A COMPARISON BY JOB CATEGORY OF EDUCATIONAL SKILL LEVELS, APTITUDES AND TEMPERAMENTS BY EMPLOYERS, EMPLOYEES AND DICTIONARY OF OCCUPATIONAL TITLES IN GARFIELD COUNTY OKLAHOMA

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CHAPTER I

INTRODUCTION

The changing workforce is one of the most significant challenges facing organizations today. Our society is changing quickly, and the changes within the current and future workforce have the potential to affect many aspects of workforce development. During the last decade, reformers have increasingly emphasized the importance of standards in both education and in the workplace. Standards have been developed in many academic subject areas, and educators and employers are working together to develop industry and occupational skill standards. However, there has been little interaction and communication between those concerned with identifying and developing worker aptitudes and skills and those working on industry skill standards.

Wages for lower-skilled jobs requiring little education have significantly declined in the last two decades. Higher levels of education are now required for jobs with wages adequate to support a family. In the past, many employers admitted they only needed entry-level workers who were prompt and would follow orders. Now, many state that they want workers who can solve problems, work in more uncertain and less well-defined circumstances, and take initiative and responsibility (Bailey, 1995). A labor market survey in Tulsa, Oklahoma, found that while the high school graduation rate is about 90%, more than 50% of those graduates go directly into the job market (Smith, 1996).

These scenarios suggest that expectations for potential employers is increasing, yet there is a major portion of the workforce who are undereducated for the demands of the job market today (Smith, 1996).

It is widely believed that an improved system of skill standards and certification is essential for improving the fit between what is learned in school and what is needed on-the-job, facilitating the movement from school to work, and ultimately strengthening the country's economic position (Commission on the Skills of the American Workforce, 1990). Industry-based skill standards are believed to be a crucial component of that movement. Advocates not only argue that skill standards will strengthen the educational system, but that they will also become a critical part of reform efforts in the workplace. Both the U.S. education system and conceptions of work have traditionally been based on a series of dualities that distinguish mental activities from physical activities, theoretical from practical, academic from vocational, and job conception from job execution (Bailey and Merritt, 1998).

In 1997, the Enid/Garfield County Development Compact was formed with the mission of recruiting and retaining quality jobs in Enid and Garfield County. A study of the existing businesses was proposed by the newly formed Development Compact to determine future direction for workforce development in Garfield County.

It was apparent that the employers' expectations of employees, due to the changing requirements of skill levels needed in industry, had not been determined. There was a need to determine the educational skill levels and aptitudes employers perceived as needed for employment. This initial area was identified as the first step in addressing the retention and recruiting future jobs. The Development Compact direction could be

enhanced by comparing the employer data to the potential employee's educational skill levels and aptitudes assessments. Additional information could be derived by comparing the perceptions of employers to basic educational skill levels and aptitudes by job categories as defined by the U.S. Department of Labor in the Dictionary of Occupational Titles. To establish the pool for potential workforce, the pre-employment educational skill level and aptitude averages of persons taking the SAGE skill level assessment at Autry Technology Center was utilized. This information would be important in determining the future direction of the Enid/Garfield County Compact in the identifying of critical areas relevant to recruiting and retaining quality jobs. Autry Technology Center could also use this information in determining the curriculum need of existing and future training programs.

Statement of the Problem

Because there is a concern of identifying, recruiting, and retaining quality jobs in Enid and Garfield County, a study of educational skill levels, aptitudes and temperaments critical to job development was deemed timely. In addition, the absence of studies that compared by job categories the average educational skill levels and aptitudes of people seeking employment training to the levels required for employment, as indicated by employers, and compared to the requirements as defined in the Dictionary of Occupational Titles indicated a need for this study. The study will be of value in assisting the Enid/Garfield County Development Compact in identifying workforce development needs that will benefit both employees in employment opportunities and employers in recruiting and retaining jobs. This information will be valuable to Autry

and retaining jobs. This information will be valuable to Autry Technology Center in the planning of future training programs and services available to clients.

Purpose

The purpose of this study was to determine a group of employers' perceptions of required proficiency in selected skills, aptitudes and temperaments for certain job categories according to the projected difficulty in recruiting workers in the future. A concurrent purpose was to compare the perceptions to levels set forth by the U.S. Department of Labor Dictionary of Occupational Titles and to the assessments of a group of potential employees.

Objectives

In order to achieve the purpose, the following objectives had to be accomplished:

1. To compare by job categories the educational skill levels and aptitudes expected by employers, the assessments of potential employees and the levels defined in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

2. To compare by job categories employer perceptions of very important temperaments to those identified in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

Assumptions

It was assumed:

1. That individuals answering the survey for businesses were knowledgeable of aptitudes and educational skill levels needed for future jobs in Garfield County.

2. That persons who were pre-employment tested at Autry Technology Center were representative of the available workforce in Garfield County.

3. The System for Assessment and Guidance (SAGE) aptitude assessment is a valid instrument for determining educational skill levels, aptitudes, and temperaments.

4. The U.S. Department of Labor Dictionary of Occupational Titles provides a valid definition of necessary skill levels, aptitudes, and temperaments needed to be successful in specific occupational job categories.

Scope of the Study

The scope of this study included Garfield County businesses which employed five or more employees during the spring and summer of 1998.

Definitions

The following definitions of terms are furnished to provide, as nearly as possible, clear and concise meanings of terms used in this study:

DOT - Dictionary of Occupational Titles

Noticeable Difference - A deviation of 1.0 or greater from the DOT identified level is considered a noticeable difference in the educational skill or aptitude level.

General Learning Ability - The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgements.

Verbal Aptitude - The ability to understand the meaning of words and to use them effectively; ability to comprehend language and to understand relationships between words.

Numerical Aptitude - The ability to perform arithmetic operations quickly and accurately.

Spatial Aptitude - The ability to think visually of geometric forms and to comprehend the two-dimensional objects.

Form Perception - The ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Clerical Perception - The ability to perceive pertinent detail in verbal or tabular material; to observe differences in copy, to proofread words and numbers and to avoid perceptual errors in arithmetic computation.

Motor Coordination - The ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed.

SAGE - System for Assessment and Group Evaluation

Executives, Officials, Managers - Occupations requiring administrative personnel to set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of a firm's operations. Includes: officials, executives, middle management, plant managers, superintendents, salaried foremen who are members of management, purchasing agents and buyers, and kindred workers.

Professionals - Occupation requiring either college graduation or experience of such kind and amount as to provide a comparable background. Includes: accountants and auditors, airplane pilots and navigators, architects, artists, chemists, designers, dietitians, editors, engineers, lawyers, librarians, natural scientists, registered professional nurses, personnel and labor relations workers, physical scientists, and teachers.

Technicians - Occupations requiring a combination of basic scientific and manual skills which can be obtained through about two years of post-high school education, such as is offered in many technical institutes and junior colleges, or through equivalent on-the-job training. Includes: computer programmers and operators, drafters, engineering aids, junior engineers, mathematical aides, licensed, practical or vocational nurses, photographers, radio operators, scientific assistants, surveyors, and technical illustrators.

Sales - Occupations engaging wholly or primarily in direct selling. Includes: advertising agents and sales workers, insurance agents and brokers, stock and bond sales workers, demonstrators, sales workers and sales clerks, grocery clerks and cashier-checkers.

Office and Clerical - Includes all clerical types of work, regardless of level of difficulty, where the activities are predominantly non-manual, transporting the products is included. Includes bookkeepers, cashiers, collectors (bills and accounts), messengers and office helpers, office machine operators, shipping and receiving clerks, stenographers, typists and secretaries, telegraph and telephone operators.

Craft Workers (skilled) - Manual workers of a relatively high-skilled level having a thorough and comprehensive knowledge of processes involved in their work. Exercise considerable independent judgment and usually receive an extensive period of training.

Includes: the building trades, hourly-paid supervisors and lead operators who are not members of management, mechanics and repairs, skilled machining occupations, compositors and typesetters, electricians, engravers, job setters (metal), stationary engineers, and tailors.

Operatives (Semi-skilled) - Workers who operate machine or processing equipment or who perform other factory-type duties of intermediate skill level which can be mastered in a few weeks and require only limited training. Includes: apprentices (auto mechanics, plumbers, bricklayers, carpenters, electricians, machinists, mechanics, metal working trades, printing trades, etc.), chauffeurs, delivery workers, dressmakers, furnace workers, motor operators, boilers and greasers, photographic process workers, truck drivers, weavers, and welders.

Laborers - Workers in manual occupations that generally require no special training to perform elementary duties that may not involve independent judgment. Includes: garage laborers, car washers, gardeners and grounds keepers, stevedores, laborers performing lifting, digging, loading, and pulling operations.

Chapter Summary and Overview of Study

Chapter I included the following sections: (1) Introduction, (2) Statement of the Problem, (3) Purpose, (4) Objectives, (5) Assumptions, (6) Scope and Limitations, and (7) Definitions. The changing workforce is a significant challenge. Communication between those who work with identifying and developing aptitudes and educational skills and those who work with skill standards must take place. To recruit and retain quality

jobs, much thought must be given to the skill requirements of industry versus the skill ability of available workforce and what competencies are obtained through training.

The remainder of the study is presented in four chapters. Chapter II provides a review of literature pertinent to the study. Chapter III explains the research design including the development of the instrument and selection of the sample. The findings of the study are presented in Chapter IV. Summary, findings, conclusions, and recommendations are given in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

Introduction

In comparison to many areas of study, little research has been done in the area of determining employee educational skill levels and aptitudes perceived by potential employers and comparing them to the educational skill levels and aptitudes by job categories of potential workforce and to levels defined in The Dictionary of Occupational Titles. To best determine the educational skill levels and aptitudes of potential workforce, both industry and education must work together. It seems, therefore, that a review of the role of the Garfield County Workforce Development Compact and The O.T. Autry Area Vocational Technical School (Autry Technology Center) would clarify the need for industry and education to work together in conducting the study. To develop the basis for studying educational skill levels and aptitudes, a review of the System for Assessment and Guidance (SAGE) was used to help lay the groundwork. Other areas included in this review of literature include an Identification of Need for this study, Related Studies, and a Summary of the Chapter.

Role of Vocational Technical Education

The concept of area vocational technical schools embraces training for all who need it and want it. Specifically, the Vocational Education Act of 1963 and subsequent amendments thereto provide training for high school students, persons who have completed or left high school, and persons employed but who need training or retraining to achieve stability or advancement in employment. Area school districts are established through criteria and procedures established by the State Board of Vocational and Technical Education and are operated in accordance with the rules and regulations of the State Board [70 O.S. 1988, 14-104 and section 9B, Article X, Oklahoma Constitution] (Rules for Vocational and Technical Education, 1998, p. 25).

Autry Technology Center's mission statement best defines the role Autry plays within the community.

> We lead in the progressive development and implementation of quality vocational and technical programs to meet the educational needs of secondary and adult students, as well as individuals in business and industry, by effective utilization of appropriate resources. We maintain standards of excellence throughout our programs, personnel, and facilities. We provide vocational assessment, counseling, training, and placement to enhance the quality of life for those we serve (Autry Technology Center Policies and Procedures, 1998, p. 1).

Role of Workforce Development Compact

An overview of the Oklahoma Workforce Development Compact was presented to Garfield County education and industry leaders by Wayne Rowley, Executive Director of the Oklahoma Workforce Development Compact, in July of 1997. A memorandum of agreement made by and between the signatory cabinet secretaries, agency heads, and The

State Chamber of Commerce created the partnership that became effective July 1996 and was known as the Oklahoma Workforce Development System. According to Rowley (1997), the purpose of the system was to maximize the effectiveness and efficiency of resources committed to developing Oklahoma's workforce. The partners agreed that the workforce mission was to create a coherent, comprehensive, and integrated workforce system that would meet the current and future needs of employment, education, and training needs of Oklahoma businesses. The partners who entered into the State Workforce Development memorandum of agreement would hold the responsibility of directing and overseeing key education, human services, training, economic development, and employment programs.

The Garfield County Workforce Development Compact was created locally to serve Enid and the Garfield County area. The formation was developed under the framework of the statewide Oklahoma Workforce Development System. The Compact's purpose was to maximize the effectiveness and efficiencies of resources committed to developing Enid and Garfield County's workforce. The local compact followed the guiding principles as presented by Rowley (1997) in the focus of the developmental process. It was agreed that the principles should be centrally guided and locally driven, promote public and private collaboration, be employer driven, be accountable for results, and use existing resources.

System for Assessment and Group Evaluation (SAGE)

Controversy, concerning aptitudes and testing, center around what is the best way to measure aptitudes and how to relate them to occupations and the workforce seeking

jobs and training. Autry Technology Center utilizes the System for Assessment and Group Evaluation (SAGE) assessment as the tool for identifying educational skill levels and aptitudes of clients. PESCO (1994) describes the SAGE system developed by their company as inherent in its structure in approaching the issues in relating aptitudes to occupations. The approach contains features found in norm-referenced and talent-referenced testing. The system combines research findings and practical applications of the Department of Labor (DOL) work in the area.

The assessment instruments of SAGE are Vocational Interest Inventory (VII), Cognitive an Conceptual Abilities Unit (CCAT), Vocational Aptitude Battery (VAB), Assessment of Worker Attitudes (AWA), and Worker Temperament (TE). The CCAT provides three scores that identify and relate to the same three sections that comprise the General Education Development (GED) as defined by the Department of Labor (Reasoning, Mathematics Abilities, and Language Abilities).

Winefordner (1988) provided an excellent review of general educational development areas of reasoning, math, and language that are tested in the SAGE assessment. The Worker Trait Group Guide is an educational version of the Guide for Occupational Exploration produced by the Department of Labor. The General Educational Development (GED) areas are referred to as educational skills. General educational development refers to the educational background that helps increase a worker's reasoning, math, and language skills.

Brief descriptions of the three areas of educational development were included in the educational skills section of the guide. Reasoning development was considered the ability to understand concepts and systems, solve problems, and exercise judgement. The

ability to understand and carry out instructions as well as to adjust to social and work environments is included in the area. Mathematical development was described as the ability to attain basic math skills such as solving arithmetic, algebraic, and geometric problems. The application of statistical and mathematical concepts to the analysis and evaluation of data and research was included at higher levels. Language development was described skills such as the mastery of an extensive vocabulary and use of correct sentence structure, punctuation, and spelling. The application of literature and the application of language to effective speaking, composition and logic and creative writing were included at higher levels. The level of reasoning, math, and language skills for each area is reported on a six level scale from 1 (simple skills) to 6 (complex skills). The skill levels represent typical curriculum in schools across the United States and are related to the following grade levels.

Level 1: grades one to three

Level 2: grades four to six

Level 3: grades seven to eight

Level 4: grades nine to twelve

Level 5: college years one and two

Level 6: college years three and four (Winefordner, 1988, p. 483).

VAB consists of 11 single trait factor units that measure the 11 specific aptitudes which relate directly to the Department of Labor's Dictionary of Occupational Titles (DOT). The strength of VAB lies in the fact that each unit measures only one aptitude.

The units in the Vocational Aptitude Battery (VAB) are:

1. General - The ability to " catch on " or understand instructions and underlying principles; the ability to reason and make judgements.
2. Verbal -The ability to understand the meaning of words and to use them effectively; ability to comprehend language and to understand relationships between words.
3. Numerical -The ability to perform arithmetic operations quickly and accurately.
4. Spatial -The ability to think visually of geometric forms and to comprehend the two- dimensional representations of three dimensional objects.
5. Form -The ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and see slight differences in shapes and shadings of figures and widths and lengths of lines.
6. Clerical -The ability to perceive pertinent detail in verbal or tabular material; to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation.
7. Motor Coordination -The ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed.
8. Finger Dexterity -The ability to move the fingers and manipulate small objects with the fingers rapidly and accurately.

9. Manual Dexterity -The ability to move the hands easily and skillfully; to work with the hands in placing and turning motions.

10. Eye-Hand-Foot Coordination -The ability to move the hand and foot coordinately with each other in accordance with visual stimuli.

11. Color Discrimination - The ability to match or discriminate between colors in terms of hue, saturation, and brilliance.

The Worker Temperaments (TE) were designed to measure the adaptability of workers in response to requirements placed on them by specific types of job-worker situations. Personal traits related to a worker's ability to adapt to work situations are called temperaments. Winefordner (1998, p. 474-475) gave a listing and brief description of ten work situations referred to as temperaments. The temperaments and descriptions were:

Plan and Direct an Entire Activity – Workers are responsible for planning, directing, or controlling an entire activity, project, or program. They are responsible for making decisions and supervising the work of others. They must keep up-to-date concerning information about their work.

Interpret and Express Feelings, Ideas or Facts – Express concept of a feeling, idea or fact from a personal point of view. Have creativity, self expression, and imagination to develop and communicate views through writing, music, or some form of art. Some focus on the process they use to communicate, such as speaking, singing, or acting. Others may communicate using photographs, designs, poems, writings, songs or paintings.

Influence Peoples's Opinions, Attitudes, and Judgements – Influence others by changing their thinking and behavior. Must be able to understand and communicate with people. Influence how others feel about a product, service, an issue, or other people. Influencing may be through direct contact or indirect through a form of media.

Make Decisions Using Personal Judgement – Make evaluations and decisions using personal judgement or sensory data received from one or more physical senses. Relies on knowledge from experience and aesthetic values. Decisions may be made without specific information or proof and uncertainty of outcome.

Make Decisions Using Standards that can be Measured or Checked – Decisions are made on concrete evidence and are not open to personal interpretation. Facts and set standards are used to make decisions when judgement is needed.

Deal with People – Interact with people at a higher level than giving or receiving instructions. The interaction is a major job responsibility. The ability to meet people and cooperate with others is important and must be done in a pleasant friendly matter.

Perform Routine Tasks – Workers do the same tasks every day with little or no change. Assignments can be done in a short period of time and follow a specific method or sequence. Little judgement is involved and sometimes a machine sets the pace of work.

Work Under Pressure – Deal with situations that involve potential danger or risk. Must have the ability to work under stress and tension. Workers must be able to maintain self-control and take decisive action in unexpected or critical situations. Be able to do job tasks well in emergencies. Working speed and sustained attention are important.

Work Within Precise Limits or Standards of Accuracy – Must pay strict attention to details and be very precise and thorough in their work. Tasks must be completed within exact standards. Those standards may include precise body movements, use of words, time limits, size, weight or accuracy of math computations. Product quality, service, or work task is directly related to the worker's performance.

Perform Duties Which Change Frequently – Perform a variety of duties that often change. The change in job task requires workers to use different skills, knowledge and abilities. Workers may need to use different materials or methods, change work locations, or be involved with people in a different way.

According to DeBock (1998), the CCAT, which measures the General Educational Development (GED), and the TE, which measures worker temperaments, can be improved through additional educational development. However, the vocational aptitude measured in the VAB does not improve with repeated testing. The SAGE measures the individual aptitude level at a given time and correlates that score to the level of development required in a specific job area as defined by the Departments Of Labor's Dictionary of Occupational Titles (DOT).

In the early 1970's, the Department of Labor introduced a supplement to the Dictionary of Occupational Titles (DOT) that linked eleven aptitudes to occupations.

Those aptitudes were general, verbal, numerical, spatial, form perception, clerical, motor coordination, finger dexterity, manual dexterity, eye-hand-foot coordination, and color discrimination. Researchers developed the concepts of aptitudes as genetically inherited predispositions to learn a type of behavior or skill. Researchers treated these predispositions as measurable talents which are normally distributed in a population. The researchers wanted to measure talents in a way that would allow predictions of how easy an individual could learn a skill not yet learned. For example, a person with a well developed or high level of musical talent might not know how to play an instrument but could learn to play the instrument much faster than most people PESCO (1994).

Other researchers looked at aptitude as how prepared an individual was to learn. The researchers questioned that if the individual had already learned the prerequisites for a behavior or the more talent the learner had, the more likely they would have learned the basic behaviors needed to learn an advanced skill. To test for numerical aptitude, rather than ask people to solve higher level math problems, they tested how well a person could solve a problem requiring arithmetic logic using addition, subtraction, multiplication, and division. According to PESCO (1994), that allowed researchers to assess people across the whole range of aptitude development. Those individuals who had a higher developed numerical aptitude were able to perform more basic operations in the same time than those with less aptitude. This is the same approach the SAGE assessment takes in measuring aptitude development of individuals. The SAGE is able to assess people across the whole range of aptitude development and predict which individuals will most quickly learn more complex behaviors on the job.

Neither the researchers who developed the concept of aptitude, the Department of Labor, nor the developers of SAGE consider aptitudes as skills. In relation to work, they view a skill as the final fully developed behavior that is immediately useful in the job situation. It is a developed ability. In comparison, the Bar Exam for lawyers is an example of a useful skill test. Candidates are usually asked to analyze a judicial ruling for precedent within the case law. That is an on-the-job skill required of the lawyer. A comparable aptitude exam is the Law School Aptitude Test (LSAT). Candidates are asked to read and reason. These are the basic prerequisite behaviors required to learn the on-the-job skills of a lawyer, PESCO (1994).

The Department of Labor defined the 11 identified areas of aptitudes as general and basic prerequisite behaviors whose degree of mastery predicts the ease of learning more complex behaviors in the same category. Job analysts related aptitudes to jobs through observations and interviews to define jobs in the Dictionary of Occupational Titles (DOT). A five-level rating scale was used to record these levels. These levels were referred to as Aptitude Development Levels. According to PESCO (1994), the Department of Labor used well accepted statistical procedures to define the highest level of Aptitude Development, Level I, as the top 10% of the population, in terms of possessing each aptitude. The other four levels were defined in similar fashion which resulted in the five-level rating scale. The levels of Aptitude Development were then defined statistically for the 11 aptitudes without reference to any specific aptitude behaviors.

Identification of Need for the Study

In considering the need for a study such as the one conducted, it becomes apparent that there are several reasons why those involved in vocational education and industry would be interested in the results. Technology and market changes have caused significant modifications in the types of skills and behaviors needed in the workforce. These changes have been the catalyst in a broad education reform movement that seeks to tie education more closely to the emerging workplace needs. According to Bailey and Merritt (1995), advocates of reform for industry skill standards argue that skill standards will strengthen the educational system and will become a critical part of reform efforts in the workplace. Education and industry, working together, will get a chance to focus on their relationship with each other and within their own institutions.

Shamblin (1998, p. D6) states "In Garfield County, it's time to take a pro-active approach in providing businesses with a viable workforce." According to Shamblin, who is general manager of Northrup-Grumman (one of the largest employers in Garfield County), knowing ahead of time what employers expect and taking pro-active steps in training a workforce to meet the needs of Enid and the area employers, everyone gets what they want in terms of employment. Shamblin (1998, p. D6) in an interview stated:

> We are entering another period where it is going to be more difficult to enter the job force without technical training prior to getting there. For example, there was a time when airplane mechanics used a pencil and piece of paper to keep track of maintenance completed on their planes. Now they have to be computer literate. Technology has touched all of us, and it's just going to become more of an issue.

McKernan (1994) cites the legendary example of the New York telephone company that reportedly had to screen 57,000 applicants to find 2,100 who were qualified

to perform entry level technical jobs. He also stresses that we are in a country in which a highly skilled workforce is critical, yet many Americans have only mediocre basic literacy. Even these skills appear to be declining, and all but a small percentage of Americans can read and write. However, American literacy is based on old standards according to McKernan. He suggests the American people don't understand how drastically the first world-and-workplace has changed as evidenced by the 57% of American workers who believe their skills will be adequate in the years ahead. As governor of Maine, he challenged a new revolution in this nation to begin with ideas to create a better society by looking honestly at our schools, labor force, and society.

It was reported in 1997 that Oklahoma had led the region for the past two years in employment growth. The state had a bigger supply of potential workers available to enter the workforce than most of the region. Now, Oklahoma is facing a shortage of workers which suggests that this trend could create a major danger for Oklahoma employers who will be faced with not only greater competition to hire workers, but increasing salary demands, Stancavage (1997).

Industry and education must work together to identify the critical areas and take pro-active steps in developing a workforce. Many theories and practices have addressed the immediate or apparent concerns, but there is an absence of studies that examine aptitudes and educational skill levels. Therefore, a study that identifies noticeable differences of aptitude and educational skill levels as perceived by employers, by job categories of highest potential openings, compared to the average aptitudes and educational skill levels of potential workforce and to the levels needed for employment as defined in the Dictionary of Occupational Titles, will be of great value.

Related Studies

Studies that compare the skill levels and aptitudes from the perspective of available workforce, the required levels needed as defined by the U.S. Department of Labor in The Dictionary of Occupational Titles, and those levels required for employment as perceived by the employers are extremely limited. However, there are related studies that contain information that will be of value to the study.

Grubb, Dickinson, Giordano, and Kaplan (1992) studied education skills and employment in sub-baccalaureate labor markets. They studied nearly 250 people who provided their assessments of education and employment conditions in their local areas. The sub-baccalaureate labor market was defined as the labor market for those with less than a baccalaureate degree but at least a high school diploma. The researchers interviewed employers and education providers in four local labor markets. Of labor markets studied, one concentrated on agriculture and agriculture processing; a second emphasized high-tech development and manufacturing; a third had a diversified economy with considerable government and service employment and limited high-tech manufacturing; and the fourth was a center for the manufacture of machinery and machine tools. The occupational areas concentrated on were: electronics technician, machinist, drafter, accountant, business occupations, and computer-related occupations.

Employers mentioned a common list of skills desirable in employees. The employers desired: highly job-specific skills; motivation and interpersonal skills to enable employees to work cooperatively; aptitude and "common sense," especially the ability to apply knowledge in complex situations; computer-based skills; and basic skills.

The basic skills deficiencies generated more complaints than any other subject area. One inconsistency that was observed among the employers was that at the same time that some stressed the specific skills necessary for entry-level work, they bemoaned the presence of extraneous theoretical and academic requirements in educational institutions. Other employers emphasized broader and more academic capacities as those skills more necessary for promotion than for entry-level jobs. It appeared that once employed, promotion took place informally and entirely because of on-the-job performance, which suggested that a great premium was placed on performance and on the ability to master additional skills necessary for promotion.

Grubb, Dickinson, Giordano, and Kaplan (1992, p. 7) concluded:

> There is a crying need at both secondary and post secondary levels to improve the teaching of academic skills. Skill standards have great potential for creating organized labor markets from the unorganized characteristics of sub-baccalaureate labor markets and for bringing employers and education providers together in a common task. It is necessary to ask what responsibilities employers should bear in reconstructing the relation between education and employment.

Hiring decisions and wage structures should be more responsive to educational accomplishments and skill differentials in order to provide greater incentives for prospective employers to learn those capacities which employers say are in short supply.

In Canada, one of the goals of education was to prepare young people to participate in paid work. In the late 1980's and early1990's, both employers and educators were voicing similar concerns and looking for ways to work together to meet the goal. Employers were faced with a highly competitive global workforce. The new economy demanded new ways of thinking, managing, and working. The new demands changed the level of education and skills required. Educators asked employers for their assistance in

helping to improve articulating and communicating their needs. Building on the framework that had been developed by a Michigan Employability Skills Task Force, a list of skills was developed based on the hiring criteria of companies represented by the Canada Corporate Council. The results of the study were a publication of a "Employability Skills Profile" that stated the traits desired by employers in Canada. Employees that could communicate, think, adapt, continue to learn throughout their lives, demonstrate positive attitudes and behaviors, exhibit responsibility, and who could work with others were identified. The employers stated they placed equal emphasis on each characteristic McLaughlin (1992).

Baily and Merritt (1995) studied the Industry-Based Skill Standards. They reported the skills standard movement was launched as part of a broad strategy to strengthen the education system and ultimately the economy. The perception of policymakers, educators, and employers was that a change in the nature of work and the types of skill required could be strengthened by skill standards. The development of a national system of voluntary industry-based skill standards was promoted by the National Skills Standard Board. The work was built on the experience developed in twenty-two pilot projects established by the Departments of Labor and Education.

The long term goal of skills standard movement was to develop and deepen the partnership between schools and employers. The intent of the movement was to increase learning and to change education to be more in tune with the current workplace needs and to move workplaces toward high-performance work systems. It was reported that not all employers had altered their workplaces in accordance with the tenets of high-performance workplaces even though few disputed the benefits and rationale of establishing them. An

important point was noted by Bailey and Merritt (1995) that if skill standards are developed that highlight the demands placed on workers, the difficulty of achieving buy-in from employers with less progressive work environments who do not see use for high-performance standards must not be underestimated.

Harrison (1997) studied the skills and attitudes that future workers needed to learn. Harrison cited the research of Fitzgerald (1985) in reporting the perceptions of 178 employers surveyed in the Northeastern United States. The employers rated basic academic skills in the top five most desired competencies for employment. An additional finding that was revealed through interviews was two out of three entry-level applicants were eliminated on the basis of written job application and sometimes a brief interview. The major problems cited included: inability to communicate, inaccuracies in the application, poor spelling, and poor grammar. Work habits, attitudes, and interpersonal skills were considered as important general employability skills and were rated as important as basic skills.

Workforce studies conducted in Oklahoma looked at the training areas most beneficial to labor force availability. Goodrich (1997) revealed that companies in the Duncan, Oklahoma area identified training areas that would be most beneficial to their company. Computer skills were identified as the skills most needed followed by basic skills, interpersonal skills, and business skills assessment testing. The companies reported basic skill training areas most needed as communication, math, reading comprehension, blueprint reading, and occupational Spanish.

The growing demand of skills required by employers, in addition to the trend pointed out by Stancavage (1997) that revealed Oklahoma employers will be faced with

not only greater competition to hire workers but increasing salary demands, could greatly effect the workforce. In a study of workforce within a forty minute travel time from Enid, Oklahoma, Gregory and Shaffer (1997) reported that 50.7% of workforce surveyed had an interest in changing jobs. Fifty-eight percent of those surveyed reported that they would change jobs for $12.00 per hour or less.

Summary

Aptitudes and educational level comparisons in respect to potential employees, employer perceptions, and those levels required by job category as defined in the Dictionary of Occupational Titles are the heart of developing a workforce. The joining of Autry Technology Center, whose mission is to develop and implement quality programs to meet educational needs, and the newly formed Garfield County Workforce Development Compact, whose mission is to create a coherent, comprehensive, and integrated workforce system, appeared as the logical start in addressing the development of a workforce.

Autry Technology Center utilizes the System for Assessment and Group Evaluation (SAGE) to identify educational skill levels and aptitudes of students. The SAGE combines research findings and practical applications of the Department of Labor (DOL). Units in the SAGE include cognitive and conceptual vocational aptitude battery and worker temperaments. The SAGE provides an accurate assessment of aptitude development of individuals through well accepted statistical procedures for each of 11 aptitude areas defined in the Dictionary of Occupational Titles. Later, the Department of Labor introduced a supplement to the Dictionary of Occupational Titles that linked the 11

aptitudes to occupations. Job analysts related the aptitudes to jobs through observations and interviews, and a five level rating scale was used to record the established levels.

Technology and market changes have produced considerable changes in the skills and behaviors required of the workforce. Many advocates have argued that skill standards would strengthen the educational system and become a critical part of reform efforts in the workplace. Nationwide, schools and labor forces were challenged to honestly look at schools, labor forces, and society. Business leaders in Garfield County felt that knowing ahead of time the employer expectations and taking the needed steps to meet the needs of industry is both timely and pro-active. The joining together of education and industry to address the aptitude and skill levels was deemed to be timely and of great value.

In related studies, researchers found that employees desired highly job-specific skills in addition to motivation, common sense, and interpersonal skills. Basic skills deficiencies were a major complaint from employers. The trend for industry-based skill standards is a common area of research, primarily because of perceptions of policymakers, educators, and employers that a change in the nature of work and the types of skills required could be strengthened by skill standards. Other studies cautioned that not all employers had altered their workplaces towards high-performance workplaces even though few disputed the benefits and rationale of skill standards. The buy-in from employers with less progressive work environments cannot be underestimated.

The joining together of Autry Technology Center and the Workforce Development Compact to address the perceptions of aptitudes and educational skill levels in developing the workforce in Garfield County lays the groundwork to address the

immediate needs and future goals of workforce development. The review of related literature provided the basis for the study.

CHAPTER III

METHODOLOGY AND DESIGN

The purpose of this chapter was to describe the methods and procedures used in conducting this study. In order to acquire data which would provide information specifically related to the intent and objectives of the study, a population was determined and instruments were developed for data collection. Procedures to facilitate data collection and methods of treating the data were selected. The data was collected in the spring and summer of 1998. Specific objectives were utilized to provide direction for the design of this research effort. The specific objectives were:

1. To compare by job categories the educational skill levels and aptitudes expected by employers, the assessments of potential employees and the levels defined in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

2. To compare by job categories employer perceptions of very important temperaments to those identified in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

The Study Population

The population for this study was limited to the businesses in Garfield County that employed five or more persons. The businesses surveyed were those listed in the Oklahoma Business Directory. The Oklahoma Business Directory is a comprehensive listing of businesses compiled by the Oklahoma Department of Commerce. A total of 632 Garfield County businesses listed in the directory as employing five or more persons were sent surveys. Of those companies 325 were in the range of 5-9 employees, 157 were in the 10-19 range, 100 were in the 20-49 range, 23 were in the 50-99 range, 20 were in the 100-249 range and 7 were in the range of 250 or more employees.

Development of the Questionnaire

In developing the employer survey instrument, the SAGE data base and job titles as listed in the Dictionary of Occupational Titles were utilized. Eight job category areas were identified from the Dictionary of Occupational Titles. The areas were: Executive/Official/Manager, Professionals, Technicians, Sales, Office and Clerical, Craft Workers (Skilled), Operatives (Semi-skilled), and Laborers. Using the ability and skill level definitions as described in the SAGE assessment data base, questions were developed in three areas to be tested. The areas identified were the educational skill levels of reasoning, math and language, vocational aptitudes and worker temperaments.

Resource personnel who were skilled in the usage of the SAGE assessment system and the Dictionary of Occupational Titles assisted in the development of the survey instrument. The multiple job category areas listed under Professionals, Sales, and

Craft Workers in the Dictionary of Occupational Titles were blended into one category for each area. After developing the questionnaire, it was field tested with the Autry Technology Center Business and Industry Services staff and the Educational Enhancement Center Staff for clarity and recommendations. An industrial business classification and definition of terms were added to the questionnaire to provide clarity. The questionnaire was then presented to the Workforce Development Compact Board for final recommendations and validation of the instrument's content. Two questions were added from recommendations of the Workforce Development Compact which included:

1. What are the two biggest obstacles to future expansion your business ?
2. What primary training, education, certification, or degree program(s) would help overcome these obstacles ?

Administering the Questionnaire

A meeting with the Workforce Development Compact Board was held to review the final draft of the survey and to discuss strategies for administration. It was determined that the cover letter to the employers should be signed by all the Board members. A cover letter and survey were sent to the 632 businesses listed in the Oklahoma Business Directory. Two weeks after mailing the original survey, a postcard was mailed to the non-respondents. It was agreed that personal visits and/or telephone calls from the Compact Board Members and the Industrial Coordinators at Autry Technology Center would be utilized if necessary to obtain a fifteen percent return rate. An article explaining the surveys purpose and benefit was published in the Sunday edition of the Enid News and Eagle prior to mailing the questionnaire. Information from the

survey provided a means to identify the educational skill levels and aptitudes employers desire of potential employees. The questionnaire consisted of three areas. Two questions were addressed in part one: the first question was determine the industrial classification of the business; the second question asked employers to list the number of anticipated job openings in six months and in 36 months and rank the categories based on the difficulty of recruiting employees. The category which was ranked one represented the most difficult to recruit and included the category compared against the educational skill levels and aptitudes and temperaments reported in the Dictionary of Occupational Titles. The second area consisted of general educational development and vocational aptitude battery. Three questions consisting of reasoning, math, and language represented the general educational skill development area, while 11 questions relating to vocational aptitudes were utilized. The third area was related to worker temperaments. Two additional questions required written responses which asked employers to write two obstacles to business expansion and what training would help overcome the identified obstacles. Employers were asked to check the response level which best described the employees' temperament needs in each of the 10 temperament areas included.

Completed responses were returned from 148 businesses, a 23% return. Two surveys did not identify the job most difficult to recruit and were not counted as complete surveys. Of the returned surveys 58, representing 18.2 % of businesses, were from the 5-9 employee range, 34, representing 21.7 % of the businesses, were from the 10-19 employee range, 24, representing 24 % of the businesses, were from the 20-49 employee range, 11, representing 47.8 % of the businesses, were from the 50-99 employee range,

15, representing 75 % of the businesses, were from the 100-249 employee range, and 6, representing 85.7 % of the businesses, were from the 250 and more employee range.

Employee Pool

The employee pool was obtained by purposive sampling. According to Kerlinger (1986, as cited in Key, 1997) purposive sampling is characterized by the use of judgement and deliberate effort to obtain representative samples by including typical groups in a sample. The researcher studied assessments of adult individuals who had taken the SAGE test during the fiscal years 1995, 1996, 1997, and 1998 at Autry Technology Center. The individuals represented the potential workforce in Garfield County seeking employment and were either in pre-employment testing or seeking training at the vo-tech center. Eight hundred twenty-two individuals had taken the SAGE assessment testing during the time period. The individuals were reported by the areas of primary job interest as identified in the interest inventory section of the SAGE test. A total of 842 responses were recorded due to some individuals having more than one primary job category interest.

Analysis of Data

Data collected were recorded in Lotus program applications. Mean scores were calculated for educational skill and aptitude data. Descriptive statistics including line graphs, pie charts and frequency distributions were utilized to describe data. According to Debock (1998) in reporting SAGE results, a deviation of 1.0 or greater from the DOT identified level is considered a noticeable difference in the educational or aptitude level,

therefore a deviation of 1.0 or greater was considered to be a noticeable difference. The statements in the questionnaires followed the format of sage assessment. The statements regarding reasoning, math, and language in the general educational development area were recorded utilizing an interval scale. The six point "likert-type" scale was consistent with the Department of Labor values assigned to the general educational development levels. Numerical values were assigned with 6 representing the statement requiring the highest degree of educational skill level and 1 representing the lowest degree. In recording the vocational aptitudes a five-point "likert-type"scale was utilized to record the responses from employers. Numerical values were assigned to the responses that correlated with the DOT assigned values for aptitudes. For purposes of presenting the data values were presented in the same format as the general educational skill levels. A "likert-type" scale was utilized to secure the employer responses regarding desired temperaments. Numerical values were assigned as follows: "Very important" = 5, "important" = 4, "important" = 3, "Slightly important" = 2, "Not critical" = 1. Only the temperaments that employers perceived as very important were recorded. Many individuals have contended that temperaments are interpersonal skills. Grubb, Dickinson, Giordano, and Kaplan (1992), Bailey and Merritt (1995), Harrison (1997), all indicated in studies that interpersonal skills were skills business and industry identified as the skills most needed in employees. Kerka (1992) cited planning, problem representation and self-management as key processes to problem solving. Sjogren (1997) defined transferable skills as skills applicable to more than one situation. He contended that interpersonal skills were one of the five basic transferable skill groups. The temperaments identified by

employers as very important were compared against the factors listed in the Dictionary of Occupational Titles as temperaments in each job category.

Responses from non-respondents were compared against responses of the initial respondent group. Since there did not appear to be a noticeable difference in the responses, the responses were reported in total in the data analysis.

CHAPTER IV

FINDINGS AND ANALYSIS

This chapter presented the analysis of data from the study investigating educational skill levels and aptitudes, as identified by employers, and compared this to data found by potential employees and to those educational skill levels and aptitudes identified in the Dictionary of Occupational Titles. Temperaments identified as very important by employers were compared to temperaments listed in the Dictionary of Occupational Titles.

The employers were asked to respond by the industrial classification of their business. Figure 1 reflects the businesses' responses by industry classification. Employers were then asked to identify the number of job openings that were anticipated within 6 months and within 3-6 months and rank the job category that they believed to be the most difficult to recruit employees.

In order to determine differences, comparisons by job categories were made in general educational skill levels and vocational aptitudes . In presenting the data, employers' responses, employee pool assessments and Dictionary of Occupational Titles criteria were compared by job category. The SAGE assessment instrument that identifies educational skill levels is referred to as Cognitive an Conceptual Abilities Unit (CCAT).

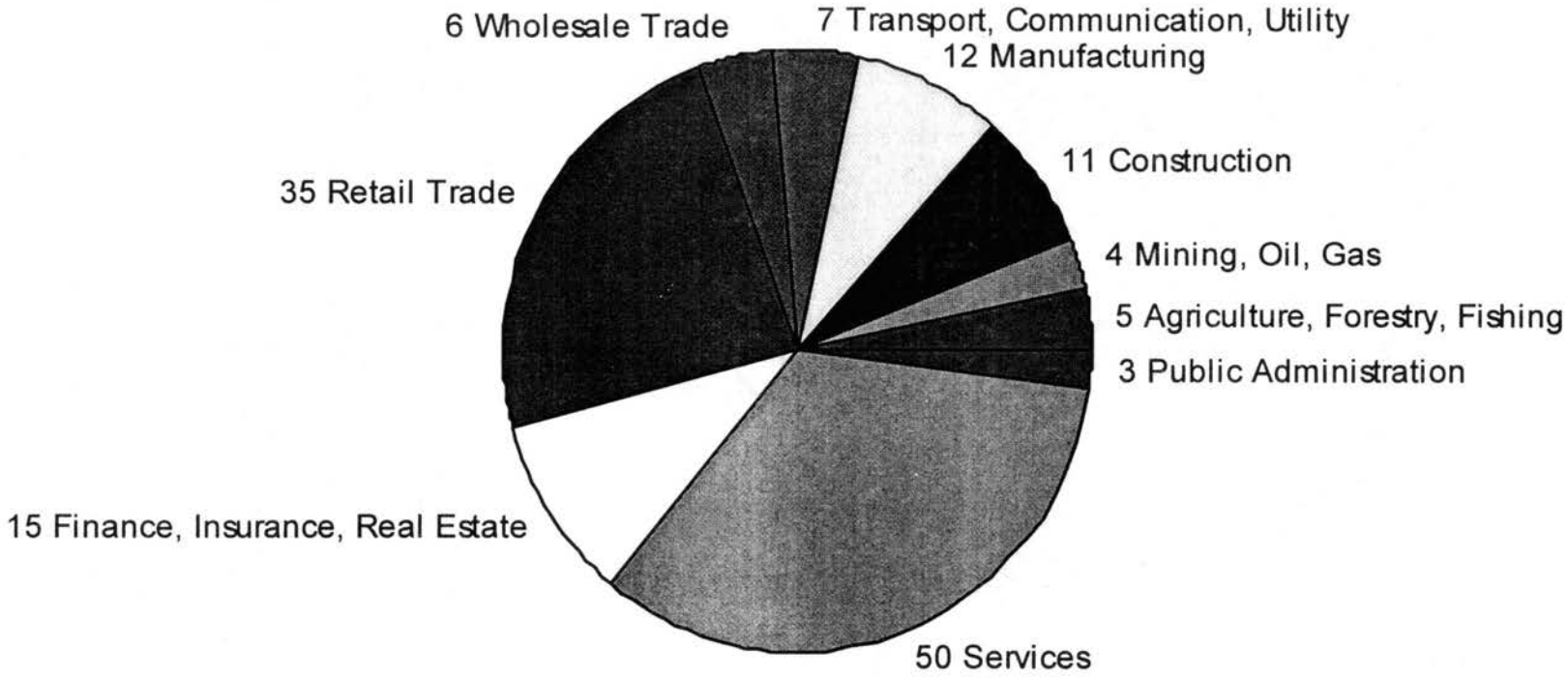

Figure 1. Responding Businesses by Industry Grouping

The CCAT provides three scores that identify and relate to the same three sections that comprise the General Education Development (GED) as defined by the Department of Labor as reasoning, mathematics, and language abilities. According to DeBock (1998), the General Education Development can be improved through additional educational development. However, the vocational aptitude measured in the vocational aptitude battery does not improve with repeated testing. DeBock (1998) indicates that a score level that is one point or more from the skill level or aptitude level is considered to be a noticeable difference when analyzing SAGE results. The temperaments employers perceived as very important were compared to the temperaments listed as desired in the Dictionary of Occupational Titles. The temperament comparisons were made by job category.

General Educational Skills and Vocational Aptitudes

Executives/Officials/Managers

Table I reveals the responses in the job category Executives/Officials/Managers. Fifteen businesses responded that this job category was the most difficult to recruit. Of special interest is the lower expectation of employers in the reasoning, math and language areas. The employer mean score was nearly 2 points lower than DOT in math. The employer expectation level of 2.07 equates to a fourth to sixth grade school level. However the numerical aptitude employers expected was .53 higher than the DOT defined level. In the language general educational development area, employer expectation was over 1 point lower than the DOT level, yet in verbal aptitude the

TABLE I

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY EXECUTIVES/OFFICIALS/MANAGERS

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	5.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00	3.00	2.00	2.00	2.00	1.00	1.00
Employee Assessment	3.88	3.73	4.55	3.49	3.41	3.10	3.31	2.63	3.00	4.20	2.67	1.61	3.86	3.55
Employer Expectation	4.00	2.07	2.73	4.00	4.00	3.53	3.13	3.40	3.67	3.93	3.40	3.47	3.27	3.33
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	•-1.12	-0.27	0.55	-0.51	-0.59	0.10	0.31	-0.37	0.00	•2.20	0.67	-0.39	•2.86	•2.55
Employer Difference	•-1.00	•-1.93	•-1.27	0.00	0.00	0.53	0.13	0.40	0.67	•1.93	•1.40	•1.47	•2.27	•2.33

Note: • = Noticeable difference

N = 27 employee assessments with interest in this job category, 15 employers who identified this job category as most difficult to recruit.

employer response was equivalent to the DOT level with both scores at 4.0. This could indicate that basic educational skill levels desired by employers in this job category could actually be less than those validated by the Department of Labor. Employer expectations were higher than DOT levels in finger dexterity, manual dexterity, and color discrimination.

Employees tend to have lower skill levels in reasoning and math but are higher in the language area than defined by the DOT. Reasoning is the only finding that appears to be of noticeable difference. One note of interest is that the employees shown have considerable higher aptitude levels in a majority of aptitude levels including: motor coordination, finger dexterity, eye/hand/foot coordination, and color discrimination than was identified by DOT.

The employer desired levels of math and language are noticeably lower than the employee pool. This is of particular interest in this category which includes occupations requiring administrative personnel to set broad policies and to be responsible for the execution of those policies. Employer expectations in the manual dexterity aptitude were noticeably higher. Of particular interest is lower expectation of employers in the math and language in the general educational development areas but higher (not noticeable) in the verbal and numerical aptitudes. It appears that the employers are indicating they desire employees to have higher aptitudes, or abilities to learn, yet in the learned general educational development, the skill levels indicated by employers, the math and language are noticeably lower. These could indicate that the employers' understanding of skills and aptitude levels are different than the standards commonly utilized by education. The reasoning level identified by both employers and employees

is 1 point or more lower than the defined levels identified by DOT. In math, the employers are nearly 2 points lower at 1.93 difference and 1.27 difference in language. While these are skills that can be improved with additional education, it appears that the employees are lower than the DOT levels but higher than the employer expectations. Aptitude levels which have not shown to improve with repeated testing appear to be higher with noticeable differences in motor coordination, finger dexterity, manual dexterity, eye/hand/foot coordination, and color coordination. The higher expectation level reported by employers appears not to present immediate concern due to the fact that the employee pool aptitudes are greater than the employer expectations. The noticeable exception of manual dexterity is apparent in the difference of 1.86 between employer and employee with the employee being slightly lower than the DOT and the employer being somewhat higher. Manual dexterity is not as critical in this job category since this job category area as defined by PESCO (1994) exercises overall responsibility for execution of policies and directs individual departments or special phases of a firms operations and is not considered as manual occupations.

Professional

Table II identifies the responses of 25 businesses that report the professional category was most difficult to recruit. While the DOT arrived at a five level of skill development in reasoning, math and language, the employers expected slightly lower reasoning and language and somewhat lower math. Math educational skill level as expected by employer expectation is 3.79 which is equivalent to seventh to eighth grade skill levels. This is of particular note since this job category includes college graduates or

TABLE II

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY PROFESSIONALS

General Educational Skill				Vocational Aptitudes										
scale 6= highest to 1=lowest				scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	5.00	5.00	5.00	4.00	4.00	3.00	3.00	3.00	3.00	2.00	2.00	2.00	1.00	3.00
Employee Assessment	3.88	3.73	4.55	3.49	3.41	3.10	3.31	2.63	3.00	4.20	2.67	1.61	3.86	3.55
Employer Expectation	4.88	3.88	4.24	4.56	4.32	4.04	3.08	3.29	4.16	3.60	3.08	3.12	2.84	2.96
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	•-1.12	•-1.27	0.45	-0.51	-0.59	0.10	0.31	-0.37	0.00	•2.20	0.67	-0.39	•2.86	0.55
Employer Difference	-0.12	•-1.12	-0.76	0.56	0.32	•1.04	0.08	0.29	•1.16	•1.60	•1.08	•1.12	•1.84	-0.04

Note: • = Noticeable difference

N = 21 employee assessments with interest in this job category, 25 employers who identified this job category as most difficult to recruit.

experience as accountants, auditors, pilots, chemists, engineers and teachers. Employers' expectations were higher in numerical, form perception, clerical, motor coordination, finger dexterity, manual dexterity, and eye/hand/foot dexterity aptitudes.

The employee pool appears to be noticeably lower in the reasoning and math skill levels than the DOT. Employees have general educational development levels comparable to the seventh to eighth level in reasoning and math where the DOT levels for both areas are at the mid-college level. Employee aptitude levels are considerably higher in motor coordination and eye/hand/foot coordination. A notable difference is for the reasoning skill level where the employee level is 1.00 lower than the employer expectation. The aptitude levels reflect a noticeable lower difference in the employee pool in clerical and manual dexterity, and a lower employer expectation in eye/hand/foot coordination. Employer expectations and employee education skill levels are noticeably lower in math than the DOT. This is of particular interest when the occupations associated with this job category are considered.

When comparing employer to employee there is not a noticeable difference because the employee difference is only .06 higher than the employer expectation. The employees appear to be noticeably lower than the DOT at 1.12 in the reasoning level, but compared to the employer expectation the difference would not be considered as noticeable. Clerical aptitudes of DOT and employees match; however, the employer expectation shows a significantly higher expectation. Motor coordination is noticeably higher by both employer and employee compared to DOT. There does not appear to be a noticeable difference when comparing the two to each other. The same comparison can be made when analyzing finger dexterity with the exception that employee aptitude is not

one complete point away from DOT at .67. There is a noticeable difference in manual dexterity, the employer expectation is 1.13 higher than DOT while the employee level is .39 lower than DOT, which would indicate a significant difference in the employer, employee comparison. Eye/hand/foot coordination is noticeably higher by both employer and employee, which does not appear to be a concern since the level of employee aptitude is actually 2.86 higher than DOT and 1.03 higher than employer expectation.

Technicians

Twenty-four businesses responded in the Technicians category. Table III indicates the lower expectations of employers in the reasoning, math, and language skill areas with a noticeable difference in language at 2.91 as compared to 4.00 for the DOT level. This indicates that a sixth grade levels is acceptable from employers compared to the DOT acceptable level of ninth to twelfth grade. The employers expectations in verbal aptitudes is higher than the DOT level in eye/hand/foot coordination.

The potential employees averaged slightly higher levels in reasoning and language skills and slightly lower math skills. Noticeable differences appear in the lower levels in finger dexterity and manual dexterity of employees; however, the eye/hand/foot coordination is significantly higher as compared to the DOT level. It should be noted that the technician occupations require a combination of basic scientific and manual skills, which could indicate an area that should be studied further in developing a workforce. Included in the Technician job category are computer programmers and operators; drafters; engineering aides; licensed, practical or vocational nurses.

TABLE III

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY TECHNICIANS

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	4.00	4.00	4.00	4.00	3.00	4.00	3.00	4.00	3.00	4.00	4.00	3.00	2.00	3.00
Employee Assessment	4.22	3.76	4.38	3.76	3.57	3.12	3.59	3.26	2.92	4.42	2.85	2.06	4.06	3.65
Employer Expectation	4.21	3.17	2.91	4.38	4.08	3.83	2.96	3.38	3.96	4.00	3.67	3.46	3.17	3.08
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	0.22	-0.24	0.38	-0.24	0.57	-0.88	0.59	-0.74	-0.08	0.42	•-1.15	-0.94	•2.06	0.65
Employer Difference	0.21	-0.83	-1.09	0.38	•1.08	-0.17	-0.04	-0.63	0.96	0.00	-0.33	0.46	•1.17	0.08

Note: • = Noticeable difference

N = 101 employee assessments with interest in this job category, 24 employers who identified this job category as most difficult to recruit.

Another noticeable difference was in the language skill level where the employers expectations were lower than the potential employee pool. Employer expectations of clerical aptitudes were higher as were the manual dexterity expectation. Of notable difference is language, where the employee pool is .38 higher than the DOT level and the employer expectation is 1.09 lower than the DOT level. This difference appears to be of greater significance when the aptitudes are included in the study. The employers reported a lower language skill expectation of 1.09 but expected a higher verbal aptitude of 1.08 when compared to the DOT. In both language skills and verbal aptitude the difference in employer and employee is not notable. It should be noted in the Technician area the difference for language skills and for verbal aptitude is reported as more than 1 point lower for DOT as compared to over 1 point higher expectation by employers. Finger dexterity in the employee pool is lower than DOT levels, which could be of significance when looking at job descriptions in the job category, but compared to the employer expectation the difference is minimized. Eye/hand/foot are noticeably higher for both employers and employees.

Sales

Of particular interest in the Sales job category is the considerable differences in math and language expectations. Sales is reported in Table IV where 23 businesses responded. DOT levels in this job category were closer to the levels identified by employers with reasoning levels required from employers being somewhat higher. The employers' expectations were noticeably higher in the clerical, motor coordination, finger dexterity, manual dexterity, eye/hand/foot coordination, and color coordination. Included

TABLE IV

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY SALES

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	3.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00	2.00	2.00	2.00	1.00	2.00
Employee Assessment	3.70	3.51	4.28	3.63	3.42	2.88	3.19	2.95	3.09	416	2.49	1.58	3.58	3.37
Employer Expectation	3.50	1.67	1.65	3.91		3.74	2.68	2.77	3.43	3.30	3.00	3.05	2.82	3.14
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	0.70	•1.51	•2.28	0.63	0.42	-0.12	•1.19	0.95	0.09	•2.16	0.49	-0.42	•2.58	•1.37
Employer Difference	0.50	-0.33	-0.35	0.91	0.57	0.74	0.68	0.77	0.43	•1.30	•1.00	•1.05	•1.82	•1.14

Note: • = Noticeable difference

N = 33 employee assessments with interest in this job category, 23 employers who identified this job category as most difficult to recruit.

in this job category grocery were clerks and cashier-checkers which could be responsible for the higher expectations in the vocational aptitudes areas.

Thirty-three potential employees were reported in the Sales job category. These occupations are wholly or primarily associated in direct selling. Employees have a somewhat higher skill level in reasoning and noticeably higher math and language levels than the DOT indicates. Employees tend to have noticeably higher aptitude levels in spatial, motor coordination, manual dexterity, eye/hand/foot coordination and color discrimination. It appears the potential employee pool assessments indicates a workforce that is noticeably more qualified than the DOT requirements indicate as needed for successful entry level skills and aptitudes. While it does not appear to be a noticeable difference the employer expectation is lower in both math and language. A point should be made, the math and language levels of employees were noticeably higher when compared to both the DOT and employer expectations. Spatial aptitudes were noticeably higher for employees than the DOT but again were not noticeable when compared to employer expectations. There were noticeable differences in the higher levels in both motor coordination and eye/hand/foot coordination as reported by employers and employees. Manual dexterity aptitudes were lower for employees -.42 than was identified by DOT, the difference was not notable. Employer expectations were noticeable different at 1.05 higher. Color discrimination was noticeably higher for both employer and employee.

Office and Clerical

Employers showed a noticeably higher expectation level in the Office and Clerical areas of general and verbal aptitude abilities. Table V indicates the 14 respondents appeared to be consistent with DOT levels in most areas. The educational skill expectations were .71 higher in reasoning and .43 lower in math and .29 lower in language skills which would not be a noticeable difference. Job categories included in the area include bookkeepers, cashiers, typists, secretaries, telegraph and telephone operators.

The largest pool of potential employees was the Office and Clerical job category. Two hundred seventy-five employees were reported. Included in the category were all clerical types of work, regardless of level of difficulty, where the activities were predominantly non-manual. Included were bookkeepers, cashiers, collectors, office helpers, office machine operators, shipping and receiving clerks, typists and secretaries. The employee assessments were higher in the three skill areas with noticeable levels in reasoning and language areas. In aptitudes, manual dexterity was noticeably lower, with spatial, motor coordination, eye/hand/foot coordination, and color discrimination being noticeably higher.

In the Office and Clerical job areas, all levels of clerical work regardless of difficulty are included, the expectations of employers in the educational skill levels are lower than the employee pool. Fourteen employers were compared to 275 potential employees whose interest inventories revealed an interest in the office and clerical field. When comparing employer expectations to employee assessments there is considerable lower expectations in math and language skills and a slightly lower expectation in the

TABLE V

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY OFFICE AND CLERICAL

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	3.00	3.00	3.00	3.00	3.00	3.00	2.00	3.00	4.00	3.00	3.00	3.00	1.00	1.00
Employee Assessment	4.18	3.70	4.52	3.75	3.67	3.27	3.48	3.12	3.45	4.43	2.83	1.79	3.90	3.69
Employer Expectation	3.71	2.57	2.71	4.07	4.00	3.79	2.36	2.57	3.79	3.21	2.86	2.54	2.50	2.57
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	•1.18	0.70	•1.52	.075	0.67	0.27	•1.48	0.12	-0.55	•1.43	-0.17	•-1.21	•2.90	•2.69
Employer Difference	0.71	-0.43	-0.29	•1.07	•1.00	0.79	0.36	-0.43	-0.21	0.21	-0.14	-0.46	•1.50	•1.57

Note: • = Noticeable difference

N = 275 employee assessments with interest in this job category, 14 employers who identified this job category as most difficult to recruit.

reasoning skill. Noticeably lower expectations were also found from employers in the spatial and eye/hand/foot coordination aptitude levels.

The only notable differences in the general education skill levels were reported in the employee level in language where the employee level was 1.52 and in reasoning at 1.18 higher than DOT. In the aptitude levels employer expectation levels were noticeably higher in general at 1.07, verbal at 1.00, eye/hand/foot at 1.50 and color discrimination at 1.57. The employee differences in aptitudes were noticeably higher in spatial and motor coordination. In eye/hand/foot coordination the difference was noticeable at 2.90 and in color discrimination at 2.69. In manual dexterity the employee assessment level was noticeable at -1.21.

Craft Workers (Skilled)

Table VI summarized the Craft Workers (Skilled). The 21 employer respondents were in close agreement with the DOT expected levels in reasoning and math but noticeably lower in language at 1.35 less than the DOT defined level. The employer expectation would equate to an expected grade level equivalent to fourth to sixth grade level range. These workers, as defined by job description, should have relatively high-skill levels and a thorough and comprehensive knowledge in the process involved in their work. This job category includes hourly paid supervisors and lead operators who are not members of management. There were also noticeable differences indicated by higher expectations from employers in clerical, eye/hand/foot coordination, and color discrimination.

TABLE VI

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY CRAFT WORKERS (SKILLED)

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	4.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	2.00	3.00	4.00	4.00	2.00	2.00
Employee Assessment	4.22	3.76	4.38	3.76	3.57	3.12	3.59	3.26	2.92	4.42	2.85	2.06	4.06	3.65
Employer Expectation	3.70	2.57	1.65	4.05	3.43	3.38	3.86	3.86	3.19	3.95	3.67	3.76	3.62	3.43
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	0.22	0.76	•1.38	0.76	0.57	0.12	-0.41	-0.74	0.92	•1.42	•-1.15	•-1.94	•2.06	•1.65
Employer Difference	-0.30	-0.43	•-1.35	•1.05	0.43	0.38	-0.14	-0.14	•1.19	0.95	-0.33	-0.24	•1.62	•1.43

Note: • = Noticeable difference

N =134 employee assessments with interest in this job category, 21 employers who identified this job category as most difficult to recruit.

The 134 potential employees were higher in the reasoning and math and noticeably higher in the language skill area with a 1.38 higher level in language. Finger dexterity and manual dexterity, two aptitude levels that would be very significant to this job category, were noticeably lower than the aptitude levels defined in DOT.

The employer's differences in Craft Workers (Skilled) were lower in all general education skill development areas. The noticeable area was language where the expectation was 1.35 lower than the DOT level. The significance of the finding is greater when compared to the higher level of 1.38 recorded for the employee pool which would indicate a significant difference of 2.73 in language comparisons from employee to employer. While the math levels of employer expectations and employee assessments were not noticeable differences compared to DOT, there were noticeable differences when compared employer to employee. The employers had noticeably higher aptitude expectations in general, clerical, eye/hand/foot, and color discrimination. Employees had noticeably higher levels compared to the DOT in motor coordination, eye/hand/foot coordination, and color discrimination. In finger dexterity, the employees were noticeably lower than the DOT at -1.15. Compared to the lower expectation of employers at - 0.33 in the same area, the significance is reduced to less than a noticeable difference. Employee differences were noticeably lower in manual dexterity at -1.94 which could be significant due to the nature of jobs classified as skilled craft workers.

Operatives (Semi-Skilled)

Table VII reveals the comparison of operatives (semi-skilled). The operatives (semi-skilled) includes workers who operate machine or processing equipment or who

TABLE VII

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY OPERATIVES (SEMI-SKILLED)

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	3.00	2.00	2.00	3.00	3.00	3.00	4.00	3.00	2.00	3.00	2.00	3.00	2.00	1.00
Employee Assessment	4.22	3.76	4.38	3.76	3.57	3.12	3.59	3.26	2.92	4.42	2.85	2.06	4.06	3.65
Employer Expectation	2.11	1.70	1.80	3.40	3.30	2.60	2.10	2.00	2.40	3.10	2.90	3.70	3.50	2.80
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	•1.22	•1.76	•2.38	0.76	0.57	0.12	-0.41	0.26	0.92	•1.42	0.85	-0.94	•2.06	•2.65
Employer Difference	-0.89	-0.30	-0.20	0.40	0.30	-0.40	•-1.90	•-1.00	0.40	0.10	0.90	0.70	•1.50	•1.80

Note: • = Noticeable difference

N = 167 employee assessments with interest in this job category, 10 employers who identified this job category as most difficult to recruit.

perform other factory type duties of intermediate skill level which can be mastered in a few weeks. Included in this job category are bricklayers, plumbers, carpenters, machinists, and other jobs requiring limited training. Employer expectations were slightly lower in the basic skill areas.

The potential employee findings reported represented 167 individuals. Employees were noticeably higher than the DOT levels in all educational skill levels of reasoning, math and language. The employees were noticeably higher in motor coordination, eye/hand/foot coordination, and color discrimination. The only aptitude of significant lower value was manual dexterity.

The potential employee pool exceeded the employer expectations in all areas of skill and aptitudes with the exception of a very slight lower difference in finger dexterity and a noticeable lower aptitude level in manual dexterity. Employees compared to DOT were noticeably different, assessments were 1.22 higher in reasoning, 1.76 higher in math, and 2.38 higher in language. The employers expectations compared to DOT were -0.89 in reasoning, -0.30 in math, and -0.20 in language which are not noticeable differences. However, when studied in a job area that requires intermediate skill levels that can be mastered in a few weeks, that significant of a difference could be a factor in job retention. Another area that could be extremely relevant to this job category is manual dexterity where the employer expectation was 0.70 higher than the DOT while the employee aptitude level is -0.94 as compared to the DOT. Employers tended to place noticeably lower expectations in spatial aptitudes at -1.90 and form perception at -1.00. Both employers and employees were noticeably higher in eye/hand/foot coordination and in color discrimination.

Laborers

Laborers were reported in Table VIII. The levels of basic skill levels expected by employers were higher in reasoning and math but lower in language. Of particular note is the DOT defined level for laborers is 1 point lower in reasoning and math than semi-skilled operatives, but the language level is the same for both job categories. Noticeable differences which were recorded as higher expectations of employers in general, verbal, numerical, clerical, motor coordination, finger dexterity, eye/hand/foot, and color discrimination. Since aptitudes are areas that do not appear to improve with repeated testing, this could indicate an area for further exploration concerning future workforce development.

The 184 potential employees were noticeably higher than the DOT levels in all educational skill levels and in most aptitude levels. The only aptitude levels that were not noticeably higher were finger dexterity and manual dexterity. These findings could indicate a workforce that has higher levels of general educational development skills and aptitudes, than employers expected and DOT defined, which could result in retention concerns for employees in laborers positions.

The reasoning, math, and language skill areas indicate the employee pool is noticeably higher than the employer expectation. Since this job category requires no specific training and is considered elementary duties that do not require independent judgement, the employee pool appears to noticeably exceed the desired skills. The aptitude levels of employee assessment and employer expectations are not noticeably different with the exception of manual dexterity where the employer expectation is

TABLE VIII

A COMPARISON OF EMPLOYER EXPECTATIONS, EMPLOYEE ASSESSMENTS, AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS OF GENERAL EDUCATIONAL SKILLS AND APTITUDES FOR THE JOB CATEGORY LABORERS

	General Educational Skill			Vocational Aptitudes										
	scale 6= highest to 1=lowest			scale 5=highest to1=lowest										
Mean	Reasoning	Math	Language	General	Verbal	Numerical	Spatial	Form Perception	Clerical	Motor	Finger Dexterity	Manual Dexterity	Eye/ Hand/ Foot	Color Discrim
DOT Level	2.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	2.00	2.00	3.00	1.00	1.00
Employee Assessment	4.04	3.62	4.29	3.54	3.44	3.00	3.48	3.21	2.97	4.23	2.67	1.90	3.89	3.72
Employer Expectation	2.29	1.47	1.33	3.38	3.25	3.19	2.63	2.81	3.06	3.94	3.31	3.81	3.25	2.81
Difference	from DOT	Level												
DOT Level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employee Difference	•2.04	•2.62	•2.29	•1.54	•1.44	•1.00	•1.48	•1.21	•1.97	•2.23	0.67	•-1.10	•2.89	•2.72
Employer Difference	0.29	0.47	-0.67	•1.38	•1.25	•1.19	0.63	0.81	•2.06	•1.94	•1.31	0.81	•2.25	•1.81

Note: • = Noticeable difference

N = 184employee assessments with interest in this job category, 16 employers who identified this job category as most difficult to recruit.

considerably higher. The expectations of employers indicates that there is less expectations from the employers in the general educational areas than the employees level of skills.

Employer expectations in most levels were reported as higher than the DOT levels with the exception of language at -0.67. The employee differences of 2.04 in reasoning, 2.62 in math, and 2.29 in language were noticeably higher than the DOT level. Also the noticeable higher differences of 1.54 in general, 1.44 in verbal, 1.00 in numerical, 1.48, in spatial, 1.21 in form perception, 1.97 in clerical, 2.23 in motor coordination, 2.89 in eye/hand/foot and 2.72 in color discrimination could indicate a potential workforce that is over qualified for the job category. The employer expectations are notably higher as compared to DOT in general, verbal, numerical, clerical, motor coordination, finger dexterity, eye/hand/foot, and color discrimination. Laborers were defined as occupations that require no special training to perform elementary duties that may not involve independent judgement.

Temperaments

Employers were asked to identify the importance of employees' abilities in all 10 temperaments listed. Only very important ratings were recorded as desired temperaments by employees in each job category.

Table IX summarized the responses for Executives/Officials/Managers. The DOT listed directing, decisions, and people as temperaments which apply to the job category. The employers agreed to the directing, decisions, and people that were listed by DOT. The greatest was to people where 100 % of employers rated the temperament as very

TABLE IX

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS EXECUTIVES/ OFFICIALS/MANAGERS AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	10	66.7%	Yes
Expressing (E)	11	73.3%	No
Influencing (I)	10	66.7%	No
Decisions (J)	11	73.3%	Yes
Under Instruction (U)	10	66.7%	No
People (P)	15	100.0%	Yes
Repetitive (R)	8	53.3%	No
Stress (S)	13	86.7%	No
Tolerance (T)	10	66.7%	No
Variety (V)	9	60.0%	No

N = 15 Employers who identified executives, officials, and managers as the most difficult job category to recruit.

important. Employers thought expressing, influencing, under instruction, stress, tolerance, repetitive, and variety were also temperament factors that applied, over 50 % of employers indicated these were very important temperament factors for this job category.

The Professionals job category were revealed in Table X. Directing, decisions, and people skills were listed by DOT applicable temperaments. The employers agreed to directing, decisions, and people. Employers highest rating was in people at 88 %. Expressing, influencing, stress, and tolerance all received 50 % or more very important ratings by the employers.

The technicians job category was recorded in Table XI. DOT listed decisions, people, tolerance, and variety. The employers agreed with people, tolerance, and variety. The employers disagreed in decisions giving only a 41.7 % very important rating to the temperament. In addition the employers thought stress was an important temperament at 75 % very important rating.

In the Sales Job category, summarized in Table XII, people temperaments was the only temperament listed by DOT. Employers agreed to people and also rated repetitive and stress at more than 50 % very important ratings. Table XIII revealed the data for office and clerical. The DOT listed areas were under instruction, people and repetitive. Employers agreed with DOT in people and repetitive, and additionally listed stress. Each temperament received 50% or more very important ratings from the employers. Employers disagreed with DOT in under instruction where only three employers which represented 21.4% of respondents thought it was a very important temperament.

TABLE X

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS PROFESSIONALS AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	17	68.0%	Yes
Expressing (E)	17	68.0%	No
Influencing (I)	13	52.0%	No
Decisions (J)	16	64.0%	Yes
Under Instruction (U)	11	44.0%	No
People (P)	22	88.0%	Yes
Repetitive (R)	12	48.0%	No
Stress (S)	16	64.0%	No
Tolerance (T)	15	60.0%	No
Variety (V)	11	44.0%	No

N = 25 Employers who identified professionals as the most difficult job category to recruit.

TABLE XI

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS TECHNICIANS AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	7	29.2%	No
Expressing (E)	7	29.2%	No
Influencing (I)	8	33.3%	No
Decisions (J)	10	41.7%	Yes
Under Instruction (U)	12	50.0%	No
People (P)	20	83.3%	Yes
Repetitive (R)	9	37.5%	No
Stress (S)	18	75.0%	No
Tolerance (T)	16	66.7%	Yes
Variety (V)	14	58.3%	Yes

N = 24 Employers who identified technicians as the most difficult job category to recruit.

TABLE XII

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS SALES AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	4	17.4%	No
Expressing (E)	6	26.1%	No
Influencing (I)	9	39.1%	No
Decisions (J)	5	21.7%	No
Under Instruction (U)	4	17.4%	No
People (P)	18	78.3%	Yes
Repetitive (R)	12	52.2%	No
Stress (S)	12	52.2%	No
Tolerance (T)	9	39.1%	No
Variety (V)	10	43.5%	No

N = 23 Employers who identified sales as the most difficult job category to recruit.

TABLE XIII

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS OFFICE AND CLERICAL AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	4	28.6%	No
Expressing (E)	2	14.3%	No
Influencing (I)	3	21.4%	No
Decisions (J)	4	28.6%	No
Under Instruction (U)	3	21.4%	Yes
People (P)	9	64.3%	Yes
Repetitive (R)	7	50.0%	Yes
Stress (S)	7	50.0%	No
Tolerance (T)	4	28.6%	No
Variety (V)	6	42.9%	No

N = 14 Employers who identified clerical and office as the most difficult job category to recruit.

Table XIV, Craft Workers (Skilled), DOT listed tolerance, variety and decisions as the most desired temperaments. Employers only agreed with tolerance which received 61.9 % very important rating. Tolerance was the only temperament employers gave more than 50 % approval. Table XV listed the operative (semi-skilled) job category. Employers and DOT did not agree on temperaments. DOT listed decisions, tolerance, and variety. Employers rated decisions at 20 % , tolerance at 30 % ,variety was not rated by employers. Employers responses only indicated repetitive as a very important temperament at 60 % .

Table XVI summarizes the laborers desired temperaments. DOT listed repetitive as the only applicable temperament. Employers indicated repetitive and people, however both temperaments only received 43.8% very important ratings. None of the ten temperaments received a 50 % or more rating from the employers.

Obstacles To Future Expansion

Responses from employers concerning the obstacles to expanding business included: primary training, education, certification or degree programs and other workforce issues supported the findings related to temperaments. Listed as responses desired were: good attitudes, willingness to work, willing to work second shift, dependability, motivated people, willing to work six days a week, honesty, dedicated help, pride in products, work ethic, people skills, want to attitude, human resource skills, reliable, capable, skilled and knowledgeable, enthusiastic and educated, common sense, thinking, training in how to work, communication skills, personal presentation and communication training, people skills in customer service and relations, a degree in

TABLE XIV

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS CRAFT WORKERS (SKILLED) AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	3	14.3%	No
Expressing (E)	2	9.5%	No
Influencing (I)	5	23.8%	No
Decisions (J)	4	19.0%	Yes
Under Instruction (U)	8	38.1%	No
People (P)	8	38.1%	No
Repetitive (R)	8	38.1%	No
Stress (S)	9	42.9%	No
Tolerance (T)	13	61.9%	Yes
Variety (V)	9	42.9%	Yes

N = 21 Employers who identified craft workers (skilled) as the most difficult job category to recruit.

TABLE XV

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS OPERATIVES (SEMI-SKILLED) AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	0	0.0%	No
Expressing (E)	0	0.0%	No
Influencing (I)	0	0.0%	No
Decisions (J)	2	20.0%	Yes
Under Instruction (U)	3	30.0%	No
People (P)	4	40.0%	No
Repetitive (R)	6	60.0%	No
Stress (S)	3	30.0%	No
Tolerance (T)	3	30.0%	Yes
Variety (V)	0	0.0%	Yes

N = 10 Employers who identified operatives (semi-skilled) as the most difficult job category to recruit.

TABLE XVI

A COMPARISON OF EMPLOYER PERCEPTIONS OF VERY IMPORTANT TEMPERAMENT FACTORS FOR EMPLOYEES AS LABORERS AS COMPARED TO DICTIONARY OF OCCUPATIONAL TITLES LISTING

Temperament Factors	Employers Perceptions		DOT Listed Yes/No
	Frequency Very Important Rating	Percent of Employers	
Directing (D)	2	12.5%	No
Expressing (E)	2	12.5%	No
Influencing (I)	4	25.0%	No
Decisions (J)	4	25.0%	No
Under Instruction (U)	2	12.5%	No
People (P)	7	43.8%	No
Repetitive (R)	7	43.8%	Yes
Stress (S)	6	37.5%	No
Tolerance (T)	3	18.8%	No
Variety (V)	4	25.0%	No

N = 16 Employers who identified laborers as the most difficult job category to recruit.

common sense, communication with third persons and general people skills. Of interesting note was one respondent's response to workforce issues that need to be addressed in the future, the respondent said, "our company's number one problem is personnel and the reason "laborers" was checked for the "most difficult to recruit" category for recruitment, is finding people who are actually willing to work. Sounds simple but this "willingness" has become a rare commodity in America today. As a result, the majority of our laborers are expatriates from Mexico. They apparently still expect to work for a living."

Summary

In summarizing the data, the employers had lower expectations than DOT levels in reasoning, math, and language in general educational skill development areas. This was an area of concern in respect to the review of literature findings and the generally accepted opinions that employees tend to have low basic skills. However, the expectations of employers in the general, verbal, and numerical aptitude areas were higher than the DOT defined levels of aptitudes needed to be successful in the job category. It appears from these findings that the employers wanted employees that had a greater aptitude to learn skills than the skill levels required for the job. This finding is of primary concern to the future of workforce development. It is apparent that employers either did not understand the questions describing the levels that referenced DOT defined levels of attainment, or the employers desire higher levels of abilities needed for learning than is required to be successful in the job. The responses that required employers to respond in their own words to questions, indicated the employers did have a concern for

basic math, communication skills, and spelling. When the employers were asked to check the response that best described the level of reasoning, math, and language they desired employees to be able to perform, the level, identified by the employer, was lower than both DOT and potential employee levels. These differences in educational skill development support the finding that potential workforce has higher reasoning, math, and language skill levels than levels employers identified as desired.

Temperaments in each job category that 50 % of employers rated as very important were considered as temperaments employers desired of potential employees. In comparing the employer findings to those listed in DOT most categories matched with the employers identifying additional temperaments than listed in the DOT. The exceptions were in the technicians, office and clerical, craft workers, and operatives job categories. In the laborers job category, no ratings were greater than 50 %. The two highest ratings were tied at 43.8 % each, those categories were people and repetitive. DOT listed repetitive as the only temperament for the job category.

There was not previous research that could be found by the researcher that compared the employer expectations to the DOT levels defined as needed for successful employment by job category. The findings reported in the data analysis provide significant information comparing the differences in the employer expectations of skills, abilities and desired temperaments, potential employee skills and abilities assessments, to levels defined as needed for successful employment or listed in the Dictionary of Occupational Titles.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to determine a group of employers' perceptions of required proficiency in selected skills, aptitudes and temperaments for certain job categories according to the projected difficulty in recruiting workers in the future. A concurrent purpose was to compare the perceptions to levels set forth by the U.S. Department of Labor Dictionary of Occupational Titles and to the assessments of a group of potential employees. A review of literature was conducted, and it was discovered that very little research had been done in determining employee educational skill levels and aptitudes perceived by potential employers. The researcher did not find research that compared employer expectations to the levels of available workforce and the levels defined in The Dictionary of Occupational Titles. In addition, there was limited work in identifying worker temperaments compared to those identified in The Dictionary of Occupational Titles. This study, then, provides a unique approach in that it seeks to compare, by job category, educational skill levels and aptitudes identified by potential employers to the potential available workforce in Garfield County. The study also compares the educational skills, aptitudes, and worker temperaments to those identified in The Dictionary of Occupational Titles.

The major objectives that guided the study were:

1. To compare by job categories the educational skill levels and aptitudes expected by employers, the assessments of potential employees and the levels defined in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

2. To compare by job categories employer perceptions of very important temperaments to those listed in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

A mailed questionnaire was developed to acquire the information needed to answer employer responses. The population for the survey included those businesses in Garfield County employing five or more persons which were listed in the Oklahoma Business Directory. The questionnaire and a cover letter from the Workforce Development Compact Board of Directors were mailed to 632 businesses in Garfield County. After a second postcard was mailed and telephone calls and personal visits made, 148 completed surveys were returned resulting in a 23.6% return rate. The available workforce was limited to those persons who had taken skills assessment testing at Autry Technology Center during fiscal years 1995, 1996, 1997, and 1998. The U. S. Department of Labor Dictionary of Occupational Titles was utilized to determine the levels considered to be necessary for successful employment.

The analysis of data included determining the mean scores for employer responses and mean scores for persons who had taken assessment testing at Autry Technology Center. A noticeable difference was determined to be a score level one point or more from the educational skill level or aptitude level. The data analysis was organized into

the following major functional areas by job category: employer and employee differences to DOT, and employer perceived very important temperaments to DOT listed temperaments.

Major Findings

The research was designed to provide a systematic investigation into determining educational skill levels, aptitudes and temperaments critical to job development. The major findings and conclusions are based on the results of this study and sequenced around the study objectives.

Employer expectations were compared to the levels defined in Dictionary of Occupational Titles. A comparison by job categories of average scores of individuals that had taken the SAGE assessment test at Autry Technology Center during fiscal years 1995,1996,1997, and 1998 was also made to the levels defined by the Dictionary of Occupational Titles. Specifically, the following findings resulted from the study:

Objective 1. To compare by job categories if there were differences in the educational skill levels and aptitudes expected by employers, the assessments of potential employees and the levels defined in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

1. The employers expected noticeably lower reasoning, math and language levels than DOT defined as needed to be successful in the Executives/Officials/Managers job category.

2. The employers expected noticeably higher motor coordination, finger dexterity, manual dexterity, eye, hand and foot, and color discrimination levels than DOT defined as needed to be successful in the Executives, Officials and Managers job category.

3. Employees had noticeably lower reasoning levels than DOT defined as needed to be successful in the Executives, Officials and Managers job category.

4. Employees had noticeably higher motor coordination, eye/hand/foot coordination, and color discrimination levels than DOT defined as needed to be successful in Executives, Officials and Managers job category.

5. Employer expectations were noticeably lower in math than the level identified by DOT in the Professional job category.

6. Employer expectations were noticeably higher in numerical, clerical, motor coordination, finger dexterity, manual dexterity, and eye/hand/foot levels than DOT defined as needed to be successful in the Professionals job category.

7. Employees had noticeably lower reasoning and math levels than DOT defined as needed to be successful in the Professionals job category.

8. Employees had noticeably higher motor coordination and eye/hand/foot levels than DOT defined as needed to be successful in the Professionals job category.

9. Employers indicated noticeably lower expectations in language skill levels and noticeably higher expectations in verbal and eye/hand/foot levels than DOT defined as needed to be successful in the Technicians job category.

10. Employees had a noticeably higher eye/hand/foot level and a noticeably lower finger dexterity level than DOT defined as needed to be successful in the Technicians job category.

11. Employers expectations were noticeably higher in motor coordination, finger dexterity, manual dexterity, eye/hand/foot and color discrimination levels than DOT defined as needed to be successful in the Sales job category.

12. Employees had noticeably higher math and language skills than the DOT defined levels in the Sales job category.

13. Employees had noticeably higher spatial, motor coordination, eye/hand/foot and color discrimination than DOT defined as needed to be successful in the Sales job category.

14. Employers expected noticeably higher general, verbal, eye/hand/foot, and color discrimination than DOT defined as needed to be successful in the Office and Clerical job category.

15. Employees had noticeably higher reasoning and language levels than DOT defined as needed to be successful in the Office and Clerical job category.

16. Employees had noticeably higher spatial, motor coordination, eye/hand/foot, and color discrimination than DOT defined as needed to be successful in the Office and Clerical job category.

17. Employees had a noticeably lower manual dexterity level than DOT defined as needed to be successful in the Office and Clerical job category.

18. Employers expected a noticeably lower language level than DOT defined as needed to be successful in the Craft Workers (Skilled) job category.

19. Employers expected a noticeably higher clerical, eye/hand/foot, and color discrimination levels than DOT defined as needed to be successful in the Craft Workers (Skilled) job category.

20. Employees had a noticeably higher language level than DOT defined as needed to be successful in the Craft Workers (Skilled) job category.

21. Employees had noticeably higher motor coordination, eye/hand/foot, and color discrimination than DOT defined as needed to be successful in the Craft Workers (Skilled) job category.

22. Employees had noticeably lower finger dexterity and manual dexterity than DOT defined as needed in the Craft Workers (Skilled) job category.

23. Employers expected noticeably higher eye/hand/foot and color discrimination than DOT defined as needed in the Operatives (Semi-Skilled) job category.

24. Employers expected noticeably lower spatial and form perception than DOT identified as needed to be successful in the Operatives (Semi-Skilled) job category.

25. Employees had noticeably higher reasoning, math and language levels than DOT defined as needed to be successful in the Operatives (Semi-Skilled) job category.

26. Employees had noticeably higher motor coordination, eye/hand/foot, and color discrimination levels than DOT defined as needed to be successful in the Operatives (Semi-Skilled) job category.

27. Employers expected noticeably higher general, verbal, numerical, clerical, motor coordination, finger dexterity, eye/hand/foot, and color discrimination levels than DOT defined as needed to be successful in the Laborers job category.

28. Employees had noticeably higher reasoning, math and language levels than DOT defined as needed to be successful in the Laborers job category.

29. Employees had noticeably higher general, verbal, numerical, spatial, form perception, clerical, motor coordination, eye/hand/foot, and color discrimination levels than DOT defined as needed to be successful in the Laborers job category.

30. Employees had a noticeably lower manual dexterity level than DOT defined as needed to be successful in the Laborers job category.

Objective 2. To compare by job categories employer perceptions of very important temperaments to those listed in the U.S. Department of Labor Dictionary of Occupational Titles as needed to be successful.

The researcher found the temperaments identified by employers could prove valuable to workforce development. DOT only identified temperaments validated in Department of Labor studies of job categories. Employers were asked to rank temperaments that they perceived as important in each of the 10 temperaments. Only those responses that were identified as very important were considered.

1. Employers identified people skills, stress or working under pressure, and decision making as the top three very important temperaments in the Executives, Officials and Managers job category.

2. DOT identified directing, decisions, and people skills as the important temperaments in the Executives, Officials and Managers and professional job categories.

3. Employers rated people skills, directing, expressing and stress or working under pressure as the most important temperaments in the Professional job category.

4. DOT listed decisions, people skills, tolerance, and variety as important temperaments in the Technicians job category.

5. Employers rated people skills, stress or working under pressure, and tolerance as the very important temperaments in the Technicians job category.

6. The only temperament listed by DOT in the Sales job category was people skills.

7. Employers rated people skills as the most important temperament followed by stress and repetitive in the Sales job category.

8. DOT listed people skills, instruction, and repetitive as important temperaments in the Office and Clerical job category.

9. Employers identified people skills, repetitive, and stress or working under pressure as the very important temperaments in the Office and Clerical job category.

10. Employers rated tolerance, variety, and stress or working under pressure as the very important temperaments in the Skilled Craft Workers job category.

11. DOT listed tolerance, variety, and decisions as important temperaments in the Skilled Craft Worker job category.

12. In the Semi-skilled job category employers rated repetitive and people skills as the very important temperaments.

13. DOT listed decisions and variety as important temperaments in the Semi-Skilled job category.

14. Repetitive was the only job temperament listed by DOT in the Laborer job category.

15. Employers rated people skills and repetitive as the very important temperaments in the Laborer job category.

Summary

It can be summarized from the findings of this study that employers desired lower levels of reasoning, math, and language skills than was identified by the DOT in many job categories. Employers expected aptitudes levels higher than those defined by DOT in many job categories. This indicates employers desired lower levels of skill training in the areas that could be improved with additional training, however in aptitude levels where additional training is not considered to improve aptitude, employers identified higher expectations.

There were noticeable differences in the educational skill levels and aptitudes expected by employers and the potential employees assessments when compared to levels defined in the U.S. Department of Labor Dictionary of Occupational Titles. Many differences would not be considered noticeable when findings were compared between the employer expectations and potential employee assessments. It appeared the potential employee pool had higher general educational development skill levels than was desired by the employers. However the employers' aptitude expectations were higher than the aptitude levels of potential employees.

It can be summarized from the findings of this study that differences are apparent in the temperaments perceived by employers as compared to those listed by DOT. The employers appeared to include more temperaments than the DOT listed in most job categories. The ability to work with people, defined as influence of peoples opinions, attitudes, and judgements was the temperament most desired by employers in all job

categories other than operatives and craft workers. Stress or the ability to work under pressure was rated as very important in most job categories by the employers.

Conclusions

It can be concluded that employers had lower expectations in reasoning, math and language skills in the Executives/Officials/Managers job category. The employer expectation equates to a fourth to sixth grade school level. Basic educational skill levels expected by employers were noticeably less that those levels defined by DOT. This was of interest in the job category that included occupations requiring administrative personnel to set broad policies and be responsible for the execution of those policies. It appeared that employers indicated they expected employees to have higher aptitudes, or the ability to learn, yet in the general educational skills the employers expected lower levels of math and language. These differences could indicate the employers' understanding of educational skills and aptitude levels were different than the standards commonly used in education.

In the Professionals job category the employers expectations were lower that the DOT levels. The employer expectations of math skills were lowest at 3.97 which is equivalent to seventh to eighth grade skill levels. This was in a job category that included college graduates or experienced accountants, auditors, pilots, chemists, engineers, and teachers. The employers expectations were again higher in aptitude levels. The employee assessments were comparable to the employer expectations in reasoning and math.

Employers had lower expectations in reasoning, math, and language skills, in the Technicians job category. The employers were noticeably lower than the DOT defined level in language. The employers' expectation level was comparable to the sixth grade level. The employees averages only slightly higher levels in reasoning and language skills and slightly lower math skills than was defined by DOT. The aptitudes level differences were minimal when employers were compared to employers. Technicians occupations require a combination of basic scientific and manual skills, which could indicate this job category should be studies further in developing a workforce.

The Sales job category appears to have a potential employee pool that is noticeably more qualified in math and language skills that DOT defined and employer expectations as needed to be successful. The employers expectations of abilities were higher that DOT levels, however the employee ability assessments were also higher. This could be of significant importance in workforce development issues.

Employers expected noticeably higher levels in general and verbal aptitudes in the Office and Clerical job category. The employee assessments were higher that DOT in all three skill areas with noticeable levels in reasoning and language areas. The employee assessments were noticeably in the skill areas that were the employer expectations. A potential challenge to the workforce in this job category could be in manual dexterity where the employee assessment level was -1.21 compared to the DOT defined level.

In the Craft Workers (Skilled) job category the employer expectation in language equated to a fourth to sixth grade level which is 1.35 less that the DOT defined level to be successful in the job category. The employer expectation were lower in the math and reasoning skill areas. The employers had noticeable higher expectation in general,

clerical, eye/hand/foot and color discrimination. The employees were noticeably higher in language skills, motor coordination, eye/hand/foot and color discrimination. The employees were noticeably lower in finger dexterity and manual dexterity. These findings indicate that this job category should be studied further to determine how the differences could affect the workforce availability.

In the Operatives (Semi-skilled) job category the potential employee pool exceeded the employer expectation in all areas of skills and aptitudes with the exception of a slight difference in finger dexterity and a noticeably lower aptitude level in manual dexterity. Employers expectation compared to DOT levels were lower in the basic skill areas. Manual dexterity could be relevant to this job category, employer expectations were higher that DOT and the employee level was lower. Employers tended to place noticeably lower expectations in spatial and form perception. These areas could be significant in a job area that requires intermediate skill levels that can be mastered in a few weeks.

In the Laborers job category the employee pool is considerably higher than employer expectation. Since this job category requires no specific training and includes elementary duties that do not require independent judgment, the employee pool assessment appears to considerably exceed the DOT level and employer expectations.

Employers rated as very important most temperaments. It can be concluded that employers desire employees that have most of the temperaments factors listed in the Dictionary of Occupational Titles for most of the job categories. This indicates temperament factors need to be considered in workforce development.

Recommendations

The emphasis concerning the importance of standards in both education and the workplace will continue as the expectations of employers continue to increase. Employers indicate they want workers who can solve problems, work in more uncertain and less well-defined circumstances, and take initiative and responsibility. Partnerships are being formed to create coherent and comprehensive workforce systems to meet the current and future need of employment, education, and training needs of Garfield County businesses. This study has some implications for the continuation of this effort as well as for additional related research.

First, it is recommended that business and education continue to work together to define the needs of employers. Since the data in this study supports the notion there are noticeable differences in general education skill development and vocational aptitudes, a continued effort to understand the educational and industry standards and expectations is imperative. The efforts could be enhanced by focus group meetings between educators and those involved in industry at all levels. The meeting's mission should include defining the strengths and weaknesses in the current processes both in education and the workplace. Objectives should be formulated that will begin the process of eliminating the differences in education, and the workplace, since both are vital to workforce development.

Second, employers identified the important temperaments desired of employees. Industry and education must continue to explore ways and means to incorporate activities that build these temperaments as part of basic education and workforce training. The

training programs being utilized should be validated to ensure these temperaments are integral to the curriculum.

Third, the employee pool, as supported by the data in this study, appeared to have higher general education levels and abilities than were identified by the employers. Yet as evidenced in the written responses from employers to the obstacles of expanding business and future training and education needs, employers indicated the need for work ethic, dependability, and capability. There is still a perception that employees lack basic skills, which results in educations criticism of not teaching basic academic skills . Efforts should be continued and expanded to determine how employers arrived at these responses and if basic skills as perceived by industry are the same as perceived by education. Education should work with industry in providing services that include performance audits, quality measures, job descriptions, interpersonal skill training and customized training services to clarify employer expectations and provide desired workforce training.

Fourth, education should continue to form partnerships with businesses that expose students to real life work experiences. The work experiences should continue to focus on the development of skills and abilities that can be enhanced and broadened through application in the workplace.

Recommendations for Further Research

The findings of this study revealed topic areas where research could provide additional information in advancing the effort of workforce development. The merits of

this study would be greatly enhanced if further research would be done in the following areas:

First, The findings of this study were based on the SAGE assessment average of potential employees seeking training or pre-employment assessments prior to employment. Further research should investigate pre and post abilities assessment to determine if educational skills and temperaments are improved with training.

Second, Further research is recommended to measure the effect new industry recruitment would have on existing employee pools. It was indicated in the review of literature that a previous study indicated 50.7% of people within a forty minute travel time of Enid, Oklahoma, had an interest in changing jobs. Fifty-eight percent of those surveyed indicated they would change jobs for $12.00 per hour or less. This study indicated that many jobs required lower skills, the potential employee pool appears overqualified in skills and abilities. New "high tech"industries that challenge the potential employee levels and offered higher wages could greatly reduce the current employee pool in Garfield County.

Third, Further research is needed to compare the skill levels employers identified to the competencies levels education requires of students. The educational skill levels appear greater than the employer expectations. However comments from employers indicate employees lack the basic skills to perform the expected job requirements. Additional research should be conducted to validate the perceptions of employers to determine if the perceived deficit of basic skills is cognitive or applied. The findings should then be compared to educational competencies to ensure educational standards and industry standards are comparable.

In the researcher's opinion the findings presented provide vital information for use in the development of a workforce compact that could address the current and future employment, education, and training needs of businesses in Garfield County, Oklahoma.

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APPENDIX A

EMPLOYER CONTACT LETTER

GARFIELD COUNTY
WORKFORCE DEVELOPMENT COMPACT

July 14, 1998

MEMBERS

Business Name
Address
City, State, ZIP

Dear (individual's name)

We need you to tell us what kind of employee you need now and in the future. The changing workforce is one of the most significant challenges facing organizations today. The Garfield County Workforce Development Compact's mission is to develop a qualified workforce for Garfield County.

You can assist us, through the enclosed survey, by describing the level of employee ability or skill level you need for anticipated job openings in your company. The information you provide will be valuable in establishing a qualified pool of employees to meet workforce demands. Your response to this survey will shape the education/training given to potential workers for years to come. A copy of the survey results will be available to you upon request.

We appreciate your participation and assure you that we will keep your responses strictly confidential. The coding system used on the envelopes is for follow-up research purposes only. The information will be reported in the aggregate with no identification of you in the report. Any risk involved with this research will be minimal. If you have any questions concerning this research, you may contact John Howell or Dale Shaffer at Autry Technology Center at (580) 242-2750 or Gay Clarkson, the Oklahoma State University Institutional Review Board Executive Secretary at 305 Whitehurst, OSU, Stillwater, OK 74078, ph. (405) 744-5700.

Please complete the survey and return in the postage paid envelope. Thank you for your participation.

Ron Shamblin – Ron Shamblin
John Cromwell
Dennis DeRossett
Jay Hoberecht
Roy Clymer
Jim Rives

APPENDIX B

EMPLOYER SURVEY

Employer Survey

Instructions: To complete this survey, answer each question. After you have completed the survey, fold, insert into the self-addressed, stamped envelope enclosed, and drop it in the mail.

1.01 What is the industrial classification of your business? (check one)

Agriculture, Forestry, Fishing	☐
Mining, Oil & Gas	☐
Construction	☐
Manufacturing	☐
Transport, Communication, Utility	☐

Wholesale Trade	☐
Retail Trade	☐
Finance, Insurance, Real Estate	☐
Services	☐
Public Administration	☐
Other (Specify):_____)	☐

1.02 Rank each category (1.02) based upon the difficulty of recruiting employees for your business (1= most difficult to 8=least difficult). If you need clarification of job category, see definitions on page 5.

Enter the number of job openings expected 1.02a & 102b)... and rank by recruitment difficulty (1.02c)

Job Category		1.02 Rank order 1to 8
Executive/Official/Manager		
Professionals		
Technicians		
Sales		
Office and Clerical		
Craft Workers (Skilled)		
Operatives (Semi-skilled)		
Laborers		

For the job category with the most difficult recruitment (the No. 1 ranking in 1.02c), check the box in questions 2.01 to 2.14 that best describes the level of employee ability and/or skill level needed:

2.01 Employees should be able to: (Check only one)

- □ apply logical thinking to practical problems
- □ collect data, establish facts, and draw conclusions
- □ interpret instructions
- □ deal with problems with concrete variables
- □ use common sense understanding and carry out a set of instructions
- □ use common sense understanding to carry out simple instructions

2.02 Employees should be able to: (Check only one)

- □ apply advanced math and statistical techniques
- □ apply wide variety of theoretical mathematical concepts
- □ perform arithmetic, algebraic & geometric equations
- □ make arithmetic calculations involving fractions, %, decimals
- □ use arithmetic to add, subtract, multiply, divide whole numbers
- □ perform simple addition, subtraction, reading, copying, counting

2.03 Employees should be able to comprehend and express and be able to: (Check only one)

- □ report, write, edit articles for newspapers, journals, etc.
- □ interview, counsel, advise or prepare and deliver lectures to others
- □ interpret technical manuals or transcribe dictation or screen people, write routine correspondence
- □ write identifying information such as weight, name, type of product, by numbers
- □ learn job duties from oral instructions or demonstration

2.04 Employees should have the ability to "catch on" or understand instructions and underlying principles; and have the ability to reason and make judgements: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.05 Employees should be able to understand the meaning of words and to use them effectively; have the ability to comprehend language and to understand relationships between words: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.06 Employees should be able to perform arithmetic operations quickly and accurately: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.07 Employees should have the spatial aptitude to look at flat drawings or pictures and form mental images as to their height, width, and depth: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.08 Employees should be able to observe detail in objects or drawings noticing differences in shape or shadings: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.09 Employees should be able to observe details, recognize errors in numbers, spelling, and punctuation in written materials, charts, tables: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.10 Employees should have coordination of eyesight and hands or fingers to perform tasks rapidly and correctly: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.11 Employees should have finger dexterity to manipulate small objects rapidly and correctly: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.12 Employees should be able to move hands with ease and skill in placing and

turning motions: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.13 Employees should have the ability to coordinate the hand and foot movement in response to visual stimuli: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

2.14 Employees should have the ability to match or discriminate between colors in terms of hue, saturation, and brilliance: (Check only one)

High Degree	Above average	Average	Below Average	Low
□	□	□	□	□

3.00 For the job category with the most difficult recruitment (the No. 1 ranking in 1.02c) check the box in question 3.01 to 3.10 that best describes the importance of the employee's ability in the following temperaments.

3.01 Plan and direct an entire activity: (Check one)

Very Important	Important	Somewhat Important	Slightly Important	Not Critical
□	□	□	□	□

3.02 Interpret and express feelings, ideas, or facts: (Check one)

Very Important	Important	Somewhat Important	Slightly Important	Not Critical
□	□	□	□	□

3.03 Influence people's opinions, attitudes, judgments: (Check one)

Very Important	Important	Somewhat Important	Slightly Important	Not Critical
□	□	□	□	□

3.04 Make decisions using personal judgement: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

3.05 Make decisions using standards that can be measured or checked: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

3.06 Deal with people: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

3.07 Perform routine tasks: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

3.08 Work under pressure: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

3.09 Work with precise limits on standards of accuracy: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

3.10 Perform duties which change frequently: (Check one)

Very Important ☐	Important ☐	Somewhat Important ☐	Slightly Important ☐	Not Critical ☐

4.01 What are the two biggest obstacles to expanding your business?

1 _____ 2 _____

4.02 What primary training, education, certification, or degree program(s) would help overcome these obstacles?

1 _____ 2 _____

4.03 What other workforce issues do you feel should be addressed?

_____

_____

_____

_____

_____

DEFINITION OF TERMS

Executives, Officials, Mangers:
Occupations requiring administrative personnel to set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of a firm's operations. Includes: officials, executives, middle management, plant managers, and superintendents, salaried foremen who are members of management, purchasing agents and buyers, and kindred workers.

Professionals:
Occupation requiring either college graduation or experience of such kind and amount as to provide a comparable background. Includes: accountants and auditors, airplane pilots and navigators, architects, artists, chemists, designers, dietitians, editors, engineers, lawyers, librarians, natural scientists, registered professional nurses, personnel and labor relations workers, physical scientists, and teachers.

Technicians:
Occupations requiring a combination of basic scientific and manual skills which can be obtained through about two years of post-high school education, such as is offered in many technical institutes and junior colleges, or through equivalent on-the-job training. Includes: computer programmers and operators, drafters, engineering aids, junior engineers, mathematical aides, licensed, practical or vocational nurses, photographers, radio operators, scientific assistants, surveyors, and technical illustrators.

Sales:
Occupations engaging wholly or primarily in direct selling. Includes: advertising agents and sales workers, insurance agents and brokers, stock and bond sales workers, demonstrators, sales workers and sales clerks, grocery clerks and cashier-checkers.

Office and Clerical:
Includes all clerical types of work, regardless of level of difficulty, where the activities are predominantly non-manual, transporting the products is included. Includes bookkeepers, cashiers, collectors (bills and accounts), messengers and office helpers, office machine operators, shipping and receiving clerks, stenographers, typists and secretaries, telegraph and telephone operators.

Craft Workers (skilled):
Manual workers of a relatively high-skilled level having a thorough and comprehensive knowledge of the processes involved in their work. Exercise considerable independent judgment and usually receive an extensive period of training. Includes: the building trades, hourly-paid supervisors and lead operators who are not members of management, mechanics and repairs, skilled machining occupations, compositors and typesetters, electricians, engravers, job setters (metal), stationary engineers, and tailors.

Operatives (Semi-skilled):
Workers who operate machine or processing equipment or who perform other factory-type duties of intermediate skill level which can be mastered in a few weeks and require only limited training. Includes: apprentices (auto mechanics, plumbers, bricklayers, carpenters, electricians, machinists, mechanics, metal working trades, printing trades, etc.), chauffeurs, delivery workers, dressmakers, furnace workers, motor operators, boilers and greasers, photographic process workers, truck drivers, weavers, and welders.

Laborers:
Workers in manual occupations that generally require no special training to perform elementary duties that may not involve independent judgment. Includes: garage laborers, car washers, gardeners and groundskeepers, stevedores, laborers performing lifting, digging, loading and pulling operations.

APPENDIX C

FOLLOW UP CONTACT CARD

Just a reminder- 7/28/98

We have not received the employer survey mailed to you two weeks ago. The type of employee you need is vital information which will help shape the training and education for your labor force as we move into the next millennium. Please complete the survey and return to the Workforce Development Compact. If you need additional information or another survey form, please contact John Howell or Dale Shaffer at 580-242-2750.

Workforce Development Compact

APPENDIX D

INSTITUTIONAL REVIEW BOARD

APPROVAL FORM

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 06-19-98 **IRB #: AG-98-047**

Proposal Title: A COMPARISON OF SKILL LEVELS REQUIRED FOR POTENTIAL WORKFORCE JOB OPENINGS AND THE SKILL LEVEL AVERAGE OF SELECTED AVAILABLE WORKFORCE SEEKING TRAINING IN GARFIELD COUNTY, OKLAHOMA

Principal Investigator(s): James Key, John Howell

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:

Signature: Thomas C. Collins Date: June 19, 1998

Interim Chair of Institutional Review Board
cc: John Howell

VITA

John W. Howell

Candidate for the Degree of

Doctor of Philosophy

Thesis: A COMPARISON BY JOB CATEGORY OF EDUCATIONAL SKILL LEVELS, APTITUDES AND TEMPERAMENTS BY EMPLOYERS, EMPLOYEES AND DICTIONARY OF OCCUPATIONAL TITLE LEVELS IN GARFIELD COUNTY OKLAHOMA

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Blackwell, Oklahoma, on April 21, 1952, the son of Martin L. and Jane C. Howell.

Education: Graduated from Morrison High School, Morrison, Oklahoma, in May, 1970; received Bachelor of Science, Hotel and Restaurant Administration from Oklahoma State University in 1974; received Bachelor of Science, Agriculture Education from Oklahoma State University in 1977; received Master's Degree, Agriculture Education from Oklahoma State University in 1987. Completed the requirements for the Doctor of Philosophy degree at Oklahoma State University in December, 1998.

Professional Experience: Agriculture Education Instructor, Owasso, Oklahoma, 1977-80; Agriculture Education Instructor, Collinsville, Oklahoma, 1980-82; Executive Secretary, State FFA Association, Oklahoma Department of Vocational and Technical Education, 1982-85; Assistant State Supervisor for Special Programs, Oklahoma Department of Vocational and Technical Education 1985-86; Coordinator, Conferences and Student Services, Oklahoma Department of Vocational and Technical Education 1986-90; Assistant State Coordinator Area Vo-Tech Schools, Oklahoma Department of Vocational and Technical Education 1990-92; State Coordinator Area Vo-Tech Schools, Oklahoma Department of Vocational and Technical Education 1992-94; Assistant Superintendent, Autry Technology Center, Enid, Oklahoma, 1994-present.