developers in both the design and development stages. Software developers must be adept at recognizing and addressing opportunities as well as existing and potential problems. Lack of solid problem-solving skills can result in poor designs which, in turn, adversely affect the performance of businesses and individuals using the systems.

Clearly Desired. Skills rated as clearly desired for software developers are adapting to new technologies and languages, accepting constructive criticism, listening, working as an effective team member, managing time, initiating ideas, exhibiting a "be the customer" mentality, investigating, multi-tasking, using interpersonal skills, communicating in an inter-team environment, transferring knowledge to application, and communicating verbally. Of these skills, five directly support problem solving and opportunity identification: adaptability to new technologies and languages, investigating, listening, generating ideas, and application of acquired knowledge. Software developers work closely with other professionals. Occasionally engineers will interact directly with users but most frequently with liaisons. As such, they must possess a portfolio of human-relation and interpersonal skills including the ability to work with team members, to communicate with other teams, to view issues from the customers' perspectives, and to accept and give constructive criticism in a positive manner. As well, software developers often find they have a number of design and development projects working simultaneously. This is frequently compounded by interruptions from their constituents, resulting in the need for multi-tasking and time management skills.

3.2.2 Database Administrators

Database administrators use software to store and organize data, such as financial information and customer shipping records. They make sure that data are available to users and are secure from unauthorized access. In a mainframe environment, this is not considered an entry-level position. However, with the proliferation of microcomputer based databases, 50 percent of the IT focus groups considered this an entry level position. As Table Seven illustrates, there are 13 non-technical skills clearly desired for database administrators. Of these skills, none were rated highly desired.

Clearly Desired. The 13 clearly desired skills include team work, listening, adaptability to new technology and languages, time management, multi-tasking, problem solving, verbal communication, transferring knowledge to application, visualization and conceptualization, "be the customer" mentality, constructive criticism, interpersonal skills, and stress management. Database administrators work as part of a team. To be an effective team member, the administrator needs effective listening, interpersonal, and verbal communication skills. Administrators must also design databases which support user needs, thus requiring skills in viewing issues from the customer's perspective, visualizing and conceptualizing user needs, transferring knowledge to application, and accepting constructive criticism.

Managing multiple projects and frequently multiple databases for multiple users requires multi-tasking, time management, stress management, and problem-solving skills. Furthermore, with continuing technological changes in hardware and software, database administrators need to adapt to new technologies and development tools.

3.2.3 Network and Computer Systems Administrators

Network and computer systems administrators are responsible for the day-to-day operation of an organization's computer networks. They organize, install, and support an organization's computer systems infrastructure. According to the IT focus groups, with few exceptions, this job category is not considered an entry-level position. As Table Eight illustrates, there are 16 non-technical skills clearly desired for network specialists. Of these, two skills are highly desired: adaptability to new technology and languages, and listening.

Highly Desired. In networking environments dissimilar hardware components produced by different manufacturers must be connected so that data and applications are accessible by users. Due to rapid technological improvements and complex environments, adaptability to new technology is of paramount importance to network specialists. Equally important is the need to listen to clients, team members, and technical support staff.

Clearly Desired. Skills reported to be clearly desired include investigating, visualizing and conceptualizing, problem solving, team work, transferring knowledge to application, multi-tasking, verbal communication, "be the customer" mentality, constructive criticism, organizational skills, understanding business culture, interpersonal skills, inter-team communication, and time management. Investigating, problem solving, visualization and conceptualization, and transferring knowledge to application are important for network design trouble-shooting and performance issues. The ability to multi-task, organize, manage time, and understand business cultures are also important support skills for successful task performance. Team work, inter-team communication, verbal communication, ability to look at issues from the customer's perspective, interpersonal skills, and the ability to accept and give constructive criticism are important for successful interactions with constituents.

4. Conclusions

This study clearly indicates that IT companies need people who have non-technical skills, both soft and business. The need for these non-technical skills is so great that some IT companies indicate that they will hire individuals with minimum technical skills so long as they demonstrate solid soft and business skills.

Of the 32 skills identified, eight are highly or clearly desired for all job categories: problem solving, team work, listening, the ability adapt to new technologies and languages, time management, the ability to transfer knowledge to application, multi-tasking, and verbal communication. An additional six skills are important to at least five of the seven categories: the ability to visualize and conceptualize, "be the customer" mentality, interpersonal skills, understand business culture, inter-team communication, and the ability to give and receive constructive criticism. IT companies and academic institutions need to include comprehensive and in-depth packages of soft and business skills in their IT training and curricula programs. Thus, this study provides the foundation for customization of training and academic programs which focus on the most important non-technical skills for each job category, resulting in the saving of both time and money. Many computing degrees are more generalist in nature and are designed to prepare students for a variety of positions. For these programs, soft skill development would best be served by focusing on the skills that are clearly desired by the majority of career paths.

Future research is planned to extend the present study to IT participants from across the United States. That study will determine whether significant differences exist between regions, markets, and other IT job category factors. The findings presented in this paper are in no way intended to minimize the unquestionable importance of technical skills. However, technical skills are a base-line measurement. "The most valuable 'tool' . . . still resides within the [IT professional]. Technological advances cannot … replace the [IT professional's] cognitive abilities." (Schenk, Vitalari, & Davis, 1998)

References

Aasheim, C., Shropshire, J., Lixin, L., & Kadlec, C. (2012). Knowledge and Skill Requirements for Entry-Level IT Workers: A Longitudinal Study. Journal of Information Systems Education, 23(2), 193-201.

Beard, D., Schwieger, D., & Surendran, K. (2008). Integrating Soft Skills Assessment through University, College, and Programmatic Efforts at an AACSB Accredited Institution. Journal of Information Systems Education, 19(2), 229-240.

Benbasat, I., Dexter, A. S., & Mantha, R. W. (1980). Impact of Organizational Maturity on Information Skill Needs. MIS Quarterly, 4(1), 21-34.

Bureau of Labor Statistics United States Department of Labor. (2013). Occupational Outlook Handbook 2012-2013 Edition. Retrieved 9 30, 2013, from http://www.bls.gov/ooh/.

Henry, R. M., Dickson, G. W., & LaSalle, J. (1974). Human Resources for MIS: A Report of Research. MIS Research Center Working Paper, WP-74-01. Minneapolis, MN: University of Minnesota.

Lee, D. M., Trauth, E. M., & Farwell, D. (1995). Critical Skills and Knowledge Requirements. MIS Quarterly, 19(3), 313-340.

Lieger, J., Woodward, B., & Martin, N. (2012). Reassessing the Skills Required of Graduates of an Information Systems Program: An Updated Analysis. 2012 Proceedings of the Information Systems Educators Conference (pp. 1-11). New Orleans, LA: Education Special Interest Group of the AITP.

Parker, D., Bailey, J., & Mitchell, R. B. (1999). Developing Nontechnical Competencies of IS Professionals Through Technological Applications. Proceedings of the Southwest Federation of Administrative Disciplines Conference, (pp. 1-5). Houston, TX.

Robles, M. M. (2012). Executive Perceptions of the Top 10 Soft Skills Needed in Today's Workplace. Business Communication Quarterly, 75(4), 453-465.

Schenk, K. D., Vitalari, N. P., & Davis, K. S. (1998). Differences Between Novice and Expert System Analysts: What Do We Know and What Do We Do? Journal of Management Information Systems, 15(1), 9-50.

Trauth, E. M., Farwell, D. W., & Lee, D. (1993). The IS Expectation Gap: Industry Expectations versus Academic Preparation. MIS Quarterly, 17(3), 293-307.

U.S. Bureau of Labor and Statistics. (2013, 12 19). Employment Projections. Retrieved 1 2, 2014, from Bureau of Labor Statistics: http://www.bls.gov/emp/ep_table_102.htm

U.S. Census Bureau. (2012). Statistical Abstract of the United States. Washington DC: U.S. Census Bureau . Retrieved from http://www.census.gov/prod/2011pubs/12statab/labor.pdf

Vitalari, N. P. (1985). Knowledge as a Basis for Expertise in Systems Analysis: An Empirical Study. MIS Quarterly, 9(3), 221-241.

Zweben, S. (2013). Computing Degree and Enrollment Trends. Washington, DC: Computing Research Association. Retrieved 11 15, 2013, from http://cra.org/govaffairs/blog/wp-content/uploads/2013/03/CRA_Taulbee_CS_Degrees_and_Enrollment_2011-12.pdf

Table 1: Projected Number of Jobs Added From 2012-2022

Category	% Increase	# of Jobs Added	Job Outlook
Computer Programmers	8%	28,400	As fast as average
Computer Support Specialists	17%	123,000	Faster than average
Web Developers	20%	28,500	Faster than average
Computer Systems Analysts	25%	127,700	Much faster than average
Software Developers	22%	222,600	Much faster than average
Database Administrators	15%	17,900	Faster than average
Network & Computer System Administrators	12%	42,900	As fast as average

Source: Bureau of Labor and Statistics

Table 2: Non-technical Skills – Computer Programmer

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Problem Solving (S)	*4.55*
2. Team Work (S)	**4.34**
3. Listening (S)	**4.31**
4. Adapt to New Technology & Languages (S)	**4.29**
5. Visualize and conceptualize (S)	**4.23**
6. Time Management (S)	**4.22**
7. Transfer knowledge to application (S)	**4.16**
8. Ability to multi-task (S)	**4.09**
9. Verbal Communication (S)	**4.04**
10. Constructive Criticism (S)	3.98
11. Understand Business Culture (S)	3.94
12. Inter-team Communication (S)	3.89
13. Investigative Skills (B)	3.88
14. "Be the Customer" Mentality (B)	3.83
15. Organizational Skills (S)	3.83
16. Interpersonal Skills (S)	3.81
17. Stress Management (S)	3.78
18. General writing skills (S)	3.61
19. Idea Initiation (B)	3.58
20. Leadership (S)	3.48
21. Technical Writing (S)	3.47
22. Project Management (B)	3.37
23. Presentation Skills (S)	3.04
24. Diversification (S)	3.00
25. Interviewing Skills (B)	2.83
26. Mediation Skills (B)	2.82
27. Role Playing (B)	2.40
28. Marketing (B)	2.27
29. Basic Accounting (B)	2.22
30. Use of Capital (B)	2.21
31. Read a Budget (B)	2.11
32. Read Financial Statements (B)	1.97

Table 3: Non-technical Skills – Computer Support Specialist

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Problem Solving (S)	*4.71*
2. Listening (S)	*4.59*
3. Adapt to New Technology & Languages (S)	**4.47**
4. Transfer knowledge to application (S)	**4.47**
5. Ability to multi-task (S)	**4.47**
6. "Be the Customer" Mentality (B)	**4.41**
7. Time Management (S)	**4.29**
8. Team Work (S)	**4.24**
9. Understand Business Culture (S)	**4.24**
10. Investigative Skills (B)	**4.24**
11. Stress Management (S)	**4.24**
12. Verbal Communication (S)	**4.18**
13. Inter-team Communication (S)	**4.18**
14. Visualize and conceptualize (S)	**4.12**
15. Organizational Skills (S)	**4.12**
16. General writing skills (S)	**4.12**
17. Interpersonal Skills (S)	**4.06**
18. Idea Initiation (B)	**4.06**
19. Constructive Criticism (S)	3.94
20. Project Management (B)	3.88
21. Leadership (S)	3.77
22. Technical Writing (S)	3.75
23. Diversification (S)	3.59
24. Mediation Skills (B)	3.53
25. Presentation Skills (S)	3.47
26. Interviewing Skills (B)	3.24
27. Basic Accounting (B)	3.18
28. Marketing (B)	3.12
29. Use of Capital (B)	3.06
30. Read a Budget (B)	3.06
31. Role Playing (B)	2.94
32. Read Financial Statements (B)	2.82

Table 4: Non-technical Skills – Web Developers

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Ability to multi-task (S)	*4.73*
2. Adapt to New Technology & Languages (S)	*4.64*
3. Team Work (S)	*4.55*
4. Visualize and conceptualize (S)	*4.55*
5. Organizational Skills (S)	*4.55*
6. Problem Solving (S)	**4.46**
7. Listening (S)	**4.36**
8. Time Management (S)	**4.36**
9. Verbal Communication (S)	**4.36**
10. Transfer knowledge to application (S)	**4.27**
11. Understand Business Culture (S)	**4.27**
12. Inter-team Communication (S)	**4.18**
13. "Be the Customer" Mentality (B)	**4.09**
14. Constructive Criticism (S)	**4.09**
15. Idea Initiation (B)	**4.09**
16. Project Management (B)	**4.09**
17. Interpersonal Skills (S)	**4.00**
18. General writing skills (S)	**4.00**
19. Stress Management (S)	3.82
20. Investigative Skills (B)	3.73
21. Leadership (S)	3.46
22. Technical Writing (S)	3.27
23. Presentation Skills (S)	3.27
24. Marketing (B)	3.18
25. Diversification (S)	3.09
26. Mediation Skills (B)	2.91
27. Use of Capital (B)	2.91
28. Read a Budget (B)	2.82
29. Interviewing Skills (B)	2.55
30. Role Playing (B)	2.55
31. Basic Accounting (B)	2.55
32. Read Financial Statements (B)	2.36

Table 5: Non-Technical Skills – Systems/Business Analyst

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Problem Solving (S)	*4.63*
2. Listening (S)	*4.53*
3. Verbal Communication (S)	**4.46**
4. Transfer knowledge to application (S)	**4.42**
5. Team Work (S)	**4.41**
6. Adapt to New Technology & Languages (S)	**4.38**
7. Ability to multi-task (S)	**4.38**
8. Time Management (S)	**4.33**
9. Investigative Skills (B)	**4.30**
10. "Be the Customer" Mentality (B)	**4.29**
11. Visualize and conceptualize (S)	**4.23**
12. Understand Business Culture (S)	**4.20**
13. Interpersonal Skills (S)	**4.16**
14. Constructive Criticism (S)	**4.08**
15. Inter-team Communication (S)	**4.07**
16. Organizational Skills (S)	**4.06**
17. Stress Management (S)	3.96
18. Idea Initiation (B)	3.92
19. Project Management (B)	3.89
20. General writing skills (S)	3.88
21. Leadership (S)	3.82
22. Technical Writing (S)	3.53
23. Diversification (S)	3.45
24. Presentation Skills (S)	3.44
25. Mediation Skills (B)	3.22
26. Interviewing Skills (B)	3.08
27. Read a Budget (B)	2.82
28. Use of Capital (B)	2.80
29. Marketing (B)	2.80
30. Basic Accounting (B)	2.64
31. Role Playing (B)	2.60
32. Read Financial Statements (B)	2.41

Table 6: Non-Technical Skills – Software Developer

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Problem Solving (S)	*4.67*
2. Listening (S)	**4.42**
3. Team Work (S)	**4.42**
4. Adapt to New Technology & Languages (S)	**4.42**
5. Time Management (S)	**4.42**
6. Constructive Criticism (S)	**4.42**
7. Idea Initiation (B)	**4.27**
8. Transfer knowledge to application (S)	**4.17**
9. Ability to multi-task (S)	**4.17**
10. Verbal Communication (S)	**4.17**
11. "Be the Customer" Mentality (B)	**4.17**
12. Investigative Skills (B)	**4.17**
13. Inter-team Communication (S)	**4.17**
14. Interpersonal Skills (S)	**4.17**
15. Understand Business Culture (S)	**4.00**
16. Technical Writing (S)	3.89
17. Visualize and conceptualize (S)	3.83
18. Organizational Skills (S)	3.83
19. Project Management (B)	3.83
20. Stress Management (S)	3.67
21. General writing skills (S)	3.67
22. Leadership (S)	3.58
23. Interviewing Skills (B)	3.58
24. Presentation Skills (S)	3.33
25. Mediation Skills (B)	3.00
26. Use of Capital (B)	2.83
27. Role Playing (B)	2.83
28. Read a Budget (B)	2.75
29. Diversification (S)	2.67
30. Marketing (B)	2.50
31. Read Financial Statements (B)	2.33
32. Basic Accounting (B)	2.25

Table 7: Non-technical Skills – Database Administrator

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Team Work (S)	**4.48**
2. Listening (S)	**4.45**
3. Adapt to New Technology & Languages (S)	**4.38**
4. Time Management (S)	**4.24**
5. Problem Solving (S)	**4.21**
6. Ability to multi-task (S)	**4.21**
7. Verbal Communication (S)	**4.17**
8. Transfer knowledge to application (S)	**4.14**
9. Visualize and conceptualize (S)	**4.14**
10. "Be the Customer" Mentality (B)	**4.07**
11. Interpersonal Skills (S)	**4.07**
12. Stress Management (S)	**4.07**
13. Constructive Criticism (S)	**4.00**
14. Understand Business Culture (S)	3.96
15. Organizational Skills (S)	3.93
16. Idea Initiation (B)	3.93
17. Investigative Skills (B)	3.90
18. Inter-team Communication (S)	3.90
19. Technical Writing (S)	3.83
20. Project Management (B)	3.79
21. General writing skills (S)	3.71
22. Leadership (S)	3.62
23. Presentation Skills (S)	3.31
24. Interviewing Skills (B)	3.24
25. Diversification (S)	3.21
26. Mediation Skills (B)	2.97
27. Read a Budget (B)	2.86
28. Role Playing (B)	2.83
29. Use of Capital (B)	2.79
30. Read Financial Statements (B)	2.79
31. Basic Accounting (B)	2.55
32. Marketing (B)	2.45

Table 8: Non-technical Skills – Computer Network Architect

Skills (B = Business Concepts, S = Soft Skills)	Rating
1. Listening (S)	*4.59*
2. Adapt to New Technology & Languages (S)	*4.59*
3. Visualize and conceptualize (S)	**4.47**
4. Investigative Skills (B)	**4.47**
5. Problem Solving (S)	**4.41**
6. Team Work (S)	**4.41**
7. Transfer knowledge to application (S)	**4.41**
8. Ability to multi-task (S)	**4.29**
9. Verbal Communication (S)	**4.25**
10. "Be the Customer" Mentality (B)	**4.23**
11. Organizational Skills (S)	**4.21**
12. Understand Business Culture (S)	**4.18**
13. Interpersonal Skills (S)	**4.18**
14. Time Management (S)	**4.12**
15. Inter-team Communication (S)	**4.12**
16. Constructive Criticism (S)	**4.00**
17. Idea Initiation (B)	3.88
18. Leadership (S)	3.88
19. Project Management (B)	3.82
20. General writing skills (S)	3.77
21. Stress Management (S)	3.65
22. Presentation Skills (S)	3.65
23. Technical Writing (S)	3.53
24. Interviewing Skills (B)	3.47
25. Mediation Skills (B)	3.24
26. Marketing (B)	3.00
27. Diversification (S)	2.94
28. Role Playing (B)	2.82
29. Read a Budget (B)	2.77
30. Basic Accounting (B)	2.77
31. Use of Capital (B)	2.71
32. Read Financial Statements (B)	2.35