

**WHAT EMPLOYERS WANT: THE MEASURE OF IMPORTANCE OF
VARIOUS SKILLS FOR REGISTERED NURSES.**

BY

JOHN VILLARREAL

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Faculty Approval:

Dr. Patricia M. Shields

Dr. Howard Balanoff

ABSTRACT

Facing today's globalized economy American workers no longer compete with only each other for high-wage or even low-wage jobs. If market equilibrium exists, employers' demand for skilled labor will equal the supply of workers with the requisite skills; but this does not always occur. The shortage of skilled labor constitutes an apparent gap between the skills employers are looking for and those skills the American workforce can bring to market.

Globalization and technology have affected skill requirements for all workers and Registered Nurses are no exception. It is important to note that the Bureau of Labor Statistics (BLS) has projected that Registered Nurses will experience the largest numerical growth, be one of the fastest growing in terms of percentages, and among the higher paying occupations between 2000-2010. The importance of having enough skilled Registered Nurses to provide care for an ever-growing population can therefore not be understated.

The purpose of this study is threefold. **First**, to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. Using the results of an employer survey, the **second** purpose is to compare the employer opinions with a previous study of Nurses' opinions about the importance of various skills. **Third**, the results of the comparison are used to speculate about the implications of differences and place them into perspective.

Across six skills categories, employers placed a higher level of importance on **Basic, Complex Problem Solving**, and **Social** skills respectively. Within these broad categories, employers placed a higher value on understanding implications of new information for future use, teaching others, reorganizing information to better approach problems, and adapting equipment to serve user needs. Using logic to solve problems, adjusting action in relation to others, and developing an approach to implement an idea are just a few of the most important skills identified by Nurses. Even though employer importance scores are vastly different from those assigned by working Nurses, there is agreement on the most important skill categories and the most important skills within each category.

As new procedures and technology emerge, new skills will be required to keep pace with these changes. Registered Nurses are faced with many challenges in a dynamic health care industry, and greater skill development will only solidify their importance and ability to deliver quality health care.

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CHAPTER 1

Introduction

Facing today's globalized economy American workers no longer compete with only each other for high-wage or even low-wage jobs. To stay competitive in a global market, employers have sought various ways to cut costs and improve profit margins. One factor of production that has felt this pinch is labor. America's workers have seen high-wage, low-skill manufacturing jobs move across national borders and become low-wage, low-skill jobs for their foreign counterparts. If skilled labor shortages exist, then employers will look for workers from around the world to expand (Froeschle, 2002, pg. 45). "Not since the industrial revolution of the 1800's has there been such a need to restructure what and how we teach to ensure that our workers and our future work force have the skills necessary for their employers to compete in a global market" (TDC, 1993, pg. 2).

Froeschle notes that many American employers lament they can't find enough skilled workers in their local labor markets (2002, pg. 42). The shortage of skilled labor constitutes an apparent gap between the skills employers are looking for and those skills the American workforce can bring to market. If workers had industry-based standards or skill standards to guide education and training curriculum, then employers might not have to spend as much time and money on initial orientation and training. A process of establishing industry-based standards resulting in a skilled workforce cannot take place overnight. Once employers have identified skill standards, education and training providers can develop curriculum to effectively teach the skills employers are requiring. The whole process could very possibly take years to complete. Therefore, it is essential

that employers across all industries are able to identify future occupational skill requirements and trends.

No one industry or occupation can operate in a vacuum. Globalization and technology have affected skill requirements for all workers and Registered Nurses are no exception. Today's dynamic economy has also imposed changing skill requirements and new educational principles on nurses. It is important to note that the Bureau of Labor Statistics (BLS) has projected that Registered Nurses will experience the largest numerical growth, be one of the fastest growing in terms of percentages, and among the higher paying occupations between 2000-2010. The importance of having enough skilled Registered Nurses to provide care for an ever-growing population can therefore not be understated.

Research Purpose

The purpose of this study is threefold. **First**, to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. Using the results of an employer survey, the **second** purpose is to compare the employer opinions with a previous study of Nurses' opinions about the importance of various skills. **Third**, the results of the comparison are used to speculate about the implications of differences and place them into perspective. Results of analysis are used to make recommendations for training strategies and future research. Within this scope, skills needed by Registered Nurses in an evolving and dynamic health care system are studied. In order to understand various types of skills, one must first become acquainted with how changing economic factors effect skill requirements.

Chapter Summaries

Chapter 2 provides a review of current literature on the changing economy and its effect on skills. This chapter describes some of the factors affecting skill requirements as well as some current and future challenges of a low-skilled workforce. Chapter 3 defines and classifies skills in a general sense and with respect to Registered Nurses. A list of forty-six skills across six broad categories and their operational definitions is presented. The conceptual framework and the survey instrument used for this study are both developed around this list of skills. Also considered are some assessment tools and possible solutions aimed at improving skills as well as changing skill requirements and new educational principles facing Registered Nurses. Chapter 4 illustrates the methodology used for this study. This chapter also illustrates the operationalization of the descriptive categories within the conceptual framework. Chapter 5 presents the results of this study. Chapter 6 provides a summary and conclusion of this research study. This chapter examines and attempts to explain the difference in attitudes of Directors of Nursing and Registered Nurses on the importance of skills as they pertain to nursing duties and responsibilities. Recommendations are presented to Workforce Development Boards for the refinement of nurse training programs, and recommendations are also offered for other possible research studies.

CHAPTER 2

Literature Review

The purpose of this chapter is to review the current body of literature on how the overall economy effects businesses and skill requirements. First, this chapter examines some of the factors shaping the economy and the effect on skills. Then, this chapter focuses on the challenges facing a low-skilled workforce and the importance of having a skilled workforce. These subjects facilitate an understanding of how all of the aforementioned factors shape the definition and classification of “skills.”

Changing economic trends and their effects on skill requirements

Globalization and technology are the two most pervasive and interconnected factors that shape skill requirements. Technology has brought new ways of doing things along with new tools. For example, the Internet has eliminated traditional geographic boundaries and made smaller, remote economies more accessible.

Globalization

Richard Judy and Carol D’Amico (1997, pg. 21) point out that because of globalization, we import goods produced by relatively low-skilled labor, and export goods that generate jobs with better pay and require higher skills than the jobs lost to the foreign competition. They argue (1997, pg. 22) that globalization also means these new jobs can migrate abroad if the workforce skills and abilities of other countries are upgraded. “Workers displaced from jobs lost to import competition will increase the

supply (and lower wages) of unskilled workers seeking jobs in industries that do not themselves face direct competition from imports” (Judy & D’Amico, pg. 36).

Many foreign countries focus on transitioning students from school to work. Through occupational preparation programs, general education, and worksite training, these countries provide employers with a steady stream of high skilled young people who are ready to work (CSAW, pg. 59).

Businesses that rely on workers with specialized skills or knowledge have the best chance of success in a global economy. Anderberg and Miller (2001, pg.53) note that simple laws of supply and demand are at the core of our economic system. Premium wages are offered to recruit and retain workers (supply of labor) with the knowledge, skills, and abilities (KSA) that employers (demand for labor) are requiring. Even if workers don’t possess the requisite KSAs, Anderberg and Miller (2001, pg. 54) argue that “long-term returns to education and training (of workers) in technical fields exceed short-term opportunity costs.”

Technology

For decades, U.S. companies have hired skilled foreign-born engineers and computer specialists, which have allowed America to retain its global lead in Information Technology (IT). Judy and D’Amico (1997, pg. 21) argue that American IT jobs have shifted from computer manufacturing to computer-based services. They go on to say that even though several computer-manufacturing jobs have been lost to foreign competition, the new jobs servicing computers and computer users pay better and require a higher level of skills than those jobs that have been lost. “Training is the most essential when

new technologies are adopted... for example, the shift from low- to high-skill jobs” (Acemoglu, pg. 446). Technology has affected developing and larger, industrialized countries in contrasting ways. As low-skilled manufacturing jobs are relocated to developing countries where labor is cheaper, industrialized nations retain and expand their share of jobs in computer-based services that require a higher order skill set.

As businesses innovate, they must re-train their workers. This means that worker skills are becoming more quickly outdated with every new innovation. According to Anderberg and Miller (2001, pg. 2), the knowledge and skill requirements of many occupations are changing so dramatically that incumbent workers can no longer perform their jobs adequately. Anderberg and Miller (2001, pg.2) go on to say that unless incumbent workers obtain additional education and training, they will be replaced by job seekers with more current KSAs.

Globalization and technology have placed a greater emphasis on workforce skills and those businesses whose employees have the most skills face lower costs and less foreign competition. Alternatively, low-skilled workers face the greatest threats from globalization. Factors that contribute to a low-skilled workforce, training costs to employers and workers, and the future of America’s low-skilled workers are considered next in order to gain a greater understanding of some potential problems caused by a “skills gap.”

Skills gap

One of the biggest problems facing America's workforce is the "skills gap," or the differences between current skills and the skills required by employers. If students are not gaining the necessary skills required by employers when they leave schools, then educators are either not aware or not teaching the skills that help students transition from school to work. Some of the blame rests on the shoulders of education, but there appears to be a chasm of disconnect between businesses and the institutions that educate and train tomorrow's workforce.

Challenges facing the low-skilled workforce

It is necessary to identify shortcomings in skills and contributing factors to begin addressing the problem of a skills gap. One possible contributing factor is a lack of industry-based skills standards, which makes it difficult for educators to teach the specific skills that employers are looking for in prospective employees. If standards have been identified and education and training providers refine their curriculum to teach the new standards, who will pay for the cost of training? Globalization and technology, as discussed earlier, have created an environment that emphasizes skills and challenges the workforce of the future to keep pace or get left behind.

Lack of industry-based skills standards

A key problem with current skills development is that educational institutions have different sets of standards from each other. Most students are expected to learn basic skills like simple computation, reading, and writing, hence very few are taught

occupation-specific skills. “The primary concern is the lack of standards for ‘core competencies’ which include academics and ‘work-place’ skills” (TDC, pg. 3). Given the above statements, it could be questioned whether core competencies are adequately taught and whether occupation-specific skills are imparted at all. Without a solid foundation of work-place skills, further education and/or training will be required to close the skills gap.

Economic development is so closely tied to workforce development because the economic prosperity of a region is dependent on workforce quality. There is a lag-time associated with identifying skill requirements from employers and then training people to acquire those skills. Education and training providers cannot develop an extensive curriculum overnight. Once curriculum has been developed, however, it takes even more time to educate and graduate students equipped with their new skills. This whole process may take years, so it becomes imperative that “education and training program providers must have an idea what employers need in the future” (Froeschle, 1996, p. 1).

Training investments

Investments in training are viewed quite differently depending on who is paying for them. Employers and employees can each contribute toward employee training, but both groups have very different expectations about the benefits and returns from training. In both cases, the benefits must exceed the costs, but employers and employees face opposite sides of the same coin.

Employers take into account how training affects the bottom line. The costs to firms for training new or existing employees are classified as quasi-fixed labor costs, and

these costs are generally calculated non-wage, like social insurance programs (Social Security and Unemployment Insurance) and employee benefits (Ehrenberg & Smith, 1991, p. 141). Ehrenberg & Smith (1991, p. 142) define quasi-fixed labor costs as investments by firms in training (or hiring) of their employees and these investments usually involve an outlay of funds with expectations of future returns. There are three types of costs that businesses face when training their employees. **Explicit monetary costs** are paid to individuals that serve as trainers and the cost of materials used during training. **Implicit or opportunity costs** are the costs of not employing the best, forgone option. An example would be for capital equipment and experienced employees to do less formal training and occupy production machinery for training purposes. Implicit or opportunity costs for experienced workers arise as experienced workers reduce production outputs because they are spending time demonstrating a process (Ehrenberg & Smith, pg. 143). Also, training costs are unrecoverable if the employee leaves after having acquired new skills through employer investment. An employee's mobility can be significantly increased through employer-provided training and this may cause apprehension when employers consider employee development programs.

Explicit costs to the employee are monies paid for training and training materials. Opportunity costs to the employee are other endeavors on which they could have spent their time and money. In competitive markets, employees typically bear the full cost of general training. Labor market frictions, where skilled labor is in short supply and expensive, may create an environment where employers will be willing to pay part of the cost of training. Acemoglu (1997, p. 460) notes that if several firms are expected to adopt new technology, however, workers will be more willing to pay for training with

expectations of higher wages in the future. “Workers are more willing to invest in their skills by accepting lower wages today if they expect more firms to innovate and pay them higher wages in the future. Similarly, firms are more willing to innovate when they expect the quality of the future workforce to be higher, thus when workers invest more in their skills” (Acemoglu, pg. 445). More skills means increased mobility to the worker and increased mobility means that future, not current, employers could potentially benefit from a worker’s improved skills. There are considerable costs associated with training and even greater expectations of future payoffs. So what happens when neither side invest in improving workforce skills? Unskilled labor markets are more susceptible to diminishing wages and face increasing foreign competition.

Future challenges

Richard Judy and Carol D’Amico (1997, p. 16) draw attention to the fact that jobs in the semiconductor industry are being lost at a fast pace, but the jobs lost are low-wage, low-skill positions. Alternatively, skilled workers are in short supply. If America doesn’t want these jobs to go overseas, then American workers will have to obtain the necessary skills to remain competitive. Entry-level workers, unless they have the requisite skills, will find it harder to find work. Judy & D’Amico go on to say that foreign countries have already recognized the importance of workforce skills as well as the relative abundance of entry-level positions. These countries have begun to upgrade the skills of their local workers in order to competitively bid for the large number of entry-level positions in the semiconductor industry.

American low-skilled workers are typically higher paid than their foreign counterparts; hence, low-skilled workers here face growing competition from the low-

skilled workers of rapidly developing nations (Judy & D'Amico, pg. 34-35). The presence of unions ensures the protection of relative high wages for low-skilled manufacturing jobs in America. Higher wages mean increasing costs to employers and a greater possibility that production costs could be lowered through relocation to developing countries and paying lower wages.

Unskilled labor is much easier to replace due in part to the large supply of individuals who are classified as unskilled. Processes and capital improvements may reduce the demand for unskilled labor, as fewer production inputs (labor) will be needed to produce equal or greater outputs. Therefore, this logic “definitely implies a higher elasticity of substitution of ‘raw’ labor for capital than for skilled labor.” (Griliches, 1969, p. 466)

As technology improves and globalization prevails, workers face stiff international competition from skilled and unskilled foreign workers. Americans have experienced a decline in high-wage manufacturing positions, while low-wage retail and services positions have absorbed these losses. Industrial employment as a percent of total employment has shifted dramatically in favor of services industries and away from manufacturing.¹ Therefore, low-skilled, high-wage manufacturing workers face a greater risk of unemployment or are forced to retrain themselves.

The importance of a skilled workforce

A number of employers will have to attract as many skilled workers as they can by offering higher wages and bidding up the cost of their services, thus creating higher

¹ Texas Workforce Commission, Labor Market Information Department data. Compares 1975 and 2000 annual average employment as a percentage of total employment by major industrial division.

costs and diminished competitiveness in the short-run. The flipside of the coin is that those who have the necessary skills are paid premium wages.

Benefits

According to Judy & D'Amico (1997, p. 85), "The highest rewards go to workers with knowledge and skills that are relevant to the workplace. Generic college degrees in and of themselves are not in demand." Wages efficiently reward workers because those with the most skills receive commensurate wages. Anderberg and Miller (2001, pg.53) state that simple laws of supply and demand are at the core of our economic system. If "skills" can be viewed as a scarce resource, then employers (demand for labor) will pay a higher wage to workers (supply of labor) who possess the most skills required. These increased wages, however, are not exclusive to high-skilled employees.

Future requirements and trends

According to Peterson & Mumford et al (1995, p. 3-3), jobs in the future will require not only basic reading, writing and computation skills, but also greater cognitive, analytical, and people skills. "Most jobs in the computer industry are now and increasingly will be in the areas of research and development, design, engineering, software, and customer support. All these jobs require higher-order skills than the production jobs that are being lost" (Judy & D'Amico, pg. 18). All workers, especially those who will work into the mid-twenty-first century, will need to continually update their education and skill levels. Math skills will also need to be drastically improved as the top ten percent of America's math students score only as well as the average student

in other countries. (Judy & D'Amico, pg. 114-115) These “hard skills” are not the answer to workforce skills deficiencies in and of themselves. People who lack the essential “soft skills” will have persistent problems finding good jobs, as many of the available jobs in America will not require a college education.

Skilled (and some unskilled) labor is also needed to construct roads, build and maintain airports, provide new development and support services for our computers, and technicians to lay down the fiber-optic network that links all of these pieces together. Also, as the number of manufacturing jobs lost to improved processes and technology increases, services industry jobs will grow to support these new processes and technology.² In order to stay competitive in a global economy, employers must get involved in students' education and training as they demand higher standards of performance from all future employees.

What are businesses saying about workforce skills?

According to a TDC study only 15 percent of employers mentioned occupation-specific shortages. “Employers told us that job applicants don't have the basic reading, writing, and computation skills they need. They also told us that workers don't have the analytical ‘think-on-your-feet’ skills” (TDC, 1993, p. 2). Mills & Prince (2001, p. 3) point out that employers consistently have difficulty locating and keeping a qualified workforce and rank this difficulty among their top human resources concerns. Mills & Prince go on to say that the hot economy of the 1990's and rapidly changing skill requirements further exacerbated labor and skills shortages. These problems are

particularly disturbing because if the workforce of today can't meet employers' skill requirements, America's future is dim.

Conclusion

The problem of inadequate workforce skills is a much-debated topic as globalization, information technology, and an aging population threaten to move American jobs overseas as those who have the requisite skills retire and make way for the new workforce. These factors do not only pose a threat to low-skilled workers, but to the nation's economy as a whole.

² Using Texas Workforce Commission Labor Market Information Department data for analysis, percentage of annual average industrial employment to total employment was compared.

CHAPTER 3

Defining and Classifying Skills

The purpose of this chapter is to show how skills are defined and classified both in a general sense and with respect to Registered Nurses. The skills definitions and classifications are used to develop a conceptual framework that will be used to analyze Human Resource Directors and Directors of Nursing collective attitudes on the importance of skills for their Registered Nurses.

Background

After exhaustive research on the nature of skills, the United States Department of Labor (DOL) has developed a skill classification system. Each skill category is generic and covers the skills required for all occupations so that the corresponding occupational skills may be placed in the appropriate category. The Secretary's Commission on Achieving Necessary Skills (SCANS) was charged with the task of defining skills for the DOL. In order to conduct a literature review, "more than fifty domestic and international sources that, like SCANS, reported on sets of essential skills" (DOL/DOE, pg. 4). How skills are defined is an important first step because skills are representative of a worker's ability to perform certain tasks. Employers use skills to match job and employee (MN Careers, 2001, pg. 1).

Various types of skills

The DOL, of course, is not the only organization, public or private, that is interested in skills and how they are defined. Even though several definitions of skills exist, they are all relatively similar with only slight variations.

In a report to the Governor on skills development, the Texas Department of Commerce (TDC) defines “core” skills.³ Core skills are divided into two groups, foundations and workplace skills. **Foundations** skills include reading, writing, math, and higher order cognitive skills. **Workplace** skills include the ability to allocate resources, work in teams, organize information, and use technology (TDC, 1993, pg. 7).

SCANS categorizes skills into three foundations skill sets and five workplace competency areas. The three **foundations** skill sets are basic skills (reading, writing, basic math), thinking skills (higher order cognitive skills), and personal qualities necessary for proficient performance in each of the competency areas. The five **workplace competency** areas include managing resources, accessing and storing information, interpersonal situations, understanding systems, and using technology (DOL/DOE, pg. 3).

Minnesota’s Department of Economic Security uses five categories to classify skills. These are **basic** skills (math, verbal, and problem-solving), **scientific and technical** skills (working with computers and scientific problem-solving), **management** skills (organizing people or resources), **medical knowledge** (ability to diagnose and treat disease), and **human service** skills (working with or helping people) (MN Careers, pg. 1).

³ It should be noted that TDC adopted the SCANS standards with only very small changes.

Several similarities exist among the various groups' skills categories and their definitions. Each group uses categories that include the "hard skills" or basics - reading, writing, and math skills, but they also include higher order thinking/analytical skills and people or "soft skills." Yet, defining skills across occupations is only the first step in determining if workforce skills are adequately meeting employer needs. Employers also need ways to assess and measure skills in order to identify an employee's major shortcomings.

Skills assessment tools and measurement

The Basic Skills Test (BST) is an example of only one of many privately administered measurement and assessment tools (published by Psychological Services Incorporated (PSI)). These tests "are a series of 15 tests specifically designed for clerical, administrative, and customer service employee selection" (DOL/DOE, pg. C-9).

The Occupational Information Network (O*NET), which will later be discussed in greater detail, is the new tool for assessing workers skills and analyzing "occupational information in order to accurately describe the activities, context, and requirements of each occupation in the United States" (DOL/DOE, pg. 5). O*NET is now replacing the SCANS skills classification system due to a change in occupational coding taxonomies. O*NET and SCANS define skills similarly. In addition, occupational skill requirements are "crosswalked" from SCANS to O*NET⁴ in order to facilitate a smooth transition

⁴ Tables that illustrate the connection between the O*NET and SCANS description and definition of skills can be found in the Conceptual Framework and Methodology chapter.

from one tool to the other. Once skills have been defined, categorized, and measured, the impact of the dynamic, modern U.S. economy on skill requirements is discussed.

What can be done to improve skills?

Standardization of skills

Employers' (public and private) involvement is essential if skill standards are to be established over various occupations, as they are the agents who employ the workforce and rely on its skills. Glover (1993, pg. 20) notes that the Texas House of Representatives and Senate attempted to create a nonprofit organization that would "convene existing industry groups and industry associations to ascertain the skill requirements of occupations in the Texas work force." Disappointingly, the action failed as little industry support was mobilized for the measure. "The primary concern is the lack of standards for 'core competencies,' which include academics and 'work-place' skills" (TDC, pg. 3).

One suggested solution is the introduction of industry-led skills standards that are supported and taught in the various education and training institutions. Focus groups that were conducted by the Texas Skills Development Program advised that

"if Texas' schools and training institutions can ensure basic and workplace skills, plus broad occupational-technical skills, Texas' businesses can train workers to individual company tool sets. Acknowledgement of Texas' business and industry concerns has caused our current research to delve into methods and strategies that would connect the foundation skills with occupational-technical skills" (TDC, pg. xi).

Since businesses will be the consumers of the worker training and education system, they should play an integral part in establishing competencies and skills they deem essential for any specific occupation. "A well conceived strategic planning process for workforce

development needs is best performed with the groundwork and documentation provided through regional labor market analysis and validated through employer expertise and insight.” (Froeschle, 1996, pg. 2) Once these standards have been agreed upon and established by industry, training programs can be created and delivered in a uniform manner across several different training avenues (e.g. secondary and postsecondary vocational and technical programs, proprietary schools, apprenticeships, and on-the-job-training). “A promising strategy for accomplishing a variety of objectives is improving the workforce is to develop an industry based system of skill standards and certification” (Glover, 1993, pg. 1-2).

The Dictionary of Occupational Titles (DOT) was the result of a previous ongoing effort by the DOL to describe occupations in terms of tasks performed by job incumbents (Peterson & Mumford et al, 1995, pg.1-2). Peterson and Mumford (1995, pg.1-5) point out that the main problem with the DOT is that it cannot provide a common framework for describing all occupations. The Occupational Information Network (O*NET) was recently developed by the U.S. Department of Labor (DOL) to provide a cross-occupational list of job descriptors.

The O*NET is an electronic database that combines the descriptive detail of the DOT coupled with other types of relevant labor market data. Information on O*NET is available for over 950 occupations. All occupations are coded using the latest version of occupational classification taxonomy known as the Standard Occupational Classification system. According to the O*NET website, “O*NET is a unique, powerful source for continually updated occupational information and labor market research. By using a contemporary, interactive skills-based database and a common language to describe

worker skills and attributes, O*NET transforms mountains of data into precise, focused occupational intelligence that anyone can understand easily and efficiently.”⁵ All occupations on O*NET are described by a universal set of forty-six skills. Only the importance of these universal skills varies by occupation. The complete list of skills is as follows:

1. **Reading Comprehension**—understanding written sentences and paragraphs in work related documents.
2. **Active Listening**—listening to what other people are saying and asking questions as appropriate.
3. **Writing**—communicating effectively with others in writing as indicated by the needs of the audience.
4. **Speaking**—talking to others to effectively convey information.
5. **Mathematics**—using mathematics to solve problems.
6. **Science**—using scientific methods to solve problems.
7. **Critical Thinking**—using logic and analysis to identify the strengths and weaknesses of different approaches.
8. **Active Learning**—working with new material or information to grasp its implications
9. **Learning Strategies**—using multiple approaches when learning or teaching new things.
10. **Monitoring**—Assessing how well one is doing when learning or doing something.
11. **Social Perceptiveness**—Being aware of others’ reactions and understanding why they react the way they do.
12. **Coordination**—adjusting actions in relation to others’ actions.
13. **Persuasion**—persuading others to approach things differently.
14. **Negotiation**—bringing others together and trying to reconcile differences.
15. **Instructing**—teaching others how to do something.
16. **Service Orientation**—actively looking for ways to help people.
17. **Problem Identification**—Identifying the nature of problems.
18. **Information Gathering**—knowing how to find information and identifying essential information.
19. **Information Organization**—finding ways to structure or classify multiple pieces of information.
20. **Synthesis/Reorganization**—reorganizing information to get a better approach to problems or tasks.
21. **Idea Generation**—generating a number of different approaches to problems.
22. **Idea Evaluation**—evaluating the likely success of an idea in relation to the demands of the situation.
23. **Implementation Planning**—developing approaches for implementing an idea.
24. **Solution Appraisal**—observing and evaluating the outcomes of a problem solution to identify lessons learned or redirect efforts.
25. **Operations Analysis**—analyzing needs and product requirements to create a design.
26. **Technology Design**—generating or adapting equipment and technology to serve user needs.
27. **Equipment Selection**—determining the kind of tools and equipment needed to do a job.
28. **Installation**—installing equipment, machines, wiring, or programs to meet specifications.
29. **Programming**—writing computer programs for various purposes.
30. **Testing**—conducting tests to determine whether equipment, software, or procedures are operating as expected.
31. **Operation Monitoring**—watching gauges, dials, or other indicators to make sure a machine is working properly.
32. **Operation and Control**—controlling operations of equipment or systems.
33. **Product Inspection**—inspecting and evaluating the quality of products.
34. **Equipment Maintenance**—performing routine maintenance and determining when and what kind of maintenance is needed.
35. **Troubleshooting**—determining what is causing an operating error and deciding what to do about it.

⁵ <http://online.onetcenter.org/help/welcome/>

36. **Repairing**—repairing machines or systems using the needed tools.
37. **Visioning**—developing an image of how a system should work under ideal conditions.
38. **Systems Perception**—Determining when important changes have occurred in a system or are likely to occur.
39. **Identifying Downstream Consequences**—determining the long-term outcomes of a change in operations.
40. **Identification of Key Causes**—identifying the things that must be changed to achieve a goal.
41. **Judgement and Decision Making**—weighing the relative costs and benefits of a potential action.
42. **Systems Evaluation**—looking at many indicators of system performance, taking into account their accuracy.
43. **Time Management**—managing one’s own time and the time of others.
44. **Management of Financial Resources**—determining how money will be spent to get the work done, and accounting for these expenditures.
45. **Management of Material Resources**—obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
46. **Management of Personnel Resources**—motivating, developing, and directing people as they work, identifying the best people for the job.

Peterson & Mumford et al (1995, pg. 3-2) have noticed that the traditional employment pattern of the past hundred years, where a person would work for a large company and methodically ascend a structured career ladder are quickly disappearing. They go on to point out that technology and global competition have placed a premium on workforce skills that allow workers to quickly master an assortment of new tasks. Industry-led standards are the first step to ensuring that the workforce will have the skills employers are looking for in the future. Using industry standards as the foundation, Skill Supply Chains, Inter-firm cooperation, and Certificates of Mastery are other possible methods to address skills shortages.

Mills & Prince (2001, pg. 1) explain that Skill Supply Chains utilize a “supply chain strategy to human resources in order to make the labor market more efficient.” These Skill Supply Chains are nurtured and operated by employers or business organizations in order to guide people toward occupations with large numbers of vacancies to fill that require varying levels of analogous skills. Mills & Prince (2001, pg. 1) also point out that Skill Supply Chains influence skills development through on-the-

job-training (OJT) coupled with education to fill the skills gap. “Skill Supply Chains can help solve recruitment problems, reduce turnover, and increase productivity” (Mills & Prince, 2001, pg. 1). Employees can gain the skills that are specific to business’s unique requirements at lower levels of employment. The entry-level employer can offer advancement beyond their own capabilities by emphasizing that the skills attained can be valuable to other businesses, quite possibly in completely different industries. Under these circumstances, “Workers (will) view low-skill, low-wage jobs as entry points into a workforce development system that provides opportunities to increase their skill levels and advance their careers” (Mills & Prince, 2001, pg. 14).

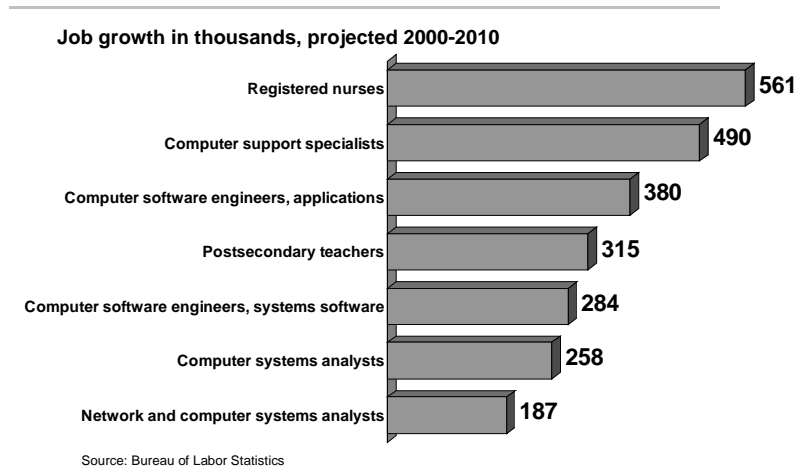
Inter-firm cooperation works much like Skill Supply Chains in that businesses come together to develop their local workforce. One way businesses can help each other is through upgrading the skills of their workers through combined training efforts. Bosworth (2000, pg. 2) notes that smaller firms may be reluctant to increase the skills of their workers because “they often encounter problems of scale that drive up costs.” Even though marginal benefits may exceed marginal costs, smaller firms may encounter cash flow constraints in the immediate short-term. Combined training efforts spread costs out over the participating employers while employees enjoy the benefits of skills training. The result is a better skilled group of employees at reduced costs to the employer.

It is also suggested that those who attained a higher level of skills be awarded Certificates of Mastery from both industry and educators. “For example, certificates of ‘Initial Mastery’ for achieving core skills could be jointly awarded by the education institution and industry. ‘Advanced Mastery’ for achieving occupational skills standards would be awarded by industry” (TDC, 1993, pg. 4).

Skills gaps are not exclusive to any one occupation or industry but the problem is more serious for those occupations and industries that are projected to grow the most over the next ten years. As the demand increases for skilled workers to fill positions in growing occupations, the problem of a skills gap further exacerbates the problems associated with a worker shortage. The graph below shows that the occupation of Registered Nurses is going to need several hundred thousand new workers over the next eight years.

Figure 3.1

Occupations with the largest numerical growth that will also be fast growing and high paying



Nursing Skills

Porter-O’Grady (2001, pg. 185) explains that even though nursing is a high-skilled, high demand occupation, nurses are not immune from the same factors that affected many other American workers. Technology has had a profound effect on nursing as it has forever altered what the nurse is expected to do and the manner in which he or she does the job. “What is critical for nursing practice is the recognition that it is now different from whatever it has been throughout the 20th century” (Porter-O’Grady,

2001, pg. 185). The remainder of this paper concentrates on how nursing skills are defined, importance of certain skills to patients and nurses, how skill requirements have changed, and some new educational principles.

How are nursing skills defined?

Historically, in nursing texts, “nursing practical skills are essentially understood in two distinct ways, as art or as psychomotor skills.” (Bjork, 1999a, pg.53) The term “art” is most commonly associated with creative endeavors like singing, dancing, or painting. Bjork notes (1999a, pg.54)⁶ that in nursing, “art” refers to the “behavioral abilities and not the aesthetics of skilled performance that were the focus when nursing arts was presented during the first half of this century.” The “art” in nursing was refined and described as precise motor skills in the psychomotor sphere of learning outcomes. “[N]ursing motor skills were characterized in terms of technique and manipulation, that is, strength, reaction time, speed, precision, consideration, and flexibility” (Bjork, 1999a, pg.54).

Practical nursing skills refer to “hands-on actions that promote the patients’ physical comfort, hygiene, and safe medical treatment” (Bjork, 1999a, pg. 52). These skills are commonly called procedures or psychomotor skills. Psychomotor skills are most associated with the profession of nursing; however, expectations and technology have changed nursing skill requirements to include higher-order classifications. Bjork (1999a, pg. 51) explains that nursing practical skills adopt “dimensions of performance, intention, and nursing ‘disciplined’ understanding.” Bjork (1999a, pg. 51) also points out

⁶ As cited in Harmer & Henderson, 1955; National League for Nursing Education, 1937.

that as the nursing profession becomes more academically oriented, less attention is paid to the practical and technical aspects of nursing.

“Convictions about what a nursing practical skill ought to be are closely connected to what one thinks nursing care is about. One of the ways of setting nursing apart from medicine has been to develop theory that highlights expressive, caring, and psychosocial elements of nursing versus the instrumental, curative, and biological elements more prominent in medicine” (Bjork, 1999a, pg.56-57).

Skills are molded by nurses’ intentions. Personal knowledge of the patient as well as procedural knowledge are the basis on which intentions are formed. Knowledge specific to the nursing discipline such as practical, ethical, and theoretical knowledge also mold skills that direct us in promoting activities of daily living and helping human beings (Bjork, 1999a, pg.57).

Importance to Patients

In reviewing patients’ comments over forty years, research findings have maintained that good quality nursing care, “reveals itself first of all through the practical, technical or manual aspects of physical care” (Bjork, 1995, pg. 8). Bjork (1999b) points to several scientific studies that examine nurses’ and patients’ views on the importance of nursing skills. Over thirty years of research, eight studies revealed that, “patients consistently viewed nursing actions that promote physical comfort, hygiene, and safe medical treatment as important nursing care” (Bjork, 1999a, pg. 52).

Importance to Nurses

Patients and nurses each value nursing skills differently. While patients' most valued psychomotor skills, nurses placed higher priority on "soft" skills. Bjork (1995, pg. 8) examined research findings since 1950 and discovered that nurses have placed a premium on "the psychosocial support of patients through interpersonal relations."

How have skill requirements changed?

"The patient's body has moved out of focus in nursing. This has led to the diminishing importance of practical skill in the discipline of nursing" (Bjork, 1995, pg. 6). The activities of accessing, informing, guiding, teaching, counseling, typing, and linking now present the greatest challenge for nursing practice skills to incorporate. "The mental models and skill-sets for this kind of nursing practice require a different learning and practice focus than most nurses currently have" (Porter-O'Grady, 2001, pg. 183). Porter-O'Grady (2001, pg. 182) also found the current configurations of nursing practice in its forms is fading as the demands of the health system are changing. He also argued that holding onto practices that no longer reflect the demands of today's patient will contribute to the demise of the nursing profession (Porter-O'Grady, 2001, pg. 183). "A technical and practical approach to nursing education has been changed to one more theoretical and professional" (Bjork, 1999b, p. 34).

New Educational Principles

As nursing education becomes more theoretical and professional, the nursing faculty's role is changing from that of a "provider of learning to facilitator of the learning process" (Porter-O'Grady, 2001, pg. 184). The traditional instructor-driven, classroom style of learning is no longer the dominant model as the student is now more responsible for learning the relevant subject matter (Porter-O'Grady, 2001, pg. 184).

Porter-O'Grady (2001, pg. 184) also found a greater portion of curriculum development is focused around a variety of clinical settings that represent the future of health care delivery. "When education of nurses was planned, organized and executed in the hospital setting, there was no conflict between education and service" (Bjork, 1995, pg. 8). Bjork (1995, pg. 8) goes on to say that the learning process revolved around real work experience, which enabled the graduate nurse to transition smoothly from school to practice. Learning valuable skills through real work situations gave the nurse an updated and practical education. The migration of nurse education to classroom institutions has reduced the nurses' preparedness for the actual work of nursing (Bjork, 1995, pg. 8).

Bjork (1995, pg. 9) notes that with the emphasis on classroom instruction, less time has been allocated for physical care and hands-on nursing skills. New nurses will have more difficulty transitioning from school to work because, though they have been given a solid foundation of knowledge from which to build, their practical skills have been found deficient. "It is, however, relevant to suggest that educators should invest time in heightening students' awareness of their performance, the styles they use, and their weaknesses and strengths in relation to developing skills in complex situations" (Bjork, 1999b, p. 44). Educators must take some ownership of the problem of deficient

nursing skills as those who graduate from those institutions rely on educators to prepare them for the working world. “It is clear that nursing education is about to see the greatest challenge to both the form and process of preparing future nurses” (Porter-O’Grady, 2001, pg. 185).

Conclusion

Research and intensified technological development have created an environment where medical treatment is more specialized and an even greater emphasis is placed on skills. The time a patient stays in the hospital is getting shorter as advanced nursing care is moving into patients’ homes. (Bjork, 1995, pg. 9) “Without engaging and embracing the issues around a new emerging foundation for nursing practice in the 21st century, it is quite possible that nurses will fail to find a meaningful place in 21st century health service” (Porter-O’Grady, 2001, pg. 186). The literature reviewed in this chapter shows the dynamic nature of the economy in general and of nursing in particular. “In conclusion, the results of ... empirical study underscore how important it is to look closely at conditions for practical skill learning and development in clinical settings, as well as in the education of nursing students.” (Bjork, 1999b, pg. 46)

CHAPTER 4

Conceptual Framework and Methodology

Research Question

The purpose of this study is threefold. **First**, to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. Using the results of an employer survey, the **second** purpose is to compare the employer opinions with a previous study of Nurses' opinions about the importance of various skills. **Third**, the results of the comparison are used to speculate about the implications of differences and place them into perspective.

Conceptual Framework

The micro-conceptual framework for this research is descriptive categories, and this study is a follow-up of previous research with a few notable differences that are discussed later. The Occupational Information Network (O*NET) is a new electronic database used to classify occupations and, among other things, skill requirements. The O*NET classification system includes six categories that are arranged by type of skill. Within each type, there are several specific skill descriptors. **Table 4.1** shows the connection between the six skill classifications and the source that justifies the inclusion of each identified skill descriptor.

Table 4.1 *Connection of Descriptive Categories and Source.*

Skill Classification	
<i>Descriptive Categories</i>	Source
<u>Basic Skills</u>	
<ol style="list-style-type: none"> 1. Reading Comprehension--Understanding written sentences and paragraphs in work related documents. 2. Active Listening--Listening to what other people are saying and asking questions as appropriate. 3. Writing--Communicating effectively with others in writing as indicated by the needs of the audience. 4. Speaking--Talking to others to effectively convey information. 5. Mathematics--Using mathematics to solve problems. 6. Science--Using scientific methods to solve problems. 7. Critical Thinking--Using logic and analysis to identify the strengths and weaknesses of different approaches. 8. Active Learning--Working with new material or information to grasp its implications. 9. Learning Strategies--Using multiple approaches when learning or teaching new things. 10. Monitoring--Assessing how well one is doing when learning or doing something. 	<p>The Occupational Information Network (O*NET)</p> <p>Bjork, I</p> <p>Porter-O'Grady</p>

<u>Technical Skills</u>	The Occupational Information Network (O*NET) Thompson & Rebeschi
<p>25. Operations Analysis--Analyzing needs and product requirements to create a design.</p> <p>26. Technology Design--Generating or adapting equipment and technology to serve user needs.</p> <p>27. Equipment Selection--Determining the kind of tools and equipment needed to do a job.</p> <p>28. Installation--Installing equipment, machines, wiring, or programs to meet specifications.</p> <p>29. Programming--Writing computer programs for various purposes.</p> <p>30. Testing--Conducting tests to determine whether equipment, software, or procedures are operating as expected.</p> <p>31. Operation Monitoring--Watching gauges, dials, or other indicators to make sure a machine is working properly.</p> <p>32. Operation and Control--Controlling operations of equipment or systems.</p> <p>33. Product Inspection--Inspecting and evaluating the quality of products.</p> <p>34. Equipment Maintenance--Performing routine maintenance and determining when and what kind of maintenance is needed.</p> <p>35. Troubleshooting--Determining what is causing an operating error and deciding what to do about it.</p> <p>36. Repairing--Repairing machines or systems using the needed tools.</p>	
<u>Systems Skills</u>	
<p>37. Visioning--Developing an image of how a system should work under ideal conditions.</p> <p>38. Systems Perception--Determining when important changes have occurred in a system or are likely to occur.</p> <p>39. Identifying Downstream Consequences--Determining the long-term outcomes of a change in operations.</p> <p>40. Identification of Key Causes--Identifying the things that must be changed to achieve a goal.</p> <p>41. Judgment and Decision-Making--Weighing the relative costs and benefits of a potential action.</p> <p>42. Systems Evaluation--Looking at many indicators of system performance, taking into account their accuracy.</p>	

<u>Resource Management Skills</u>	
<p>43. Time Management--Managing one's own time and the time of others.</p> <p>44. Management of Financial Resources--Determining how money will be spent to get the work done, and accounting for these expenditures.</p> <p>45. Management of Material Resources--Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.</p> <p>46. Management of Personnel Resources--Motivating, developing, and directing people as they work, identifying the best people for the job.</p>	

Tables on pages 36 through 48 are the O*NET descriptions and definitions of skills with citations are included. It is important to note that there are no citations provided for Technical Skills. Peterson & Mumford et al (1995, p. 3-34) did find literature on the existence and importance of various technical skills, but previous studies did not attempt to relate technical skills to other types of skills. Previous studies also failed to formulate a methodical taxonomy of technical skills. “Thus, it would be difficult, if not impossible to use the existing research literature to propose a systematic taxonomy of technical skills” (Peterson & Mumford et al, 1995, pg. 3-34).

Description and Definition of Basic Skills

Table 4.2

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scale	Level Scale
Reading Comprehension 1	Decodes, interprets, & comprehends information drawn from written documents, books, etc.	Understanding written sentences & paragraphs in work related documents	Hayes & Flower (1986) Friedrickson (1982)	Reading	<i>High:</i> Reading a scientific journal article describing surgical procedures. <i>Medium:</i> Reading a memo from management describing new personnel policies. <i>Low:</i> Reading step-by-step instructions for completing a form.
Active Listening 2	Receives, interprets, & attends to verbal information & monitors comprehension of this material asking questions as appropriate	Listening to what other people are saying & asking questions as appropriate	Daly (1994) Beck & Carpenter (1986)	Listening	<i>High:</i> Presiding as judge in a complex legal disagreement. <i>Medium:</i> Answering inquiries regarding credit references. <i>Low:</i> Taking a customer's order.
Writing 3	Communicates thoughts, ideas, information, & messages in writing; planning, generating, & revising text	Communicating effectively with others in writing as indicated by the needs of the audience	Hayes & Flower (1986) Needles & Knapp (1994)	Writing	<i>High:</i> Writing novel for publication. <i>Medium:</i> Writing a memo to staff outlining new directives. <i>Low:</i> Taking a telephone message.
Speaking 4	Communicates thoughts, ideas, & information orally attending to the comprehension of listeners & the demands of the setting	Talking to others to effectively convey information	Daly (1994)	Speaking	<i>High:</i> Arguing a legal case before the Supreme Court. <i>Medium:</i> Interviewing applicants to obtain personal and work history. <i>Low:</i> Greeting tourists and explaining tourist attractions.
Mathematics 5	Understands mathematical problem solving procedures & how these procedures might be used to address various problems	Using mathematics to solve problems	Greeno & Simon (1988)	Mathematics Arithmetic	<i>High:</i> Developing a mathematical model to simulate and resolve an engineering problem. <i>Medium:</i> Calculating the square footage of a new home under construction. <i>Low:</i> Counting the amount of change to be given to a customer.

Table 4.2 (cont.)

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scale	Level Scale
Science 6	Understands basic scientific problem solving procedures & how these procedures might be used to address various problems	Using scientific methods to solve problems	Feltovich, Spiro, & Coulson (1993) Kilkarni & Simon (1990) Carey (1986)	None	<i>High:</i> Conducting analyses of aerodynamic systems to determine the practicality of an aircraft design. <i>Medium:</i> Conducting product tests to insure safety standards are met, following written instructions. <i>Low:</i> Conducting standard tests to determine soil quality.
Critical Thinking 7	Recognizes & can analyze the strengths & weaknesses of arguments & propositions using logic to establish the validity of these propositions	Using logic & analysis to identify the strengths & weaknesses of different approaches	Halpern (1994) Perkins, Jay, & Tishman (1994)	Reasoning Self-Management Knowing How to Learn	<i>High:</i> Writing a legal brief challenging a federal law. <i>Medium:</i> Evaluating customer complaints and determining appropriate responses. <i>Low:</i> Determining whether a subordinate has a good excuse for being late.
Active Learning 8	Works with new information & concepts actively seeking to identify the meaning & implications of these concepts as they apply to problem solving	Working with new material or information to grasp its implications	Chi, Bassock, Lewis, Reimann, & Glaser (1989) Schmeck & Grove (1979)	Knowing How to Learn	<i>High:</i> Identifying the implications of a new scientific theory for product design. <i>Medium:</i> Determining the impact of new menu changes on a restaurant's purchasing requirements. <i>Low:</i> Thinking about the implications of a newspaper article for job opportunities.
Learning Strategies 9	Identifies & uses various alternative strategies for working on learning tasks, looking for examples, taking notes, & identifying alternating strategies for working with this material	Using multiple approaches when learning or teaching new things	Mumford, Baughman, Supinski, Costanza, & Threlfall (1994) Greeno & Simon (1988) Sweller (1989)	Knowing How to Learn	<i>High:</i> Applying principles of educational psychology to developing new teaching methods. <i>Medium:</i> Identifying an alternative approach that might help trainees who are having difficulties. <i>Low:</i> Learning a different method of completing a task from a co-worker.
Monitoring 10	Establishes expected standards for performance & monitors the attainment of these standards changing behavior & approach as indicated by feedback information	Assessing how well one is doing when learning or doing something	Brown & Camponie (1986) Snow & Swanson (1992)	Monitors & Corrects Performance	<i>High:</i> Reviewing corporate productivity and developing a plan to increase productivity. <i>Medium:</i> Monitoring a meeting's progress and revising the agenda to ensure that important topics are discussed. <i>Low:</i> Proofreading and correcting a letter.

Description and Definition of Complex Problem Solving Skills

Table 4.3

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Level Scale Anchors
Problem Identification 17	Reflects the restructuring of an ill-defined situation such that the basic nature of the problem & requisite problem solving strategies are identified	Identifying the nature of problems	Getzels & Csikszentmihalyi (1976) Redmond, Mumford, & Teach (1993) Hoover & Feldhusen (1990)	Creative Problem solving Decision making Reasoning	<i>High:</i> Analyzing corporate finances to develop a restructuring plan. <i>Medium:</i> Identifying and resolving customer complaints. <i>Low:</i> Comparing invoices of incoming articles to ensure they meet required specifications.
Information Gathering 18	Searches for key diagnostic information needed to address a problem using appropriate search strategies	Knowing how to find information & identifying essential information	Qin & Simon (1988) Perkins (1992) Davidson & Sternberg (1984)	Problem solving Decision making Reasoning	<i>High:</i> Analyzing industry indicies and competitors' annual reports to determine feasibility of expansion. <i>Medium:</i> Conducting an employee opinion survey. <i>Low:</i> Looking up procedures in a manual.
Information Organization 19	Uses appropriate concepts & schema to organize information identifying essential features & concept relationships	Finding ways to structure or classify multiple pieces of information	Davidson & Sternberg (1984) Kuhn (1970) Mumford, <i>et al.</i> (1991)	Problem solving Decision making Reasoning	<i>High:</i> Developing a prototype for a new database system. <i>Medium:</i> Classifying library materials according to subject matter. <i>Low:</i> Laying out tools to complete a job.
Synthesis/ Reorganization 20	Reorganize & restructure applicable schema to create new ways or conceptual systems needed to understand a problem situation	Reorganizing information to get a better approach to problems or tasks	Owens (1969) Finke, Ward & Smith (1992) Mobley, Doares, & Mumford (1992)	Creative Problem solving Reasoning	<i>High:</i> Determining the best order in which to present evidence in a criminal trial. <i>Medium:</i> Redesigning floor layout to take advantage of new manufacturing techniques. <i>Low:</i> Rearranging a filing system to make it easier to get needed material.
Idea Generation 21	Uses understanding of situation and/or key features of this relevant schema to generate or identify alternative problem solutions	Generating a number of different approaches to problems	Guilford (1950) Runco (1991,1994)	Creative Problem solving	<i>High:</i> Developing alternative transportation plans for a growing urban area. <i>Medium:</i> Developing recruitment strategies. <i>Low:</i> Finding alternative routes while making deliveries.

Table 4.3 (cont.)

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Level Scale Anchors
Idea Evaluation 22	Uses available expertise or mental models to identify various consequences of a proposed solution recommending changes or implementation as appropriate	Evaluating the likely success of an idea in relation to the demands of the situation	Runco & Vega (1990) Mumford, Zaccaro, Harding & Fleishman (in press)	Decision making Problem solving Reasoning	<i>High:</i> Analyzing probable outcomes of public health policies to combat disease epidemic. <i>Medium:</i> Evaluating and selecting employee suggestions for possible implementation. <i>Low:</i> Determining which procedure to apply to get a report typed more quickly.
Implementation Planning 23	Creates a mental representation or formal plan for implementing a solution & identifies appropriate actions & timing of actions to implement plan.	Developing approaches for implementing an idea	Krietler & Krietler (1987) Covington (1987) Carrol & Gillen (1987)	Problem solving Creative Reasoning	<i>High:</i> Developing and implementing a plan to provide emergency relief for a major metropolitan area. <i>Medium:</i> Scheduling deliveries based on distance between sites, staffing time, availability of vehicles, and cost. <i>Low:</i> Scheduling and coordinating a one-day meeting.
Solution Appraisal 24	Observes & evaluates problem solving activities using observations to adjust strategies & structure experience	Observing & evaluating the outcomes of problem solution to identify lessons learned or redirect efforts	Brown & Camponie (1986) Sternberg (1986)	Monitoring Decision making Problem solving	<i>High:</i> Reviewing, assessing, and modifying the implementation of a new business plan. <i>Medium:</i> Measuring customer satisfaction after introduction of new billing procedures. <i>Low:</i> Identifying and correcting an error made in preparing a report.

Description and Definition of Technical Skills

Table 4.4

Construct Label	Technical Definition	Operational Definition	SCANS Scales	Scale Anchors
Operations Analysis 25	Identifies the requirements for a new technology including user needs, product requirements, and production, or operating, requirements for a system, tool, or type of technology	Analyzing needs and product requirements to create a design	Improves and designs technology	<p><i>High:</i> Identifying the control system needed for a new process production plant.</p> <p><i>Medium:</i> Suggesting changes in software to make a system more user friendly.</p> <p><i>Low:</i> Selecting a photocopy machine for an office.</p>
Technology Design 26	Uses principles and knowledge of technology to create new technologies or adapt existing technologies to user needs laying out blueprints or parameters for operating the systems consistent with needs, site, and technology	Generating or adapting equipment and technology to serve user needs	<p>Improves and designs technology</p> <p>Selects technology</p>	<p><i>High:</i> Creating new technology for producing industrial diamonds.</p> <p><i>Medium:</i> Redesigning the handle on a hand tool for easier gripping.</p> <p><i>Low:</i> Adjusting exercise equipment for use by customer.</p>
Equipment Selection 27	Identifies the kind of technology, equipment or tools available most likely to satisfy user requirements in a cost-effective fashion	Determining the kind of tools and equipment needed to do a job.	Selects technology	<p><i>High:</i> Identifying the equipment needed to produce a new product line.</p> <p><i>Medium:</i> Choosing a software application to use to complete a work assignment.</p> <p><i>Low:</i> Selecting a screwdriver to use in adjusting vehicle carburator.</p>
Installation 28	Uses design specifications and understanding of local situation to install equipment or technological systems in such a way as to meet user needs	Installing equipment, machines, wiring, or programs to meet specifications	Improves and designs technology	<p><i>High:</i> Installing "one of a kind" process production molding machine.</p> <p><i>Medium:</i> Installing new switches for a telephone exchange.</p> <p><i>Low:</i> Installing a new air filter in an air conditioner.</p>
Programming 29	Writes computer software in one of more languages to provide the procedures needed to accomplish one or more tasks	Writing computer programs for various purposes	<p>Applies technology to task</p> <p>Uses computers to process</p>	<p><i>High:</i> Writing expert system programs to analyze ground radar geological data for probable existence of mineral deposits.</p> <p><i>Medium:</i> Writing statistical analysis programs to analyze demographic data.</p> <p><i>Low:</i> Writing a program in BASIC to sort objects in a database.</p>

Table 4.4 (cont.)

Construct Label	Technical Definition	Operational Definition	SCANS Scales	Scale Anchors
Testing 30	Uses appropriate tools, techniques, and procedures to establish whether a machine or program is operating in accordance with specifications or design layouts	Conducting tests to determine whether equipment, software, or procedures are operating as expected	Applies technology to task Selects technology	<i>High:</i> Developing procedures to test a prototype of a new computer system. <i>Medium:</i> Starting a machine to obtain a first-run workpiece and verify dimensional tolerances. <i>Low:</i> Using a test station to assess whether a car meets emission requirements.
Operations Monitoring 31	Monitor the inflow and operations involved in producing a product; identifying changes likely to affect production or continued operations	Watching gauges, dials, or other indicators to make sure a machine is working properly	Applies technology to task	<i>High:</i> Monitoring and integrating control feedback in a petrochemical processing facility to maintain production flow. <i>Medium:</i> Monitoring machine functions on an automated production line. <i>Low:</i> Monitoring completion times in running a computer program.
Operation and Control 32	Uses information and system status to make necessary changes in system status applying appropriate controls	Controlling operations of equipment or systems	Applies technology to task	<i>High:</i> Controlling aircraft approach and landing at a large airport during a busy period. <i>Medium:</i> Adjusting the speed of assembly line equipment based on the type of product being assembled. <i>Low:</i> Adjusting the settings on a copy machine to make reduced size photocopies.
Product Inspection 33	Inspects and evaluates the products of a process or procedure to make sure they are meeting design specifications, error tolerances, and user needs	Inspecting and evaluating the quality of products	Applies technology to task	<i>High:</i> Establishing and monitoring quality control procedures for a large manufacturing operation. <i>Medium:</i> Measuring new part requirements for tolerance to specifications. <i>Low:</i> Inspecting draft of memorandum for clerical errors.
Equipment Maintenance 34	Evaluates the servicing needs of a machine or system conducting requisite maintenance or obtaining support for conducting this maintenance	Performing routine maintenance and determining when and what kind of maintenance is needed	Troubleshoots and maintains technology Applies technology to task	<i>High:</i> Conducting maintenance checks on an experimental aircraft. <i>Medium:</i> Clearing moving parts in production machinery. <i>Low:</i> Adding oil to an engine as indicated by a gauge or warning light.

Table 4.4 (cont.)

Construct Label	Technical Definition	Operational Definition	SCANS Scales	Scale Anchors
Troubleshooting 35	Identifies and diagnoses the sources of operating errors in a machine, computer, or electrical system, and determines the actions to be taken to fix this error	Determining what is causing an operating error and deciding what to do about it	Maintains and troubleshoots technology	<i>High:</i> Directing the debugging of control code for a new operating system. <i>Medium:</i> Identifying the circuit causing an electrical system to fail. <i>Low:</i> Identifying the source of a leak by looking under a machine.
Repairing 36	Uses tools and procedures to repair faulty components of an operating system or machine	Repairing machines or systems using the needed tools	Maintains and troubleshoots technology	<i>High:</i> Repairing structural damage to a building following an earthquake. <i>Medium:</i> Replacing a faulty hydraulic valve. <i>Low:</i> Tightening screw to get a door to close properly.

Description of Definition of Systems Skills

Table 4.5

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Level Scale Anchors
Visioning 37	Create and apply a cognitive template or mental model describing how components of a system should interact under ideal conditions	Developing an image of how a system should work under ideal conditions	House and Howell (1992) Mumford, Snell, Reiter-Palmon (1994)	Systems understanding	<i>High:</i> Creating a new vision for a large manufacturing organization that lets the company respond to changes in market and technology <i>Medium:</i> Preparing a presentation detailing the role of a work unit in relation to the organizational structure <i>Low:</i> Understanding a co-workers' roles in finishing a job
Systems Perception 38	Understands how various components of a system work together and monitors key diagnostics to identify changes in system states and the nature of operations	Determining when important changes have occurred in a system or are likely to occur	Zaccaro, Gilbert, Thor, & Mumford (1991)	Systems understanding	<i>High:</i> Identifying how changes in tax laws are likely to affect preferred sites for manufacturing operations in different industries <i>Medium:</i> Observing conditions that may impede the flow of work on an assembly line notifying personnel that corrective action is necessary <i>Low:</i> Identifying how an argument among team members might affect the day's work
Identification of Downstream Consequences 39	Can identify the effects on different systems of a change in a given variable and how these changes will effect operations over time	Determining the long-term outcomes of a change in operations	Bass (1994) Jacobs & Jaques (1989)	Systems understanding Improves and designs systems	<i>High:</i> Identifying changes that might occur in an industry if a new piece of legislation is passed <i>Medium:</i> Identifying how introduction of a new piece of equipment will affect production rates <i>Low:</i> Identifying how loss of a team member will affect completion of a job
Identification of Key Causes 40	Can identify those variables that have the strongest effects on system operations and the variables to be manipulated to bring about desired outcomes	Identifying the things that must be changed to achieve a goal	Bass (1994)	Improves and designs systems	<i>High:</i> Identifying the changes in organizational policy needed to encourage research and development efforts <i>Medium:</i> Identifying the major reasons why a client might be unhappy with a product <i>Low:</i> Determining which route to take to deliver a passenger to a destination quickly

Table 4.5 (cont.)

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Level Scale Anchors
Judgement and Decision Making 41	Weighs the pros and cons of various actions in relation to broader goals under conditions where complete information is not available	Weighing the relative costs and benefits of a potential action	Peterson (1992) Hogarth (1986) Sternberg (1990)	Decision making Monitors and corrects performance	<i>High:</i> Deciding whether a manufacturing company should invest in a new robotics technology <i>Medium:</i> Evaluating a loan application for degree of risk <i>Low:</i> Deciding how scheduling a break will affect work flow
Objective Evaluation 42	Actively seeks out multiple sources of information about different system outcomes appraising the potential biases in this information and acting accordingly	Looking at many indicators of system performance taking into account their accuracy	Peterson (1992) Mumford and Connelly (1991)	None	<i>High:</i> Evaluating the long-term performance problems of a company <i>Medium:</i> Determining why a manager has underestimated production costs <i>Low:</i> Determining why a co-worker has been overly optimistic about how long it would take to complete a task

Table 4.6

Description and Definition of Higher Order System Skills

[illegible]

Description and Definition of Lower Order Resource Management Skills

Table 4.7

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Scale Anchors
Financial 44	Obtains requisite funds from either internal or external sources	Obtains needed operating budgets or start-up money	Peterson (1992)	Allocating money	<i>High:</i> Obtains financial support needed to start a new division of a Fortune 500 company. <i>Medium:</i> Obtains increase in yearly promotional budget to address new competition. <i>Low:</i> Requests a raise to bring salary into line with peers.
Budgeting 44	Allocates funds to various aspects of operations including production, product development, and marketing	Allocates funds to accomplish relevant work	Peterson (1992)	Allocating money	<i>High:</i> Develops yearly operating budget for a Fortune 500 company. <i>Medium:</i> Proposes a budget for an advertising campaign. <i>Low:</i> Suggests changes in a budget proposal to allow for more promotional activities.
Accounting 44	Monitors and evaluates the use of funds and the return on investment	Determines how funds are being spent and whether these funds are being spent wisely	Peterson (1992)	Allocating money	<i>High:</i> Develops new procedures for monitoring the employee reimbursements in a large corporation.. <i>Medium:</i> Does payroll accounting for a midsize corporation. <i>Low:</i> Assesses whether net pay is correct after checking deductions.
Timeframe Estimation 43	Can estimate roughly how long it will take to accomplish certain tasks using knowledge of available material and personnel needed	Can tell how long it will take to complete a task	Peterson (1992)	Allocates time	<i>High:</i> Estimates how many people will need to be hired to complete development of a new aircraft. <i>Medium:</i> Determines how many months it will take to finish building a house. <i>Low:</i> Determines how long it will take to assemble a night stand.
Identification of Critical Periods 43	Can determine the points on a task or project where critical events requiring extra resources will occur	Can tell at what points in a project extra attention or extra help will be needed	Peterson (1992)	Allocates time	<i>High:</i> Determines when problems will arise in the development of an auto prototype. <i>Medium:</i> Determines when building schedules will require additional subcontractors. <i>Low:</i> Determines when failure to complete a task will affect others' work.

Table 4.7 (cont.)

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Scale Anchors
Prioritizing 43	Can identify those tasks or problems that require immediate attention and schedules or reschedules activities to address this issue	Knows what issues are important and deals with things accordingly	Peterson (1992)	Allocates time	<i>High:</i> Establishes the daily agenda for the President during a foreign crisis. <i>Medium:</i> Delays arrival at a routine meeting to deal with a serious personnel issue. <i>Low:</i> Completes tasks in the order specified by a supervisor.
Allocation of Time 43	Can allocate one's own and other's time to various tasks in a manner which will allow for their timely completion within the context of other ongoing activities	Allocates time to tasks in accordance with current needs	Peterson (1992)	Allocates time	<i>High:</i> Rearranges the schedules of personnel in a manufacturing plant to get a product to market on time. <i>Medium:</i> Determines how many person-hours will be needed to complete a consulting project. <i>Low:</i> Determines how long it will take to get a message to someone.
Obtaining and Allocating Material Resources 45	Identifies the materials, equipment, and facilities that need to be leased or purchased and allocates these in accordance with the needs of the organization	Determines what equipment, materials, or facilities need to be leased or purchased	Fleishman, Mumford, Zaccaro, Levin, Hein and Korotkin (1991)	Allocates material resources	<i>High:</i> Directs acquisition of new telecommunications equipment for a phone company. <i>Medium:</i> Identifies a new type of equipment that will reduce production time in an assembly plant. <i>Low:</i> Suggests changing a work rule to allow better distribution of shared tools and equipment.
Maintaining Material Resources 45	Ensures that materials, equipment, and facilities are in good working order, inspecting materials and arranging for repairs as necessary	Ensures that equipment, materials, and facilities are in good working order	Fleishman, Mumford, Zaccaro, Levin, Hein, and Korotkin (1991)	Allocates material resources	<i>High:</i> Proposes new occupational health and safety guidelines. <i>Medium:</i> Ensures that scheduled equipment maintenance has been done. <i>Low:</i> Makes sure that an engine has adequate oil.
Monitoring and Utilizing Material Resources 45	Ensures that equipment, materials, and facilities are used in the intended fashion and applied efficiently in completing requisite tasks	Ensures that materials, equipment, and facilities are used efficiently	Fleishman, Mumford, Zaccaro, Levin, Hein, and Korotkin (1991)	Allocates material resources	<i>High:</i> Develops a Quality Management program for a Fortune 500 company. <i>Medium:</i> Identifies changes in working procedures that will reduce material waste in a factory. <i>Low:</i> Ensures that rules involving equipment "sign-outs" are followed.

Table 4.7 (cont.)

Construct Label	Technical Definition	Operational Definition	Citations	SCANS Scales	Scale Anchors
Obtaining and Allocating Personnel Resources 45	Identifies and recruits people with expertise needed by the organization and assigns people to tasks calling for this expertise	Recruits and selects people needed to do the job	Fleishman, Mumford, Zaccaro, Levin, Hein, and Korotkin (1991)	Allocates material resources	High: Establishes a hiring system for a and development organization th promotes long-term growth. Medium: Identifies the candidates for job who seem to have the best overa qualifications. Low: Identifies who on a team has the replace a sick team member.
Motivating Personnel 46	Takes necessary actions needed to encourage others to complete a task using techniques such as goal setting, consensus building, etc.	Can motivate people to get the job done	Fleishman, Mumford, Zaccaro, Levin, Hein, and Korotkin (1991)	Allocates personnel resources Leadership	High: Creates an overriding vision for organization to guide it during a change. Medium: Identifies the kind of outcomes c rewards employees want and assi to projects likely to provide these outcomes. Low: Praises a co-worker who has don particularly good job.
Developing Personnel 46	Identifies the developmental needs of personnel and initiates actions needed to develop necessary skills	Teaches people things they need to know to get a job done	Fleishman, Mumford, Zaccaro, Levin, Hein, and Korotkin (1991)	Allocates personnel resources Leadership	High: Identifies the implications of tech changes for work force developm initiates requisite training. Medium: Instructs subordinates in a better complete a task. Low: Helps new co-worker learn office procedures.
Monitoring and Utilizing Personnel 46	Monitors personnel performance and providing requisite performance feedback as necessary and adjusting performance demands as indicated	Provides others with feedback about their performance and how to improve it	Fleishman, Mumford, Zaccaro, Levin, Hein, and Korotkin (1991)	Allocates personnel resources Leadership	High: Evaluates the strengths and weak senior staff and suggests assignm likely to maximize performance. Medium: Observes the performance of a w group and conducts performance sessions. Low: Identifies an error in someone el: products.

Methodology

The purpose of this study is threefold. **First**, to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. Using the results of an employer survey, the **second** purpose is to compare the employer opinions with a previous study of Nurses' opinions about the importance of various skills. **Third**, the results of the comparison are used to speculate about the implications of differences and place them into perspective. Survey research is the method selected for this study in order to address the first two research purposes. Results of the survey analysis will provide a basis to address the third purpose of this study.

Research Design and Survey Construction

The survey for this research was developed by following the O*NET model. Since the survey had already been tested, there was no need to pilot test it. The survey consisted of forty-six skill descriptions across six separate categories. Human Resource Directors and Directors of Nursing were asked to indicate the importance of that skill description as it pertains to the duties of Registered Nurses by assigning a value from 0 to 100.



As was alluded to earlier, there are some notable differences between this study and the procedures employed to create the O*NET results. First, this study is much smaller in scope than the O*NET study. O*NET is a national study where this one is limited to Texas. Also, O*NET sought information on several hundred occupations, while this study was only concerned with Registered Nurses. O*NET also used an employer list for their sample selection, but they surveyed the job incumbents or employees, not the employers. Finally, unlike the sampling procedure employed by

O*NET, this study surveyed the universe of Human Resource Directors or Directors of Nursing who work in Texas hospitals. Keeping these differences in mind, they do not make comparison between the two studies impossible or invalid. The comparison and contrast between the two studies will illustrate the differences in opinions between the supply of and demand for labor about the importance of various skills. Employer opinions represent the demand for nursing labor, while the O*NET study provides the supply of nursing labor perspective.

Table 4.8 is an actual copy of the survey instrument and it indicates how the survey was linked to the conceptual framework. Each of the descriptive categories and skill descriptors are listed in the conceptual framework, which are identical to those listed on the survey. Hence, there is a one-to-one relationship between every item in the conceptual framework and the survey instrument.

Table 4.8

Skills Survey 2002

For the survey form below, please indicate which skills you feel are necessary to perform the tasks of a Registered Nurse (RN) . Of those skills you have identified, rank their importance from 0 to 100 , with 0 being a skill that is not important and 100 being an extremely important skill to perform the tasks of a Registered Nurse.	
<i>Six Skill Categories of a Registered Nurse (RN)</i>	Rank Skills From 0 to 100
<u>Basic Skills</u>	
1. Understanding written sentences and paragraphs in work related documents. 2. Listening to what other people are saying and asking questions as appropriate. 3. Communicating effectively with others in writing as indicated by the needs of the audience. 4. Talking to others to effectively convey information. 5. Using mathematics to solve problems. 6. Using scientific methods to solve problems. 7. Using logic and analysis to identify the strengths and weaknesses of different approaches. 8. Working with new material or information to grasp its implications. 9. Using multiple approaches when learning or teaching new things. 10. Assessing how well one is doing when learning or doing something.	1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____
<u>Social Skills</u>	
11. Being aware of others' reactions and understanding why they react the way they do. 12. Adjusting actions in relation to others' actions. 13. Persuading others to approach things differently. 14. Bringing others together and trying to reconcile differences. 15. Teaching others how to do something. 16. Actively looking for ways to help people.	11. _____ 12. _____ 13. _____ 14. _____ 15. _____ 16. _____
<u>Complex Problem-Solving Skills</u>	
17. Identifying the nature of problems. 18. Knowing how to find information and identifying essential information. 19. Finding ways to structure or classify multiple pieces of information. 20. Reorganizing information to get a better approach to problems or tasks. 21. Generating a number of different approaches to problems. 22. Evaluating the likely success of an idea in relation to the demands of the situation. 23. Developing approaches for implementing an idea. 24. Observing and evaluating the outcomes of a problem solution to identify lessons learned or redirect efforts.	17. _____ 18. _____ 19. _____ 20. _____ 21. _____ 22. _____ 23. _____ 24. _____
<div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> Labor Market Information A Member of the Texas Workforce Network </div>  </div>	

June 21, 2002

Table 4.8 (cont.)

<i>Six Skill Categories of a Registered Nurse (RN)</i>	Rank Skills From 0 to 100
<u>Technical Skills</u>	
25. Analyzing needs and product requirements to create a design.	25. _____
26. Generating or adapting equipment and technology to serve user needs.	26. _____
27. Determining the kind of tools and equipment needed to do a job.	27. _____
28. Installing equipment, machines, wiring, or programs to meet specifications.	28. _____
29. Writing computer programs for various purposes.	29. _____
30. Conducting tests to determine whether equipment, software, or procedures are operating as expected.	30. _____
31. Watching gauges, dials, or other indicators to make sure a machine is working properly.	31. _____
32. Controlling operations of equipment or systems.	32. _____
33. Inspecting and evaluating the quality of products.	33. _____
34. Performing routine maintenance and determining when and what kind of maintenance is needed.	34. _____
35. Determining what is causing an operating error and deciding what to do about it.	35. _____
36. Repairing machines or systems using the needed tools.	36. _____
<u>Systems Skills</u>	
37. Developing an image of how a system should work under ideal conditions.	37. _____
38. Determining when important changes have occurred in a system or are likely to occur.	38. _____
39. Determining the long-term outcomes of a change in operations.	39. _____
40. Identifying the things that must be changed to achieve a goal.	40. _____
41. Weighing the relative costs and benefits of a potential action.	41. _____
42. Looking at many indicators of system performance, taking into account their accuracy.	42. _____
<u>Resource Management Skills</u>	
43. Managing one's own time and the time of others.	43. _____
44. Determining how money will be spent to get the work done, and accounting for these expenditures.	44. _____
45. Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.	45. _____
46. Motivating, developing, and directing people as they work, identifying the best people for the job.	46. _____
<p>The results from this survey will be disseminated in the aggregate to ensure that all respondents and their responses be kept anonymous. Please respond by July 12, 2002.</p>	

Contact LMI by:
 Phone: 1-512-491-4818
 E-mail: skills.survey@twc.state.tx.us
 Fax: 1-512-491-4917
 Mail: 9001 N. IH35, Austin, Tx. 78753, Attn: Skills Survey

Survey Instrument

A self-administered survey was used to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. A survey, cover letter, and return envelope were mailed to 333 Human Resource Directors and Directors of Nursing throughout Texas. **Appendix A** provides a copy of the cover letter, and **Table 4.8** provides a copy of the survey instrument. A web page (<http://www.twc.state.tx.us/lmi/surveys/rnskills/index.html>) was also created that contained a copy of the cover letter and a copy of the survey that could be printed and faxed or sent as an email attachment to skills.survey@twc.state.tx.us. **Appendix C** provides a copy of the web page. The surveys were mailed and the website and email address were launched on June 24, 2002. Respondents were asked to reply by July 12, 2002. Phone calls were made during the weeks of July 8th-12th and 15th-19th to remind the Human Resource Directors and Directors of Nursing about the survey.

Response Rates

Surveys were mailed to Human Resource Directors and Directors of Nursing for General Medical and Surgical hospitals in the state of Texas. Respondents were given three weeks to send their reply. One hundred and four surveys were returned completed with usable data for a response rate of just over 31%.

Sample Selection

The EXPO File⁷ was used to identify all employers within the General Medical Services Hospital industry, public and private. A total of 369 employers were identified, but 36 were excluded because they had out-of-state addresses⁸.

Strengths

The main reason for using survey research is that it is an effective method of reaching several possible respondents (Human Resource Managers), over a broad geographical area, to determine what skills they look for in prospective employees. Babbie states (1998, p.256) that survey research is an excellent technique to use if the study is descriptive, exploratory, and explanatory, and if individuals are the main unit of analysis. Shields also explains some advantages of survey research for descriptive studies. "Often the student can develop questionnaires from the categories, the literature and experience (when they can argue that the literature left something important out)" (Shields, 1998, pg. 218). The observations stated above describe some **strengths** to using the survey method in addressing this study's research question.

Weaknesses

There are some inherent **weaknesses** in survey research. Sample selection and response rates often challenge the validity of survey results. Poor sample selection can lead to divergence of the sample population from the general population and skew results.

⁷ All employers who are covered by Unemployment Insurance (UI) and listed in the Covered Employment and Wages Program were surveyed. The Covered Employment and Wages Program is "a cooperative program involving the State Employment Security Agencies (SESAs) and the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor." (ES-202 pg. 1-1)

⁸ These were corporate offices, not functioning hospitals in Texas.

If the response rate is particularly low, then one might have a difficult time arguing that the results from the sample responses are representative of a larger population. Another problem with surveys is that the respondents might not answer honestly due to a number of reasons. Human Resource Directors might respond by claiming that they require a very high level of skill for the occupation surveyed with the expectation that Workforce Development Boards would use their funds to ensure that people could be trained to obtain the identified skill requirements. Even though there may be some minor inherent weaknesses to survey research, a survey was deemed to be the most appropriate research technique to use for this study.

Statistical Procedures

The **statistical tests** that were conducted measured frequencies and simple means in order to describe the opinions of employers concerning the importance of various skills. One-Sample t-tests were used to determine if any significant differences exist between the two sets of data. The results of the t-tests and a complete listing of all skill descriptions and corresponding survey/O*NET scores are listed in **Appendix B**. Chapter 5 discusses the results of statistical analysis.

CHAPTER 5

Results

The purpose of this study is threefold. **First**, to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. Using the results of an employer survey, the **second** purpose is to compare the employer opinions with a previous study of Nurses' opinions about the importance of various skills. **Third**, the results of the comparison are used to speculate about the implications of differences and place them into perspective. The results are presented in this chapter.

Analysis of Survey Results

The first purpose of the survey was to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. In order to address the first purpose of this study, survey questions were developed to determine the level of importance placed on a variety of universal skills. The survey responses were then compared to the O*NET responses in order to address the second research purpose. The results of the comparison are used to speculate about the implications of differences and place them into perspective. The following describes the results of the study and analysis of the data that was collected. The six descriptive categories from the conceptual framework are shown on Table **5.1**. The most important skills identified by the survey results and O*NET scores for each descriptive category is listed. **Table 5.2** shows the top ten skills identified by each group across all categories. Twenty skills with the largest score differences are also listed for the purpose of further comparison.

Table 5.1--Survey Results

Top 5 Basic Skills			
Employers		Employees (O*NET)	
Skill	Score	Skill	Score
Active Listening	97	Speaking	79
Speaking	97	Reading Comprehension	73
Reading Comprehension	93	Critical Thinking	71
Writing	93	Active Listening	69
Active Learning	91	Writing/Science/Monitoring*	65

* skills at the bottom of the list tied with the same score.

Top 3 Social Skills			
Skill	Score	Skill	Score
Instructing	93	Service Orientation	79
Service Orientation	92	Social Perceptiveness	73
Social Perceptiveness	91	Coordination	71

Top 6 Complex Problem Solving Skills			
Skill	Score	Skill	Score
Problem Identification	94	Problem Identification	67
Information Gathering	94	Information Gathering	60
Solution Appraisal	91	Information Organization	54
Information Organization	90	Solution Appraisal	54
Synthesis/Reorganization*	89	Idea Evaluation*	50
Idea Evaluation*	89	Implementation Planning*	50

* skills at the bottom of the list tied with the same score.

Top 5 Technical Skills			
Skill	Score	Skill	Score
Operation Monitoring	88	Equipment Selection	46
Equipment Selection	84	Operation Monitoring	42
Product Inspection	76	Operation and Control	42
Technology Design	75	Product Inspection	31
Operation and Control	74	Operations Analysis	29

Top 3 Systems Skills			
Skill	Score	Skill	Score
Identification of Key Causes	80	Judgment and Decision Making	73
Judgment and Decision Making	77	Systems Perception	52
Systems Evaluation	76	Identification of Key Causes	52

Top 2 Resource Management Skills			
Skill	Score	Skill	Score
Time Management	94	Time Management	63
Management of Personnel	90	Management of Personnel	54

Table 5.2--Top Ten Most Important Skills & Largest Importance

Top 12 Skills Across All Categories
--

Employers		Employees (O*NET)	
Skill	Score	Skill	Score
Active Listening*	97	Speaking*	79
Speaking*	97	Service	79
		Orientation*	
Problem Identification*	94	Reading Comprehension*	73
Information Gathering	94	Social Perceptiveness*	73
Time Management	94	Judgment and Decision Making	73
Reading Comprehension*	93	Critical Thinking	71
Writing*	93	Coordination	71
Instructing	93	Active Listening*	69
Service Orientation*	92	Problem Identification*	67
Active Learning	91	Writing*	65
Social Perceptiveness*	91	Science	65
Solution Appraisal	91	Monitoring	65

* skill is identified on both lists.

▫ skills at the end of the list tied with the same score

Skills Listed By Largest Differences Between Comparison Groups

Negotiation	66
Persuasion	61
Mathematics	60
Troubleshooting	58
Management of Financial Resources	57
Synthesis/Reorganization	56
Technology Design	54
Idea Generation	47
Operation Monitoring	46
Product Inspection	45
Equipment Maintenance	43
Learning Strategies	40
Management of Material Resources	40
Idea Evaluation	39
Equipment Selection	38
Solution Appraisal	37
Information Organization	36
Implementation Planning	36
Installation	36
Management of Personnel Resources	36

Differences were calculated by subtracting O*NET from employer survey scores.

The top portion of **Table 5.1** indicates the top five **Basic** skills that employers and Nurses feel are most important. Active Listening, Speaking, Reading Comprehension, and Writing are among the top five skills listed for both employers and Nurses. Both groups agree on some of the most important **Basic** skills, but they don't agree on all skills. Employers indicated that Active Learning is extremely important, while Nurses indicated that Critical Thinking is more important. This difference in opinion illustrates the point that employers value the ability to learn new information and grasp its implications. Working nurses, on the other hand, feel that it's more important for them to be able to use logic and analysis to identify strengths and weaknesses of different approaches.

Service Orientation, and Social Perceptiveness are two **Social** skills that are valued the most by both Nurses and Directors of Nursing/Human Resource Directors. The highest employer score for a **Social** skill went to Instructing, while Service Orientation was most valued by Nurses. Nurses identified Coordination as an important skill to perform their daily tasks but employers did not list it. It's not difficult to understand why a Nurse would need to be service oriented and socially perceptive; although, employers more highly valued a Nurse's ability to teach others how to do something. Working Nurses felt that adjusting their actions in relation to the action of others was a more important skill to have.

The **Complex Problem Solving** skill category indicated that employers and Nurses both feel that Problem Identification and Information Gathering are the two most important skills, respectively. Also, Solution Appraisal and Idea Evaluation are viewed by both groups as important skills for Nurses. Employers viewed Synthesis/Reorganization, or the ability to reorganize information to better approach

problems or tasks as an important skill for Nurses. Implementation Planning was seen as a more important skill to working Nurses as it deals with the practical developing approaches for implementing an idea. Even though these last two skills were rated differently between groups, they are somewhat similar in definition.

Four of the top five **Technical** skills are common for both employers and Nurses. Operation Monitoring, Equipment Selection, Product Inspection, and Operation and Control were all identified as the most important **Technical** skills by both groups. The survey results show that employers feel that Technology Design is an important skill, but working Nurses valued Operations Analysis more highly. On the surface, one might not associate Technology Design with nursing. Closer examination of the definition illustrates that it has to do with adapting equipment and technology to serve user needs, which has practical nursing application.

Nurses also recognized two of the three **Systems** skills identified as important to employers. Identification of Key Causes and Judgment and Decision Making skills were viewed by both groups as important for working Nurses. Employers valued Systems Evaluation skills while Nurses felt that Systems Perception was more important. Hence, employers valued a nurse's ability to look at many indicators of system performance, taking into account their accuracy. Nurses felt that determining when important changes have occurred in a system or are likely to occur is more important to carrying out their duties.

Time Management and Management of Personnel were both rated as the most important **Resource Management** skills by both employers and Nurses. Both skills refer to management of others. As Nurses earn experience and tenure, it can be ascertained that they will be asked to take on supervisory roles.

When reviewing the upper portion of **Table 5.2, *Top 10 Skills Across All Categories***, it becomes apparent that employers and Nurses value **Basic, Social, and Complex Problem Solving** skills more than other categories. The top four skills for employers are either **Basic** or **Complex Problem Solving** skills. The top four for Nurses are either **Basic** or **Social** skills. Hence, employers value the capacity to solve ill-defined problems in complex, real world settings while Nurses value working with people to achieve goals. Employers appreciate the theoretical whereas Nurses value the practical application of skills.

Examination of the bottom part of **Table 5.2** reveals some interesting differences of opinion. The third largest discrepancy of mean scores is “mathematics.” Employers value this skill while Nurses place a much lower level of importance on it. This difference could be caused by an overemphasis placed on this skill by employers or an aversion to it by Nurses. A majority of the largest discrepancies are in the Technical skills category. Nurses did not see Technical skills, as a whole, as very important to performing their daily tasks. Employers viewed some of these skills as important, but many scored below seventy. Further examination of the data reveal that even though there are vast differences between the mean scores for employers and Nurses, their opinions bear out more agreement than disagreement.

The charts on the following pages are provided to give a general trend of opinions while comparing employers and Nurses. Each descriptive category is examined and bar charts are used to visually illustrate the survey and O*NET mean scores.

Chart 5.3

Basic Skills Comparison

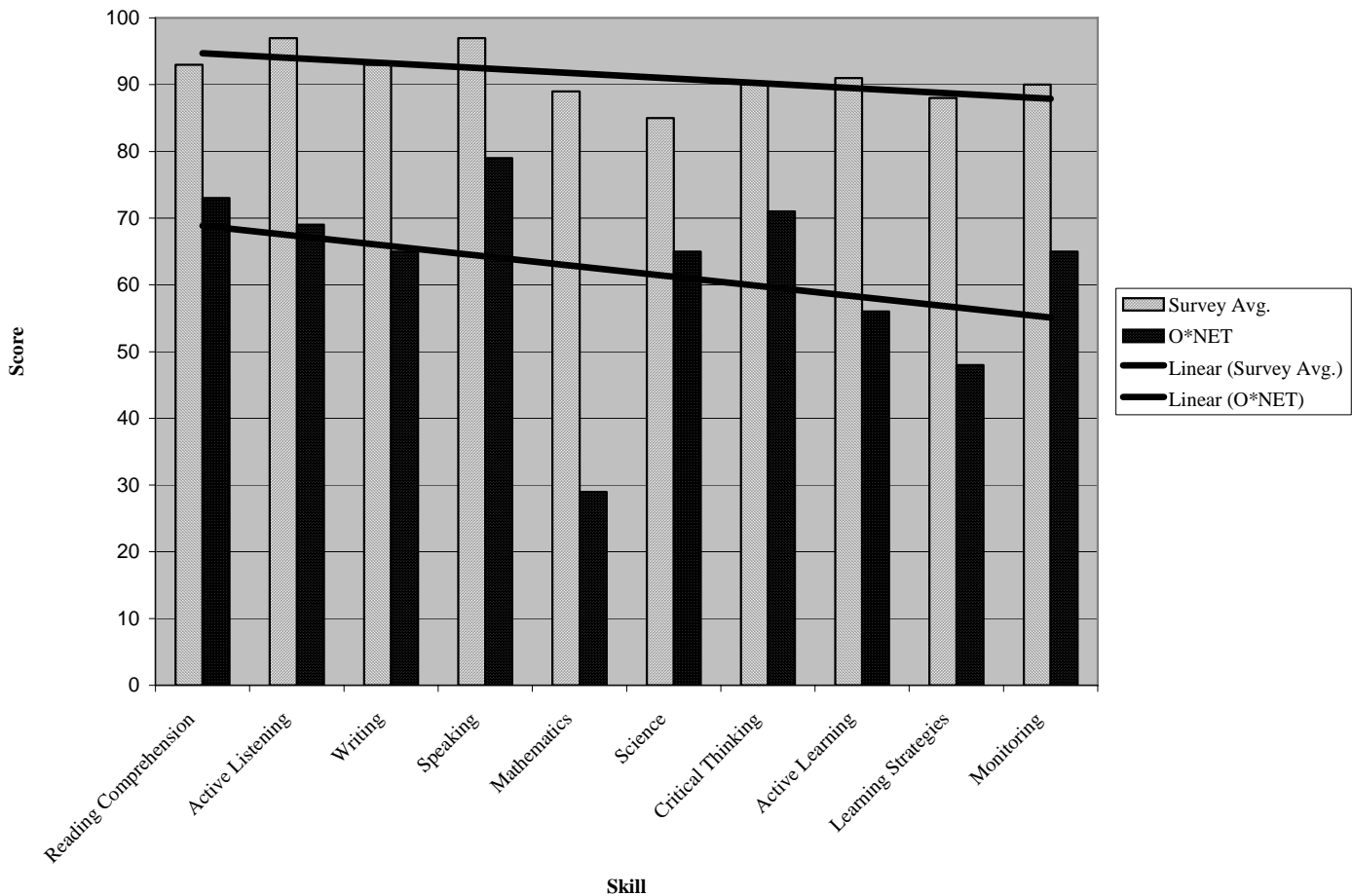


Chart 5.3 reveals that all skills in this category are at least sixteen points different. It is interesting to note that even though the scores are very different, they track along together fairly closely with only a few exceptions. Linear trend lines⁹ are used to illustrate that even though the mean scores are vastly different, the general opinions on the importance of Basic skills are virtually the same.

⁹ The lines on Charts 5.3-5.8 are quasi-trend lines. They are meant to show that the distance between the two responses was more or less consistent.

Chart 5.4

Social Skills Comparison

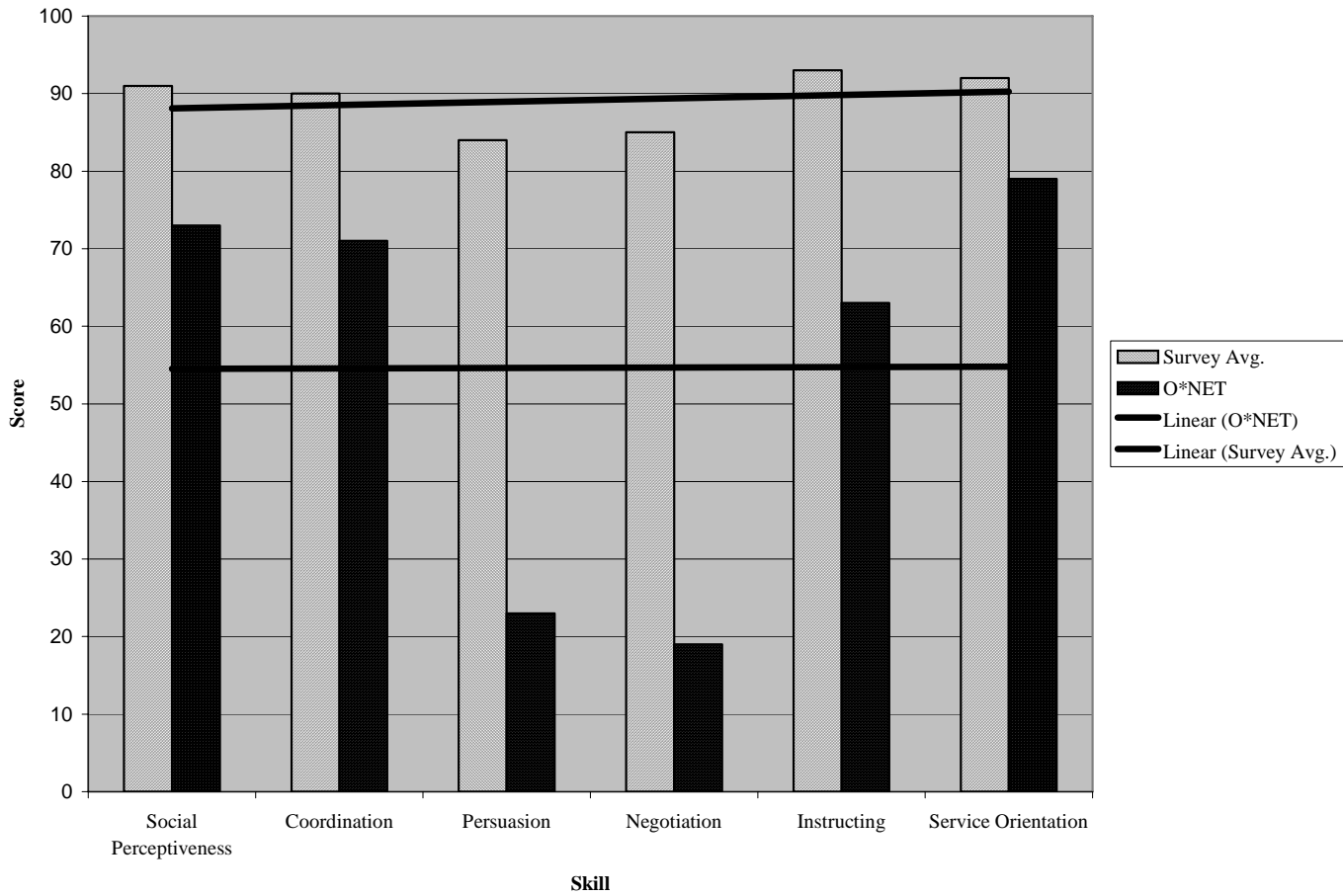


Chart 5.4 shows that there are large differences in attitudes about the importance of Persuasion, and Negotiation skills. Service Orientation is the one skill in this category where both mean scores are even remotely close to one another. Again, linear trend lines are used to show agreement about the relative importance of each skill to employers and Nurses. Notice, the trend lines are close to parallel.

Chart 5.5

Complex Problem Solving Skills Comparison

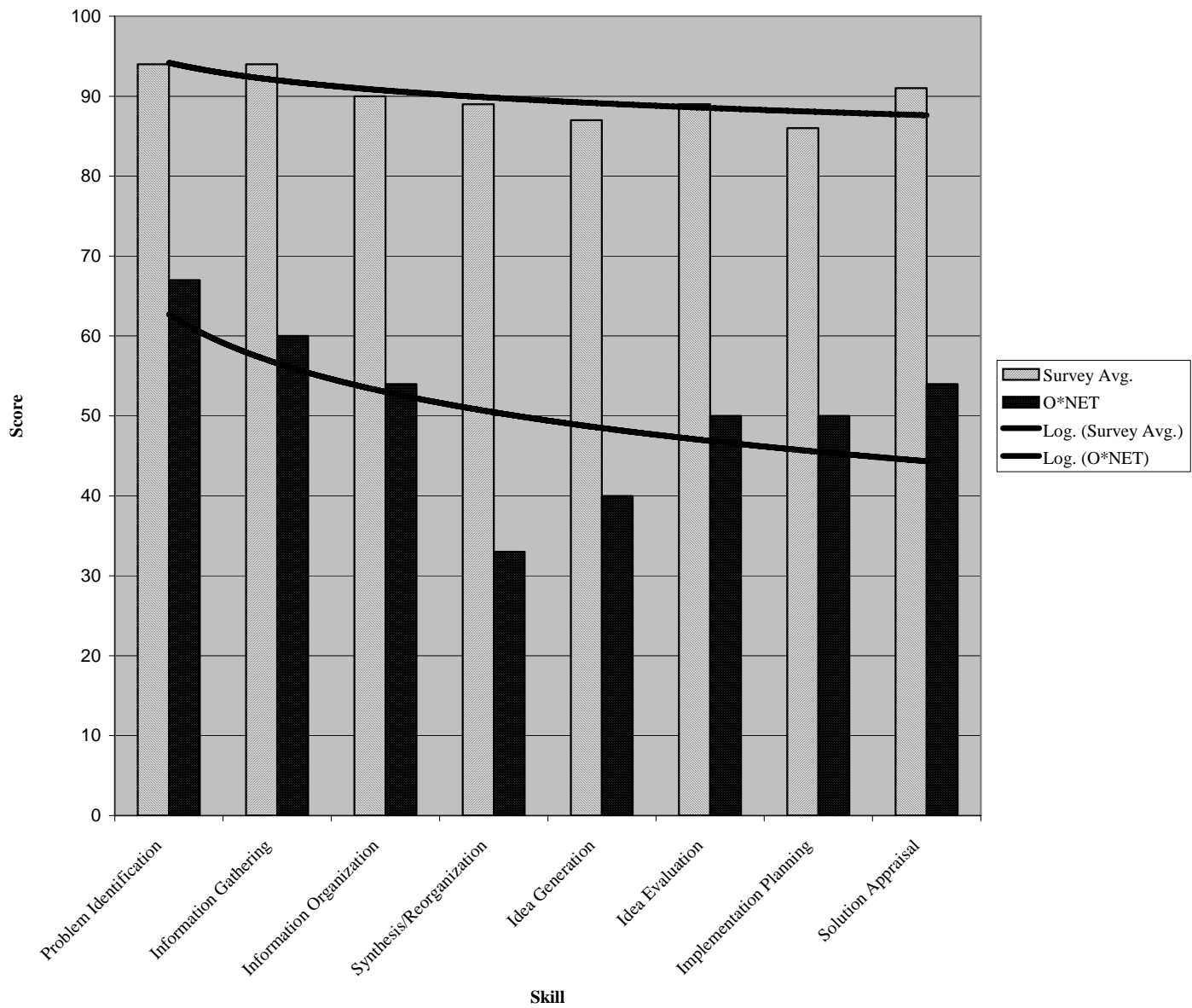


Chart 5.5 displays the same tracking characteristic as the other charts. The survey mean scores and the O*NET mean scores move in the same direction across nearly every skill in this category.

Chart 5.6

Technical Skills Comparisons

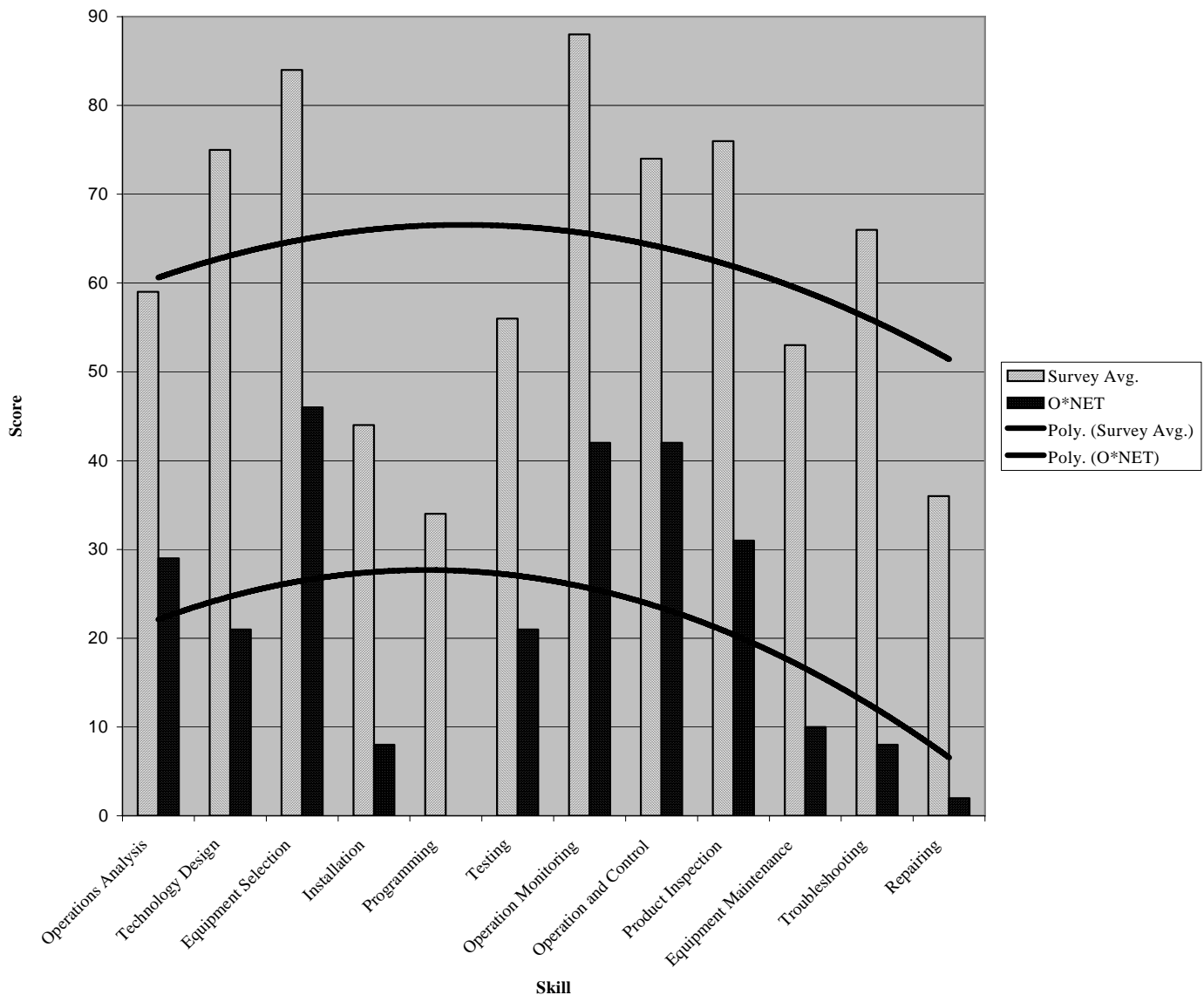


Chart 5.6 reveals that the greatest amount of variation between the two sets of mean scores is found in this category. A Polynomial trend line was used to show similarity between employer and Nurses' opinions of Technical skills. Programming was the only skill that received a score of 0 in the O*NET study for Registered Nurses.

Chart 5.7

Systems Skills Comparisons

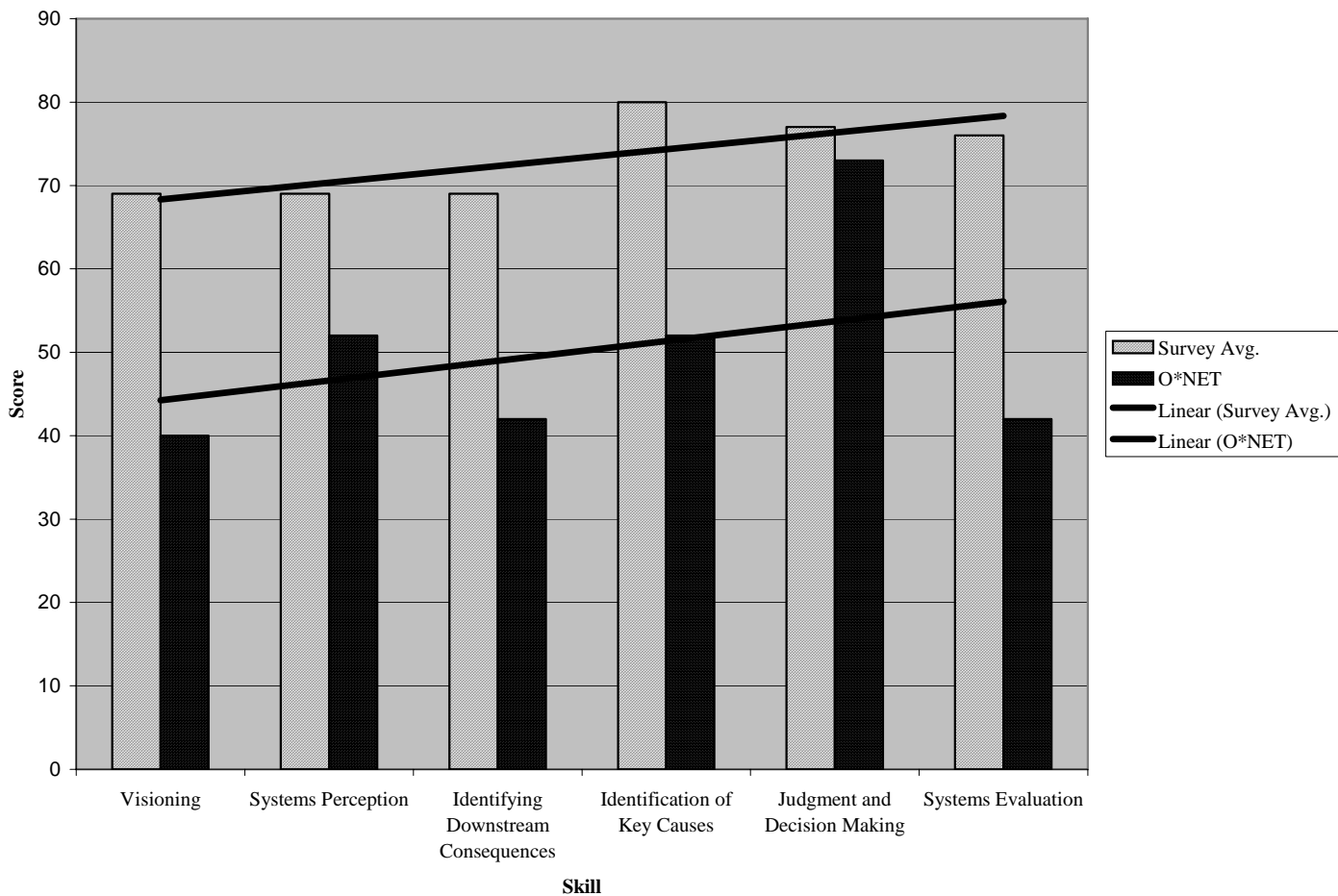


Chart 5.7 illustrates that the O*NET averages show much more variation, while the survey averages remain fairly static; all skills scored in the high 60's to 80 range. However, when a linear trend line is introduced, the two sets of data are remarkably similar.

Chart 5.8

Resource Management Skills Comparisons

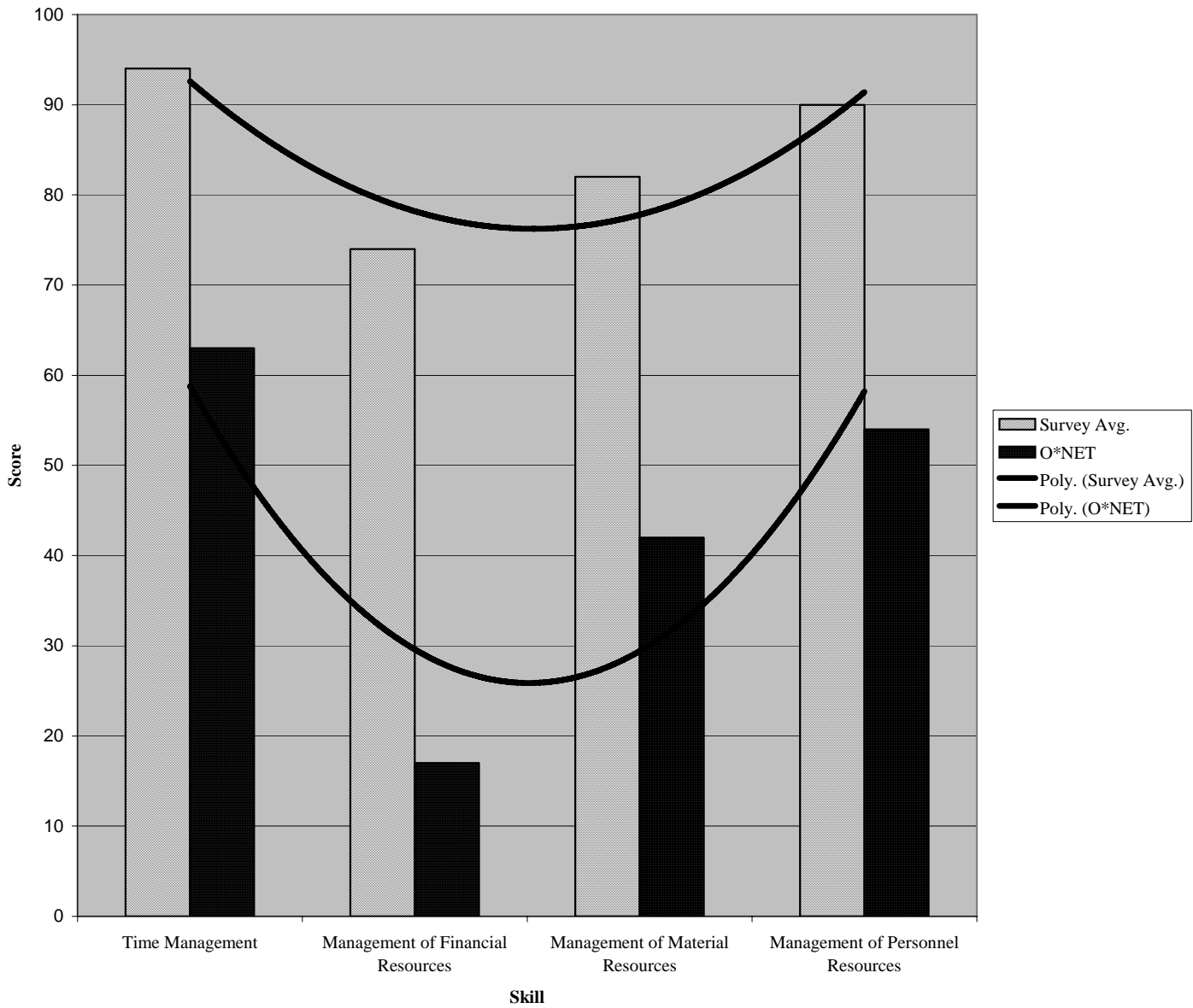


Chart 5.8 reveals that the two sets of mean scores move in the same direction across all skills in this category. Here again, a much greater level of importance was placed on Resource Management Skills by the survey mean scores than the O*NET

averages. The biggest difference in mean scores exists in the Management of Financial Resources.

This chapter presented the results of the survey used to describe the opinions of Human Resource Directors and Directors of Nursing of Texas hospitals concerning the relative importance of required skills for Registered Nurses (RN). The survey responses were then compared to the O*NET responses in order to address the second research purpose. Chapter 6 attempts to speculate about the implications of differences and place them into perspective in order to make recommendations to Workforce Development Boards.

Chapter 6

Conclusion

The first purpose of the survey was to describe the opinions of employers about the relative importance of generic and specific skills used by Nurses. In order to address the first purpose of this study, survey questions were developed to determine the level of importance placed on a variety of universal skills. The survey responses were then compared to the O*NET responses in order to address the second research purpose. The results of the comparison are used to speculate about the implications of differences and place them into perspective. This chapter attempts to provide some explanations for the overall results and make recommendations concerning RN training programs to Workforce Development Boards and provide possible areas for future study.

Of the six skills categories, employers placed a higher level of importance on **Basic**, **Complex Problem Solving**, and **Social** skills respectively. The skills that employers rated at the top of each of these categories all scored in the nineties. Two of the four **Resource Management** skills scored in the nineties as well. According to the survey results, it can be said that employers place a higher level of importance on skills in these four descriptive categories. And within each category, employers feel that these skills are the most important for their Registered Nurses to possess. So, how do Human Resource Directors and Directors of Nursing of Texas hospitals' opinions differ from those of their working Nurses?

At first glance, the importance scores for all skills across the six skill categories appear vastly different. Survey responses indicated that across all skills categories, employers placed a much higher level of importance on skills than the Registered Nurses who responded to the O*NET survey. One possible explanation is that employers

generally place greater importance on skills than their employees. With greater skills of their workers, the less training and employee development employers will have to pay for in the future. Another possible explanation would be that Human Resource Directors and Directors of Nursing do not regularly perform the duties of a Registered Nurse, therefore, they are not as “in touch” with skill requirements as their nurses. Also, the survey respondents were not told about the O*NET model and the importance indicator for Registered Nursing skills, but these facts were withheld because they might have influenced their responses. **Charts 5.3 through 5.8** illustrate the point that even though the scores are different, employers and working Nurses have similar opinions about the importance of the various skills in each category. In comparing the two sets of importance scores, one must consider that these valuations come from two completely different groups. It can be expected that two groups as opposite as employers and employees would hold different opinions about a variety of topics. So, it’s not difficult to understand why the importance scores are so different for employers and working Nurses across forty-six skill definitions. Even though these scores are vastly different, there is agreement on the most important skill categories and the most important skills within each category. The few differences that appear are thought provoking, but a trend begins to emerge upon closer inspection.

The lists of most important skills identified by employers and working Nurses have a lot in common with only a few notable differences. As stated earlier, Nurses take a more practical approach to assigning importance of skills. Using logic to solve problems, adjusting action in relation to others, and developing an approach to implement an idea are just a few of the most important skills identified by Nurses. Employers placed a higher value on understanding implications of new information for future use,

teaching others, reorganizing information to better approach problems, and adapting equipment to serve user needs. Working Nurses appreciate the practical whereas employers favor the theoretical or abstract thinking.

The only recommendation that can be offered is that Workforce Development Boards try to provide more training and education on abstract thinking skills. Case in point, **Mathematics** is one skill that was rated highly among employers and not so highly with working Nurses. There is an apparent chasm in attitudes on the importance of skills between Registered Nurses and Human Resource Directors and Directors of Nursing. The challenge to education and training providers is to close that gap by either changing attitudes of employers or providing more comprehensive training to Registered Nurses.

Recommendations for Future Research

This study was primarily concerned with describing opinions of employers on the importance of various skills, but no attention was paid to why employers feel the way they do. A possible area of future study would be to build on the results of this study by attempting to answer why employers feel the way they do about certain skills. Also, one could build on the results of the O*NET study to find justification for why working Nurses feel the way they do about the importance of various skills. Both of the above suggestions would take considerable time and effort, but would go a long way in determining why opinions vary so much between employers and working Nurses.

Hospital employers are demanding more of their Registered Nurses, as a Doctor's time is more expensive. As health care costs rise, hospital employers will seek to find ways to cut those costs. Lowering labor costs through shifting duties to lower-paid employees is a real possibility. As new procedures and technology emerge, new skills will be required to keep pace with these changes. Registered Nurses are faced with many

challenges in a dynamic health care industry, and greater skill development will only solidify their importance and ability to deliver quality health care.

Appendix A

June 21, 2002

Dear Human Resources Director,

The Labor Market Information Department of the Texas Workforce Commission is currently conducting a Skills Survey. This study seeks to determine the relative importance of skills for registered nurses (RN's) as ranked by the Human Resource Directors of Texas Hospitals. The survey results will be used to make recommendations about training for RN's.

Your participation is essential in addressing the needs discussed above. Survey responses will be aggregated and shared with various federal, state, and local organizations that are concerned with workforce development. Our goal is to identify those skills that are most necessary for RN's and make recommendations to help develop the associated curriculum. The brief time spent filling out the survey could translate into a better-prepared workforce with potential cost saving for upgrading the skills of RN's.

Responses are due by July 12, 2002. No individual or employer will be identified, in the published survey results. A return envelope is enclosed, or you may respond by going to www.texasworkforce.org/lmi/surveys/rnskills and save the survey to your computer's hard drive. Once saved, fill out the survey form and email as an attachment to skills.survey@twc.state.tx.us. If you have any questions, you may call John Villarreal at (512) 491-4818 or email him at john.villarreal@twc.state.tx.us.

Thank you for your time and consideration. Your participation in this survey will help build a better-trained workforce! If you would like a copy of the survey results, please e-mail your address to skills.survey@twc.state.tx.us.

Sincerely yours,

James Barnes, Director
Labor Market Information Department

Appendix B--Survey Results

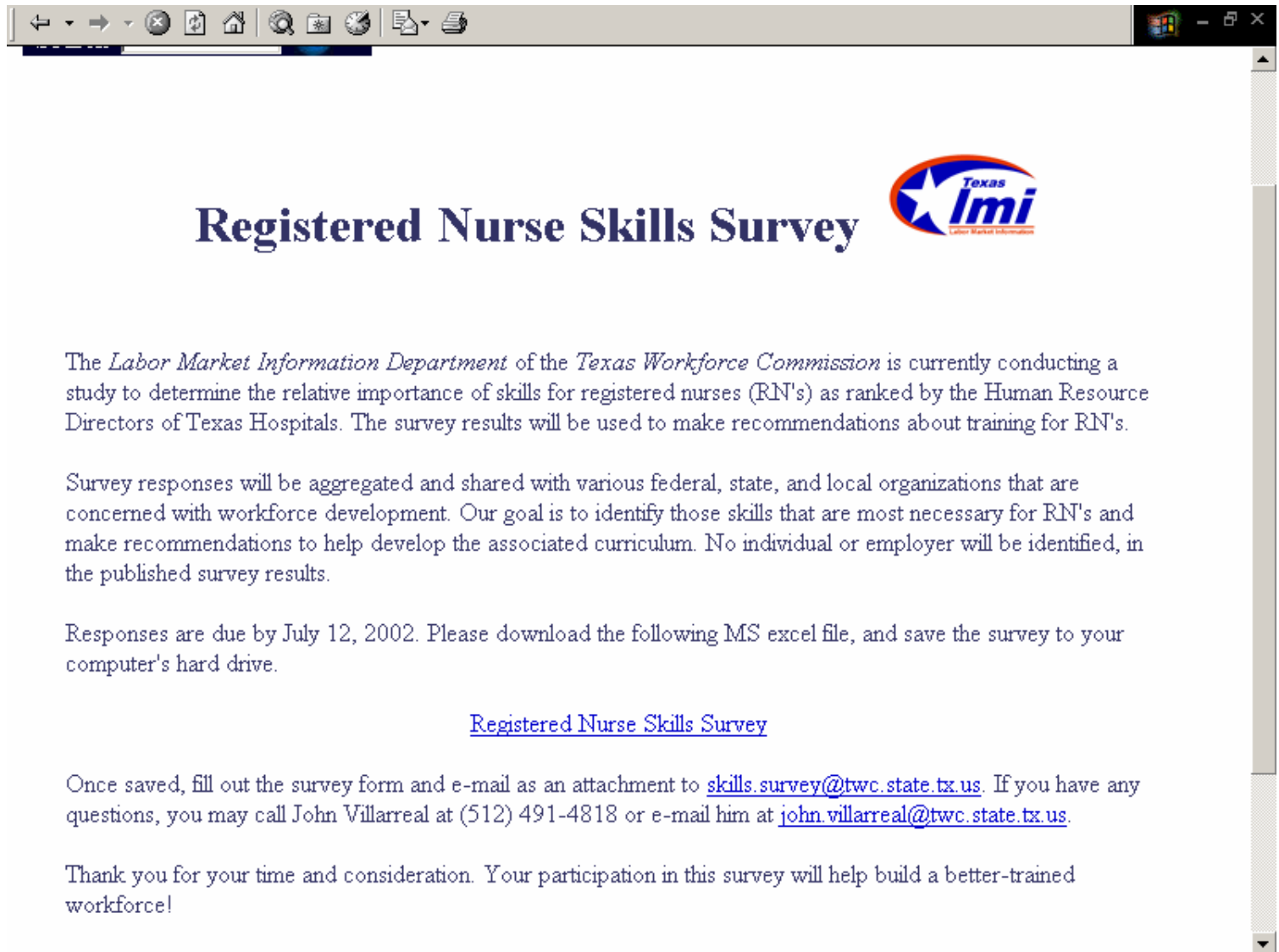
<u>Skill Category</u>		<u>Srvy Avg.</u>	<u>O*NET</u>	<u>t-test value</u>	<u>Sig. Level</u>
Basic Skills					
1	Reading Comprehension	93	73	10.81	0.000
2	Active Listening	97	69	37.90	0.000
3	Writing	93	65	23.44	0.000
4	Speaking	97	79	27.19	0.000
5	Mathematics	89	29	36.87	0.000
6	Science	85	65	11.08	0.000
7	Critical Thinking	90	71	14.11	0.000
8	Active Learning	91	56	35.60	0.000
9	Learning Strategies	88	48	26.48	0.000
10	Monitoring	90	65	16.80	0.000
Social Skills					
11	Social Perceptiveness	91	73	11.69	0.000
12	Coordination	90	71	12.49	0.000
13	Persuasion	84	23	36.14	0.000
14	Negotiation	85	19	39.79	0.000
15	Instructing	93	63	26.81	0.000
16	Service Orientation	92	79	10.57	0.000
Complex Problem Solving Skills					
17	Problem Identification	94	67	21.83	0.000
18	Information Gathering	94	60	32.91	0.000
19	Information Organization	90	54	22.49	0.000
20	Synthesis/Reorganization	89	33	41.72	0.000
21	Idea Generation	87	40	34.23	0.000
22	Idea Evaluation	89	50	33.09	0.000
23	Implementation Planning	86	50	23.58	0.000
24	Solution Appraisal	91	54	30.99	0.000
Technical Skills					
25	Operations Analysis	59	29	9.83	0.000
26	Technology Design	75	21	21.98	0.000
27	Equipment Selection	84	46	17.26	0.000
28	Installation	44	8	10.93	0.000
29	Programming	34	0	10.30	0.000
30	Testing	56	21	9.97	0.000
31	Operation Monitoring	88	42	24.80	0.000
32	Operation and Control	74	42	10.38	0.000
33	Product Inspection	76	31	16.40	0.000
34	Equipment Maintenance	53	10	11.75	0.000
35	Troubleshooting	66	8	18.41	0.000
36	Repairing	36	2	9.60	0.000
Systems Skills					
37	Visioning	69	40	10.52	0.000
38	Systems Perception	69	52	6.46	0.000
39	Identifying Downstream Consequences	69	42	9.44	0.000
40	Identification of Key Causes	80	52	13.07	0.000
41	Judgment and Decision Making	77	73	1.94	0.055
42	Systems Evaluation	76	42	13.59	0.000

Appendix B (cont.)

<i>Resource Management Skills</i>					
43	Time Management	94	63	33.10	0.000
44	Management of Financial Resources	74	17	24.15	0.000
45	Management of Material Resources	82	42	20.39	0.000
46	Management of Personnel Resources	90	54	22.49	0.000

As illustrated by the table above, all skill comparisons except one were statistically significant at the .001 level. The survey responses showed a much higher level of importance placed on all skills except Judgement and Decision Making, which shows no statistically significant difference

Appendix C



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