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High School Graduate Employment Trends and the Skills Graduates Need to Enter Texas Manufacturing Industries

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Abstract

Much has been written about workplace skills that warrant employability success (i.e., SCANS and ASTD studies), but very little has been written about specific applications to individual industrial sectors, specifically manufacturing. This study was undertaken to determine current and projected employment trends of high school graduates by Texas manufacturers. Surveys were distributed to 210 Texas firms with 500 or more employees. Sought were the specific basic academic and vocational skills students with only a high school education would need to find employment in Texas manufacturing industries.

Introduction

Krieg, Brown and Ballard (1995), characterize today's working climate as the "third wave" of the industrial revolution with the first and second being steam and the assembly line, respectively. They confirm that this wave mandates students acquire a "new set of skills to survive economically, politically, and socially" (p. 7). In this country, two consequential skill inventories have shed light on generic employability skills that employers deem necessary for success in the workplace. The first, is a study that was sponsored by the American Society for Training and Development (ASTD) and conducted by Carnevale, Gainer, and Meltzer

(1989). Over 50,000 varied employers throughout the US were surveyed to determine which skills employers wanted to see in entry-level employees. The second study, conducted by the US Department of Labor, has become known as the SCANS report (Secretary's Commission on Achieving Necessary Skills, 1991).

While there are differences in the headings for the various skills categories found in the inventories, the sub-headings are similar. Spille (1994), argues that the SCANS category of "Basic Skills" and the ASTD categories of "Competence" and "Communication Skills" list "essentially the same skills: reading, writing, computation, speaking, and listening" (p. 17). Spille concludes that the "differences between the two inventories tend to be in the skill areas of teamwork, leadership, and organizational effectiveness, which are specifically listed in the ASTD scheme, but not in the SCANS scheme" (p. 18). Nonetheless, the outcomes of these two inventories are accepted as direct reflections of the skills progressive employers seek in their employees. Carnevale et al. (1989) maintain that the "most important skills for any employee are the academic triumvirate reading, writing and computation" (p. 8).

The fundamental message issued by these studies is that high school graduates should enter the workplace with the academic and vocational skills that afford employment and sustain their longevity as productive members in today's complex work environment. However, secondary education for workplace readiness, and the opportunities for secondary education, are in dire straits in the US. One contributing factor is our educational system's lack of adequate instructional content (curricula, instruction and support variables). In her book entitled *Teaching Workplace Skills*, Koffel (1994) argues "that educators spend much time discussing theories, sharing knowledge, experimenting and searching for concepts, while employers who hire students who graduate from our educational system want to see results and want their employees to be able to do something with their knowledge" (p. 2). Specifically in occupational programs, "a clear implication of employers' complaints is that an emphasis on technical or job-specific skill is inadequate" (Grubb, 1992, p. 83). Cheek affirms that "vocational and technical education are having difficulty keeping pace with [technological] trends" (Cheek, 1993, p. 55). Consequently, he contends, employers are "having trouble transferring these new technologies into the work place, since many workers lack the knowledge and skills on which to build new learning experiences" (p. 55).

Yet another factor affecting the chance for secondary education is the alarmingly high number of high school dropouts. Approximately 3.4 million individuals between 16 through 24 years of age have not completed high school and are not currently enrolled in school (National Center for Educational Statistics, 1992). Furthermore, research shows that fewer than one quarter of Americans seek a bachelor's degree, but more attend community colleges or technical institutions, some only briefly (Hansen, 1994). According to Cetron (1988), 50% of all new jobs by the year 2000 will require education beyond high school and 30% of them will require a college degree. It is apparent that the demand for a better educated employee, coupled with the high potential of dropping out of school, especially challenges both the educational aspirations of young people and the professional proficiency of educators.

Scope

Studies like the SCANS and ASTD, as well received as they might be, allude to a similar framework of employee attributes that is essentially fundamental. That is to say, no specific competencies are listed by industry. According to Resnick and Wirt (1996), the SCANS competencies are generic in nature and "are not targeted to any particular job or even to a group of occupations" (p. 11).

In 1994, the Eastern North Carolina Consortium for Assistance and Research in Education (ENCCARE) sponsored a study of manufacturing firms in the state of North Carolina. The study was undertaken to determine specific basic academic and vocational skills required of employees with only a high school diploma. The instrument developed for the study was based on "policy and position papers issued by a number of government, manufacturing, and educational organizations" (Volk & Peel, 1994, p. 2). Some of the documents referenced included the SCANS report, *America and the New Economy, America's Choice: High Skills or Low Wages! Building Public-Private Partnerships to Improve Vocational Education in Illinois,* and *The Forgotten Half: Non-College Youth in American*. With only 20% of North Carolina's high

school graduating populations seeking some sort of post-secondary education (1994), ENCCARE sought answers to the following questions: What are the projected hiring trends for individuals with only a high school diploma? What types of skills do manufacturing firms require of high school graduates? Study findings show that the hiring of people with only a high school diploma is expected to remain constant. Another noteworthy finding was that employers valued group interaction over the traditionally perceived skills of reading, writing and math required for high school graduates to succeed in the workplace1.

The Texas Employment Commission (TEC) [currently the Texas Workforce Commission] projects a labor force of 10.3 million for Texas in the year 2000(TEC, 1991). The TEC contends that "an estimated 9.7 million Texas residents will be working in 2000, while joblessness will have declined to a more moderate 6.0 percent" (p. 2). Even though the projected job market in Texas looks favorable, an educational challenge faces Texas. According to the *Statistical Abstract of the United States (1994)*, 53% of Texans do not finish high school or do not seek education past high school. The Texas Education Agency reports that of the 656,532 students who were graduated from high school over the last four years, approximately 33% do not plan to continue their education (Hitchcock, 1996). Furthermore, Texas employers have "expressed deep frustration with the lack of workplace basic skills in many of their potential employees" (Skills Standards Research and Communications Project, 1996, p. 16). Despite education reform undertaken to meet the demands for an educated workforce, it is expected that the average employee will not "likely be well suited to some of the jobs being created" (TEC, 1991, p. 5). Many of the "new workers will have relatively low education and skill levels" (p. 22).

While most jobs will be in high-skilled professions that require "better language, math and reasoning skills" (TEC, p. 35), the majority of occupations are expected to be similar to those currently in the Texas economy. The major shift, however, will be the changes in skill requirements for existing jobs. Of specific relevance to this report, manufacturing jobs are expected to increase by 151,600 jobs, resulting in an estimated employment figure of 1,150,100. This projected figure equates to an average annual growth rate of 1.0% up to the year 2000.

Purpose

Much has been written about workplace skills that warrant employability success, but very little has been written about specific applications to individual industrial sectors, specifically manufacturing. In addition, research shows that students who complete high school will not likely continue with their education. To that end, employability issues need to be addressed concerning the type of education and skills required by manufacturing industries for employees with only a high school diploma. Three questions concerning the employee populations working in manufacturing firms in Texas were explored:

1. What are manufacturer's current hiring practices for people who possess only a high school diploma?
2. What are manufacturers's projected trends for hiring people who possess only a high school diploma?
3. What kinds of skills (i.e., academic, technical, interpersonal) do manufacturers require of high school graduates?

Method

The study was funded through a research mini-grant awarded by the School of Applied Arts and Technology at Southwest Texas State University. Permission was attained by the authors to utilize the survey instrument entitled "Survey of Basic Academic and Vocational Skills Required of Employees With Only a High School Diploma" developed by Kenneth S. Volk and Henry A. Peel for the ENCCARE project (Volk & Peel, 1994). The self-administered instrument comprised two sections. Section one requested information from employers concerning the number of current employees and anticipated hires with only a high school diploma. Section two comprised skill statements that addressed academic concerns as well as personal attitudes and conduct. The statements were grouped into nine skill categories: (a) reading, writing and math, (b) communication, (c) critical thinking, (d) group interactions, (e) personal development, (f) computer skills, (g) technical systems, (h) leadership, (i) employability.

Surveys were distributed to all 210 Texas firms with 500 or more employees identified through the Directory of Texas Manufacturers at the University of Texas in Austin. The 500-employee criterion was used for the sake of comparing findings to that of the ENCCARE study. Surveys were mailed to the human resource department of each company. A letter encouraging participation in the study was mailed approximately 1-1/2 months after the initial mailing. A total of 96 firms responded; 16 were considered unusable because they were incomplete. Instruments from firms indicating that their employee figure had diminished below 500 were retained. A usable return rate of 38.10% (80 of 210) was realized. No effort was made to control for type of manufacturing because a consensus was sought for hiring trends and perceptions about needed skills in general.

Findings

Based on their similarities, titles or positions held by respondents were consolidated into four groups. Subsequently, participants included 54 (68%) personnel/human resource representatives, eight (10%) training and development representatives, eight plant managers and eight employee relations managers. Two respondents claimed affiliation to manufacturing engineering departments.

Company Profiles

The data show that 13 (16.3%) companies had between 601 to 700 employees on their payrolls, and 10 (12.5%) showed a range between 501-600. Nineteen firms (23.8%) showed employee totals equal to or greater than 1401. The median range for the number of employees by firm was 701 to 800. This figure was derived by taking the average of each range and multiplying it by the number of firms found in that range. Consequently, between 72,000 and 80,000 employees were indirectly represented in this study.

Table 1

Respondents by Firm Size

Number of Employees	Number of Firms Responding	Percentage of Total Firms
400 - 500	9	11.3
501-600	10	12.5
601-700	13	16.3
701-800	8	10.0
801-900	5	6.2

901-1000	3	3.8
1001-1100	5	6.2
1101-1200	5	6.2
1201-1300	2	2.5
1301-1400	1	1.2
1401+	19	23.8
	Total 80	

Employee Profiles

Participants were asked to provide current and projected trends related to the availability of jobs for students with only a high school diploma. In addition, they were asked for the percentage of jobs that could be done by this caliber of individual. They were not, however, asked to provide information on the types of jobs being performed.

Current employment practices. Data revealed that 66% of the 80 firms surveyed indicated that more than half of their employees possessed only a high school diploma (Table 2). Sixteen percent of the employers indicated that between 71% to 80% of their payroll comprised of people with only a high school diploma, and 15% noted having between 81% to 90% of employees with only a high school level education. Furthermore, 63% of the respondents felt that at least 50% of their current jobs could be done by someone having only a high school education. Forty-six percent concluded that people with only a high school diploma could perform 70% or more of the jobs found in their facilities. In addition, 59% of the employers confirmed that more than 40% of the people hired in the past year possessed only a high school diploma (Table 2).

Table 2

Employee Profiles: Current Employment Practices for High School Graduates

Characteristics	**Percentage of Employees**	**Responding Firms**
Percentage of people employed with only a	0 - 10	5

high school diploma:	11 - 20	5
	21 - 30	1
	31 - 40	5
	41 - 50	7
	51 - 60	12
	61 - 70	10
	71 - 80	13
	81 - 90	12
	91 - 100	6
	unknown	4
Percentage of jobs that could be done by	0 - 10	6
someone with only a high school diploma:	11 - 20	6
	21 - 30	2

	31 - 40	3
	41 - 50	9
	51 - 60	8
	61 - 70	6
	71 - 80	20
	81 - 90	15
	91 - 100	2
	unknown	3
Percentage of people hired in the past year	0 - 10	8
with only a high school diploma:	11 - 20	6
	21 - 30	2
	31 - 40	0
	41 - 50	5

	51 - 60	8
	61 - 70	3
	71 - 80	9
	81 - 90	15
	91 - 100	7
	unknown	17

Projected hiring practices. When specifically asked if their hiring practices for this type of employee was expected to increase, decrease or remain the same, 53% of the respondents affirmed they would continue to hire people with only a high school diploma (Table 3). An additional 34% of the firms projected hiring less numbers of people with this level of education, and approximately 9% firms reported that they expected an increase.

Table 3

Employee Profiles: Projected Hiring Practices for High School Graduates

Characteristics	Number of Companies	Percentage of Totals
Future number of employees expected to be hired with only a high school diploma will: Increase	7	8.75
Decrease	27	33.75
Remain the same	42	52.50

No answer given	4	5.00

Skills Required of High School Graduates

The prominent portion of the instrument sought information related to high school graduates and the specific skills desired of them by manufacturers. Individual skill statements were subdivided into nine skill categories. Each category contained the following introductory phrase: "High school graduates employed by this company should have basic skills sufficient to . . ." Respondents were asked to rate a skill statement based on their perception of that skill as being a required element for employment. They were asked to choose *strongly support* if the skill was absolutely required; *support* if the skill was desired, but not required; or *do not support* if the skill was not required as a requisite for employment. The three choice categories were placed in a Likert scale where absolutely required represented a scale value of 2, desired, but not required represented a 1, and not required a 0. A percentage value of the total number of respondents under each category was tabulated for individual skill statements. In addition, scale weighted averages of the statements were calculated and ranked in descending order of importance. This format of presenting the data made it easier to narrate the findings of the study and it helped to establish a scheme for determining the relative importance among the skill statements.

Reading, writing and math skills. Employers overwhelmingly endorsed the ability to understand job-related words as the most important skill within this category (Table 4). Results show that employers valued the ability to perform simple mathematics as the second most important competency. Conversely, the possession of advanced math concepts such as statistics; geometry and algebraic equations were not supported by the employers as "absolutely required" for employment. Approximately 70% of the respondents agreed that the ability for a graduate to demonstrate proficiency in reading instruments such as gauges and meters to be an "absolutely required" skill for employment. Furthermore, 63% of the employers perceived it an "absolute required" skill that a graduate's reading comprehension is sufficient enough to comprehend local newspapers and technical manuals. Fifty-seven percent of employers felt that the ability to write a simple memorandum was an absolute requirement for employment. In addition, employers perceived the ability to estimate time, weight and speed measurements more important than being able to read blueprints.

Table 4

Employer Support for Reading, Writing and Math Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2			
Skill Statement	Percent of Total			Weighted Average
Understand common job-related words	0.00	10.00	90.00	1.90
Perform simple mathematical functions	0.00	18.99	81.01	1.81

Read instruments such as gauges and meters	3.80	26.58	69.62	1.66
Read the local newspaper	3.75	27.50	68.75	1.65
Write simple memoranda	2.53	40.51	56.96	1.54
Read technical manuals	3.75	42.50	53.75	1.50
Estimate time, weight and speed measurements	16.46	46.84	36.70	1.20
Understand elementary statistics	12.65	26.84	40.51	1.08
Read blueprints	26.25	48.75	25.00	.99
Understand geometric principles	24.05	55.70	20.25	.96
Perform algebraic equations	26.58	54.43	18.99	.92
Write a technical report	31.64	51.90	16.46	.85

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Communication skills. Results in this category confirm that manufacturers want high school graduates to be articulate and attentive (Table 5). Specifically, an employee's ability to follow instructions, speak clearly, give clear instructions and pay attention during presentations were viewed as absolute requirements for employment by better than 71% of the respondents. Understanding and/or speaking another language, and being able to sketch and dimension an object in multi-view, were not regarded by the majority as necessary skills for employment. However, it should be noted that approximately 41% of the employers indicated that possessing a second language was desired.

Table 5

Employer Support for Communication Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2			
Skill Statement	Percent of Total			Weighted Average
Follow procedural instructions	0.00	6.33	93.67	1.94
Speak in clear sentences	0.00	18.99	81.01	1.81
Give clear directions	1.26	27.85	70.89	1.70
Listen to formal presentations	3.80	25.31	70.89	1.67
Understand and/or speak another language	50.63	40.51	8.86	.58
Sketch and dimension an object in multi-view	56.96	31.65	11.39	.54

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Critical thinking skills. Generally, manufacturers rated all of the listed critical thinking skills as "desired" or "absolutely required" (Table 6). Three of the four statements received an average rating greater than 1.55. Of these, being able to problem solve and make decisions independently were considered "absolutely required" skills for employment by 73% and 68% of the respondents, respectively. Respondents, however, could not agree on the need for graduates to formulate a hypothesis. Twenty-four percent strongly supported it as a necessary skill, but an almost even 23% felt that it was not necessary to gain employment.

Table 6

Employer Support for Critical Thinking Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2			
Skill Statement	Percent of Total			Weighted Average
Understand problem solving processes	2.50	25.00	72.50	1.70
Make decisions independently	1.25	31.25	67.50	1.66
Troubleshoot problems	1.27	41.77	56.96	1.56
Formulate a hypothesis	22.79	53.16	24.05	1.01

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Group interaction skills. All skill statements under group interactions were absolutely required for employment by at least three-quarters of the participants (Table 7). In fact, this category ranked as the most important skill category of the nine listed in the survey (Table 13). Working well with colleagues, working well with supervisors, working as a team member and being able to ask questions were perceived as skills absolutely required of high school graduates by 90% or more of the respondents. Furthermore, 76% of employers surveyed viewed a graduate's cognition and appreciation of a colleague's opinion, gender, culture and ethnicity as absolute requirements for employment. In addition, the ability to participate in-group discussions was absolutely required by 80 percent of the participants.

Table 7

Employer Support for Group Interaction Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2			
Skill Statement	Percent of Total			Weighted Average

Work well with supervisors	0.00	7.50	92.50	1.93
Be willing to ask questions	0.00	8.75	91.25	1.91
Work well with colleagues	1.25	8.75	90.00	1.89
Work as a member of a team	0.00	12.50	87.50	1.88
Respect others opinions	1.25	15.00	83.75	1.83
Recognize equality of the sexes	1.25	18.75	80.00	1.79
Participate in group discussions	2.50	17.50	80.00	1.78
Recognize cultural and ethnic diversity	5.00	18.75	76.25	1.71

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Personal development skills. There was much agreement among employers on the personal development skills a high school graduate would need to enter the workforce (Table 8). All five-skill statements were perceived as requirements for employment by the majority of the employers. An even percentage of employers, 68%, considered the ability of a graduate to exhibit self-esteem and to establish personal goals an absolute requirement for workplace success. In addition, 66% of the employers felt that graduates should have the desire for further education and training. Personal development skills was the third most important group of skills achieving a weighted-average mean of 1.60.

Table 8

Employer Support for Personal Development Skills Required of High School Graduates

High school graduates employed by this company	Scale	

should have basic skills to:	0 1 2			
Skill Statement	Percent of Total			Weighted Average
Exhibit self-esteem	1.25	31.25	67.50	1.66
Establish personal goals	1.25	31.25	67.50	1.66
Desire further education of training	2.50	31.25	66.25	1.64
Work toward advancement	2.50	40.00	57.50	1.55
Recognize career options	6.25	40.00	53.75	1.48

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Computer skills. Computer skills ranked last among the skills required of high school graduates (Table 13). As found in Table 9, 63% of the employers categorically considered the ability for a graduate to manipulate a keyboard an absolute requirement to finding employment. In addition, half of the respondents desired for a graduate to be able to operate computer-aided drafting software. However, the other half perceived it to be an absolute requirement for employment. With the exception of the aforementioned skills, in addition to the ability to operate desktop publishing software, the majority of the respondents indicated that they desired, but did not necessarily consider the abilities to understand DOS commands, operate word processing, spreadsheet and database software as prerequisites for hiring a high school graduate. Worth noting, the least desired skill within this category was the ability to operate desktop publishing, it attained a weighted scale average of .56.

Table 9

Employer Support for Computer Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2	
Skill Statement	Percent of Total	Weighted Average

Operate a computer keyboard	6.33	30.38	63.29	1.57
Operate computer-aided drafting software	0.00	50.00	50.00	1.50
Operate word processing software	11.25	56.25	32.50	1.21
Operate spreadsheet software	17.50	66.25	16.25	.99
Operate database software	23.75	60.00	16.25	.93
Understand DOS commands	27.50	58.75	13.75	.86
Operate desktop publishing software	48.10	48.10	3.80	.56

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Technological systems skills. Employers had differences of opinion on the importance of high school graduates having an understanding of technology systems. Only two skill statements were rated as "absolutely required" by the respondents: select the proper tools or equipment for a task and assemble equipment following written directions (Table 10). Approximately 80% of the employers rated as "absolutely required" a demonstrated ability for selecting the proper tools or equipment to perform a task. In addition, almost 60% felt strongly about high school graduates being able to assemble equipment using written directions; however, 36% desired, but did not necessarily consider it essential for employment. Furthermore, 54% of the respondents desired that a graduate be able to calibrate instrumentation, the remaining 46% however, were split between supporting or not supporting this skill as a requirement for employment.

Table 10

Employer Support for Technical Systems Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2	

Skill Statement	Percent of Total			Weighted Average
select the proper tools or equipment for a task	1.26	18.99	79.75	1.78
assemble equipment following written directions	5.00	36.25	58.75	1.54
know how technological systems operate (e.g. communications, manufacturing)	14.10	42.31	43.59	1.29
calibrate instrumentation	22.81	54.38	22.81	1.00

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Leadership skills. Analysis shows that most employers require or desire high school graduates possess leadership characteristics as they prepare to enter the workplace (Table 11). The ability to motivate others, improve organizational effectiveness and demonstrate leadership qualities were desired of graduates by the majority of employers. The most highly rated leadership attribute was the ability to negotiate and resolve conflicts. It was absolutely required for employment by 53% of the employers and desired by 42%.

Table 11

Employer Support for Leadership Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2			
Skill Statement	Percent of Total			Weighted Average
Negotiate and resolve conflicts	5.06	41.77	53.17	1.48

Improve organizational effectiveness	3.85	50.00	46.15	1.42
Demonstrate leadership qualities	3.75	61.25	35.00	1.31
Motivate others	8.75	60.00	31.25	1.23

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Employability skills. All of the statements under this skill category, with one exception, were sanctioned by the majority of employers as required skills of people with a high school level education to gain employment (Table 12). This support rendered employability skills the second highest skill category of the nine (Table 13). Three statements (demonstrate punctuality, maintain regular work habits, and maintain quality standards) were skills absolutely required for employment by greater than 90% of the employers. About 88% of the respondents felt that taking pride in one's work as an absolute hiring criterion for employment. Greater than 50% of employers absolutely required that graduates practice a healthy lifestyle and have knowledge of the company for which they will be working. Still, 54% of them did not feel that knowledge of the company was required for employment. Approximately 13% percent of the employers did not perceive participating in community/civic activities as a requirement for hiring a high school graduate. Not only did 61% desire it, but also another 27% required it.

Table 12

Employer Support for Employability Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2			
Skill Statement	Percent of Total			Weighted Average
Demonstrate punctuality	0.00	3.75	96.25	1.96
Maintain regular work habits	0.00	6.25	93.75	1.94
Maintain quality standards	0.00	6.25	93.75	1.94

Take pride in one s work	1.25	11.25	87.50	1.86
Practice a healthy lifestyle	0.00	33.75	66.25	1.66
Have a knowledge of the company	2.50	43.75	53.75	1.51
Participate in community/civic activities	12.66	60.76	26.58	1.14

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Table 13

Group Comparison: Average Response for Employability Skills Required of High School Graduates

High school graduates employed by this company should have basic skills to:	Scale 0 1 2
Skill Statement	Weighted Average
Group interaction	1.84
Employability	1.72
Personal development	1.60
Critical thinking	1.48
Technological systems	1.40

Communications	1.37
Leadership	1.36
Reading, writing and math	1.34
Computer	1.09

Note. aScale rating system: 0 = skill not required; 1 = skill desired, but not necessary; 2 = skill absolutely required.

Conclusion

Experts predict that due to the influx of new technologies in the workplace high school graduates will need to possess better academic and vocational skills as compared to their predecessors. This study was undertaken to determine current and projected employment trends of high school graduates by Texas manufacturers. Also sought were the specific skills people with only a high school education would need to enter the workplace. Study findings strongly parallel those of the ENCCARE project. The two studies found the majority of employers surveyed expect their hiring of people with only a high school diploma to remain constant. This is relatively good news since most manufacturers in both studies conceded that the majority of their employees had only a high school diploma, and that most jobs in their facilities could be done by individuals with only a high school level education. However, projected hiring trends for people with only a high school diploma are not all together favorable. Data suggest that 34% of the manufacturers surveyed are forecasting a decrease in their hiring of people with only high school diplomas. The ENCCARE findings suggest that 30% of employers surveyed will discontinue hiring people with only a high school education. Consequently, the availability of manufacturing jobs for people with only a high school education will continue to diminish as the twenty-first century is realized. In this regard, study findings lend credence to employment trends being projected for high school graduates in general.

The specific skills manufacturers valued most in high school graduates, however, counter conventional thinking: reading, writing and computation were not considered to be the most important competencies. The top three skill categories in descending order of rated score were group interaction, employability and personal development. Particularly, they reflect attributes that are more intrinsically humanistic rather than academic or technical (Table 13). The skills categories of reading, writing and math, and computer skills, even though considered important categories in general, achieved eighth and ninth place rankings, respectively. It was noteworthy that similar conclusions were reached through the ENCCARE study.

In essence, the core of these results purports that manufacturers place a higher value on employees who work well as team members, who respect the gender, cultural and ethnic differences among colleagues, who arrive at work on time, who have good work habits and take pride in their work. This is not to say that employers do not value the possession of basic academic skills by their hires. On the contrary, it submits that perhaps due to the lack of workplace skills of their potential employees, employers seek educable employees with a level of academic skills that afford learning of job specific skills. This aspect of learning hinges on employers hiring graduates who basically get along with their supervisors and coworkers, and more dramatically, value the breadth of education. Carnevale et al. (1989) acknowledge that "the strategic relevance of interpersonal, negotiation, and teamwork skills is evident. They are basic tools for achieving the flexibility and adaptability that America's workforce must have in order to remain competitive" (p 15).

The underlying implication of interpersonal skills being valued more by employers than academic and technical skills is not as impious as it might appear. It merely asserts that interpersonal skills should be the foundation on which SCANS/ASTD based curricula is developed and delivered in the classroom. This no doubt presents a challenge to educators and curricula developers alike. Barton (1996) proposes that the "SCANS skills cannot be taught in the abstract in traditional passive modes of text books and teacher lectures. They probably can be learned only in the context of doing; they will be learned by doing, through opportunities to gain experience, actual or simulated. They will be learned through performing them" (p. 138). Koffel (1994) argues that no matter the discipline that is being taught, new ways of teaching should be utilized to teach the skills needed by students. In her book that provides a systematic method for reinforcing the ASTD skills in the classroom, Koffel contends that "we as instructors and teachers can begin tomorrow by changing how we teach, not necessarily what we teach" (p. 3). Finally, of the six steps proposed by Spille (1994) to enable the successful teaching of the SCANS/ASTD skills, the third step is of specific relevance to this discussion. In it, he reiterates the message of "especially emphasizing [the] integration of multiple skills" when developing curricula.

Recommendations

The findings established through this study have identified the educational requirements that should allow high school graduates to gain employment in industry. Despite attaining a response rate that could be construed as lacking, this project has produced findings that will aid teachers and administrators in developing and implementing curricula. Furthermore, counselors, parents and students alike should utilize these data to assist them in establishing realistic career paths. Foremost, this type of insight into the relative importance of manufacturers educational needs should be central to strategic planning as it relates to quality workforce training. The following suggestions should enhance the efficacy of future similar studies:

1. Manufacturing firms with less than 500 employees should be included in the study. This will establish a forum from which to compare the skill demands of smaller companies to larger ones.
2. A national study of manufacturing firms should be undertaken to determine consensus of the relative importance of entry level skills at the national scale.
3. The instrument should be modified to allow respondents the opportunity to list job descriptions held by people who possess only a high school education. Doing this will give a clear indication of the types of manufacturing jobs being performed by people with only a high school education and their inherent difficulty.

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Footnote

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