

WORKFORCE QUARTERLY FOR EDUCATORS: EXPANDED VERSION

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INTRODUCTION: AN OVERVIEW OF THIS REPORT

Educators have pointed out that students are interested in the wages and amount of education necessary to pursue specific careers. Implicit in this concern is a desire to understand the job market. Clearly, a position that requires only an Associate Degree and pays close to \$40,000 is in principle attractive – unless, of course, the particular job is so glutted with applicants that the chances of any single candidate are close to nil. *It is necessary, therefore, to place information about jobs and careers in the overall context of the Southwestern Pennsylvania supply and demand for labor.*

This is, unfortunately, easier said than done. Two challenges restrict the usefulness of the existing data, and make their utilization by educators a difficult – perhaps impossible – task:

- *The availability of information.* Despite important limitations discussed in Appendix A, data on the demand for occupations are available thanks to the projections prepared by the Pennsylvania Department of Labor and Industry. Data on the supply of qualified labor, on the other hand, are extremely hard to compile and assemble (see Appendix A). From the point of view of users, in fact, this information does not exist. It has been impossible for educators, therefore, to compare supply and demand, and to provide well-grounded guidance to students engaged with future occupational choices.
- *The difficulty of translating labor market information into content of two types:*
 - *Educational curriculum which, once taught, will enhance the ability of students to compete successfully in the careers of their choice; and*
 - *Actual career counseling, which involves using information to guide students into the workforce and into promising job ladders.*

The purposes of this brief are to make a start in meeting these challenges:

- *To make labor market information accessible to educators working with high school students, in a ready and relatively easy-to-use format; and*
- *To demonstrate how to think about, and how to utilize labor market information.¹*

We covered nine counties, Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Washington and Westmoreland. *We identified those occupations in Southwestern Pennsylvania in which demand was large – i.e., estimated at 50 or more openings per year – and significantly outstripped supply.* We offer the reader in a condensed form some key information about these

occupations – the wages associated with each, and the skills needed to access them.

Supply of personnel for an occupation was measured by the output of the educational system, i.e., by the number of degrees awarded by postsecondary institutions, both public and private, and by the number of individuals completing vocational-technical programs in our area’s vocational-technical and high schools.²

Demand of personnel was measured by the occupational projections of the Pennsylvania Department of Labor and Industry (L & I) for 1998-2008. These projections estimate the number of job openings available for each occupational category on the basis of growth and replacement (of people leaving the workforce) needs. We used as our demand variable the average number of yearly openings for an occupation.³ These data are organized by Workforce Investment Areas. Total for the region was obtained by simply adding the figures for the four separate Workforce Investment Areas (WIAs) that encompass Southwestern Pennsylvania.

*The crucial component in the development of a picture of the regional labor market was the matching of occupations with degrees.*⁴ This matching enabled us to associate each job category with a given level of supply, and determine which positions were most attractive given their need for personnel, pay, and comparative ease of access. The results of our analysis are presented in what follows.

“IN-DEMAND” JOBS AND CAREERS: A REGIONAL PICTURE

Our definition of “in-demand” occupation is as follows:

- One in which demand is at least 150% of supply;
- One in which, according to L & I projections, we can expect at least 50 openings per year within the region;
- One paying a minimum of \$12.50 per hour.

We present below a set of tables and a chart providing information on such occupations. Both tables and chart are organized into two different groups, the first containing “in-demand” positions for which a four-year college degree is a minimum requirement, and a second encompassing those positions that can be accessed with less than a four-year college degree.

To a very large extent the tables speak for themselves: they offer the reader a quick summary profile of the characteristics of “in-demand” occupations in the

TABLE 1 – “IN-DEMAND” OCCUPATIONS IN SOUTHWESTERN PENNSYLVANIA REQUIRING A 4-YEAR DEGREE AND MORE –DETAILED INFORMATION¹

Occupational Title	Annual Openings*	Sum of Graduates, less than 4-year degree	Sum of Graduates, 4-year degree or more	Total Graduates	Demand/Supply (in percent)	Average Hourly Wage (\$)	Average Annual Wage (\$)
Physicians and surgeons	212	0	140	140	151	67.54	140,485
Engineering, mathematical and natural sciences managers	153	9	9	18	850	44.80	93,193
All other engineers	122	2**	74**	76	161	31.39	65,293
Salespersons--scientific products and services	111	7	0	7	1586	27.92	58,082
Sales agents--securities, commodities, financial services	138	0	13	13	1062	26.92	56,001
Sales agents--insurance	96	12	0	12	800	21.82	45,378
Sales agents--advertising	50	0	4	4	1250	20.36	42,350

*Average number of annual openings between 1998 and 2008 as estimated by the PA. Department of Labor and Industry. Same is the case with Table 2.

** These values are recalculated and restated.

¹Educational requirements for occupations in Table 1 and 2 are taken from the BLS Occupational Outlook Handbook (<http://www.bls.gov/oco>).

TABLE 2 – “IN-DEMAND” OCCUPATIONS IN SOUTHWESTERN PENNSYLVANIA REQUIRING LESS THAN 4-YEAR DEGREE –DETAILED INFORMATION

Occupational Title	Annual Openings	Sum of Graduates, less than 4-year degree	Sum of Graduates, 4-year degree or more	Total Graduates	Demand/Supply (in percent)	Average Hourly Wage (\$)	Average Annual Wage (\$)
First line supervisors, sales and related	344	38	0	38	905	24.95	51,902
First line supervisors, mechanics/installers	135	0	0	0	13500	23.46	48,788
Painters and paperhangers, construction	101	2	0	2	5050	21.24	44,171
Salespersons, except scientific	256	29*	22*	51	502	21.01	43,703
Police patrol officers	300	129	0	129	233	20.94	43,553
Other sales representatives and salespersons	71	19	0	19	374	20.90	43,464
Aircraft pilots and flight engineers	86	26	0	26	331	20.74	43,140
Engineering and related technicians	347	46	1	47	738	19.12	39,771
Industrial machinery mechanics	59	0	0	0	5900	19.06	39,643
Flight attendants	221	0	0	0	22100	18.66	38,820
Telephone and cable tv installers and repairers	109	20	0	20	545	17.99	37,424
First line supervisors, clerical and administrative	460	30*	21*	51	902	17.84	37,098
Respiratory therapists	57	15	16	31	184	17.71	36,846
Sales agents, selected business services	171	1	0	1	17100	17.56	36,522
Bus and truck mechanics, diesel engines	61	27	0	27	226	17.27	35,922
Aircraft mechanics	88	11	0	11	800	17.24	35,856
Other plant and system operators	56	0	0	0	5600	17.18	35,724
Secretaries, except legal and medical	458	120	0	120	382	14.80	30,781
Physical and corrective therapy assistants	52	32	0	32	163	14.76	30,707
Industrial truck and tractor operators	67	0	0	0	6700	14.48	30,108
Maintenance repairers, general utilities	296	63	0	63	470	14.28	29,693
Human services workers	168	25	20	45	373	14.07	29,256

* These values are recalculated and restated.

region. However, some general observations are worth making about this select group of positions:

- It is remarkable how very little difference exists in average annual wages between jobs requiring a four-year degree or more, and jobs requiring less than a 4-year degree – If we exclude the top three occupations in the college list (physicians and surgeons, engineering, mathematical and natural sciences managers, and all other engineers). The top of the “less than four-year college” group merges in a continuous fashion with the bottom of the college set. And, it should be noted, there are many more total openings calling for less than a four-year degree than demanding a BA/BS and beyond, a point to which we will return below.
- The tables also make apparent how “misaligned” the job market is, i.e., how imperfect the relationship is between formal education and the attainment of any given job. Many occupations, it will be noted – flight attendants, first line supervisors, mechanics/installers, and sales agents of various kinds, to name some --, show few or no graduates eligible to fill their vacant slots. Other occupations, both in the four-year college and the “less-than-four-year-college” list, are associated with a mix of graduates at very different levels of education. The points to bear in mind are, first, that much training – the bulk of it, in fact – takes place on-the-job or via apprenticeships sponsored by unions and trade associations, and that this type of training is not captured by our data. Second, employers vary enormously in their hiring practices and approaches – while some may require different levels of formal education, others may prefer to hire individuals with certain characteristics and minimum knowledge, and “mold” them to their company philosophies and needs. For educators, the implication is that *teaching basic skills is critical, as well as having students think in terms of careers rather than specific jobs*. While it is important and desirable for a student “to keep an eye” on particular jobs in the market, he/she must also be ready to deal with the uncertainties inherent in the occupational matching process.
- The relative absence of information technology (IT) careers in our tables is striking. This is due to a combination of reasons. First, we focused in this report on the *total* number of job openings expected in an occupation. Some of the fastest growing job segments (such as several in the IT arena) are still small, which means they generate few open slots. By contrast, a declining but large occupational category may show many openings due to its large replacement needs.⁵ Second, many of in-demand occupations have titles, which mask their very large “IT component.” This is the case, for instance, with engineering, mathematical and natural sciences managers, with the heterogeneous group under “all other engineers”, and with secretaries. In short, IT skills are very much

part of the regional demand, but in a “distributed” fashion rather than as independent careers.

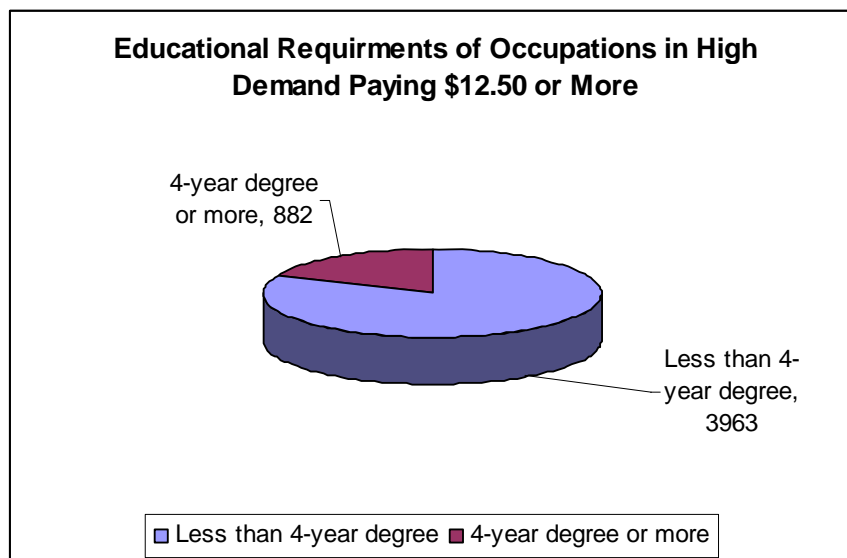
- The top 20 occupations that do not require four years of postsecondary education are by no means “easy” fields. In fact, as will become clear in the following discussion, they require a combination of skills and competencies comparable in many respects to that of the occupations calling for four-year degrees. *Secondary students must come to an early understanding of what they need to do to access these careers – as much as they need to understand the more traditional, college-bound path.* Early career counseling is critical to success.

OCCUPATIONAL DEMAND AND EDUCATIONAL ACHIEVEMENT

A final observation is worth making to complete our picture of “in-demand” occupations in Southwestern Pennsylvania. To re-state, the latter are those where:

- Demand is at least 150% of supply;
- At least 50 openings per year are expected within the region;
- Minimum pay is \$12.50 per hour; and

L& I projections show that there are 42,623 expected jobs openings, in total, in the SWPA region. From these projections, we calculate that there are an expected 4,845 yearly openings in the region meeting these characteristics (i.e., demand/supply ratio, minimum vacancies and minimum pay). These “in-demand” occupations are 11% of the expected job openings.



The question is how are they apportioned according to educational requirements? How many call for a BA/BS or more, and how many call for less? The answer is provided in the above chart – 3,963 or 82% of the “in-demand” occupations require less than 4-year degree. This confirms Ken Gray’s well-known assertion, based on national data, that the bulk of well-paid job vacancies require less than a four-year college degree.⁶ This finding reiterates the importance of providing students with a broad overview of careers available to them, including those that do not conform to the commonly accepted views of the educational path that is appropriate to them (i.e., the path that asserts that “all must go to college”).

“IN-DEMAND” JOBS AND CAREERS: SKILLS

This section goes beyond identifying and describing “in-demand” regional occupations; it attempts to create *the profile of skills* associated with each. The purpose is to provide educators a possible strategy *to translate the skills demanded by the job market into knowledge and competencies that can be taught in schools* (either directly in the classroom or indirectly through supporting programs and activities).

To attain this goal we made use of WorkKeys, an instrument that enables users to create profiles both of the skills of individuals and of those required by jobs. It is possible then to assess the degree to which there is a match between a position and any given candidate.⁷ Table 3 presents “in-demand” occupations in Southwestern Pennsylvania and their associated skill requirements as measured by WorkKeys.

TABLE 3 – “IN-DEMAND” OCCUPATIONS AND THEIR WORKKEYS SKILL REQUIREMENTS

	OES Occupational Title	Applied Mathematics	Reading for Information	Locating Information	Profiles
4-year degree or more	Physicians and surgeons	6	6	5	E
	Engineering, mathematical and natural sciences managers	7	7	6	W
	All other engineers	5	6	6	W
	Salespersons: scientific products and services	4	4	5	A
	Sales agents: securities, commodities, financial services	5	5	4	A
	Sales agents: insurance	5	6	5	W
	Sales agents: advertising	6	4	5	W
Less than 4-year degree	First line supervisors, sales and related	5	5	5	W
	First line supervisors, mechanics/installers	5	5	5	W
	Painters and paperhangers, construction	3	3	3	W
	Salespersons, except scientific	4	5	4	W
	Police patrol officers	4	5	4	W
	Other sales representatives and salespersons	5	5	5	W
	Aircraft pilots and flight engineers	4	4	4	A
	Engineering and related technicians	6	5	5	A
	Industrial Machinery Mechanics	5	5	5	W
	Flight Attendants	3	4	4	A
	Telephone and cable TV installers and repairers	4	4	4	W
	First line supervisors, clerical and administrators	5	4	5	A
	Respiratory therapists	4	5	4	A
	Sales agents, selected business services	5	5	5	W
	Bus and truck mechanics, diesel engines	5	5	5	W
	Aircraft mechanics	4	5	4	A
	Other plant and system operators	4	3	4	W
	Secretaries, except legal and medical	5	5	4	W
	Physical and corrective therapy assistants	4	4	4	W
	Industrial truck and tractor operators	3	3	3	W
Maintenance repairers, general utilities	3	4	4	W	
Human services workers	4	4	4	W	

W-WorkKeys Profile stands for a standard profile taken from ACT’s occupational profile database.

A-Aggregate WorkKeys Profile is used when a specific job (as defined by its OES title) has not been profiled by ACT. In that case, Keys2Work translates the OES code into the corresponding O*NET title or titles, takes the WorkKeys profiles for these O*NET titles and aggregates them as appropriate/feasible.

E-Educational Profile, also refers to jobs that are not present in ACT’s database. However, because they all call for advanced degrees, it can be safely assumed that a “6, 6, 5” (as shown in Table 3 for Physicians and Surgeons) is the minimum level required to complete education.

Educators can use Table 3 to translate numeric profiles of occupational requirements into educational content in three areas, Applied Mathematics (AM), Reading for Information (RI) and Locating Information (LI). This is best demonstrated through an example.

“Telephone and cable TV installers and repairers” is an Occupational Employment Statistics (OES) code⁸ with a “4, 4, 4” numerical profile. This means that successful performance in this occupation is dependent on reaching a skill level “4” in Applied Mathematics (AM), Reading for Information (RI) and Locating Information (LI). Appendix B describes the meaning of the WorkKeys numeric levels for these three scales (AM, RI and LI).

By consulting Appendix B we find that a person who has attained a level “4” in Applied Mathematics (AM) can:

- “Perform one or two mathematical operations (addition, subtraction, multiplication, or division) using several positive or negative numbers.”
- “Add commonly known fractions, decimals, or percentages, or add three fractions that share a common denominator.”
- “Calculate averages, simple ratios, proportions, and rates, using whole numbers and decimals.”
- “Reorder verbal information before performing calculations.”
- “Determine which operation(s) to perform and in what order.”
- “Read a simple chart or graph to obtain the information needed to solve the problem”

Similarly, there are practical, clear explanations (as well as examples) of what a level “4” means in RI and LI. *Although by no means automatic, the transposition of WorkKeys skill levels into educational content that can be taught in the classroom, and that can be used to assess a student’s prospects to pursue a career of interest and to provide overall career counseling, is relatively straightforward. This is even more so because WorkKeys has been adopted for use in 10th grade by several school districts in Southwestern Pennsylvania. A great number of local students, therefore, already have WorkKeys scores that can be used by educators and counselors as a baseline to develop educational and career literacy plans.⁹ Specifically, an educator can simply compare the skill profile for any of the “in-demand” occupations in Table 3 with the profile of any actual student to achieve an immediate sense of the gap between a student’s career plans/goals and his/her achievements to-date.*

This straightforward procedure, we believe, has the potential of turning career counseling into a simpler, practical and speedier process – the last feature being important because of the well-known work overload of public educators.

CONCLUSION

This report suggests a number of actions – some straightforward and others less so – that teachers, counselors and other educators can take to assist students in making career choices and in succeeding in the labor market:

- *Examine jobs in terms of demand and supply. Students need a realistic evaluation of their prospects in securing a position and building a career. Tables 1 and 2 are a start in this direction, although they need to be supplemented with other in-depth research.*¹⁰
- *Drill down into the skills required by “in-demand” occupations. Once again, this report provides a beginning (see Table 3).*
- *Use WorkKeys profiles, if available, to compare the student’s current skill profile with that required by “in-demand” occupations of interest to him/her. For the 100 school districts in Southwestern Pennsylvania, which have already introduced WorkKeys testing, this should offer few problems.*
- *If WorkKeys scores for students are not available, educators can utilize the detailed descriptions associated with each of the WorkKeys scales (see Appendix B) to build their own assessment of a student’s current skills. This assessment can then be compared with the requirements of in-demand occupations (see Table 3). This is obviously a much more cumbersome and time-consuming way of evaluating a student’s prospects, but by no means impossible. A review of a student’s records and a few simple tests should result in educators being able to assess an individual’s skill profile accurately. The major obstacle to this approach is clearly the time it would take, given the well-know workload of counselors and other educators.*
- *Whenever appropriate, develop an action plan to be implemented by the student. Again, the only limitation here is manpower, to assist the student with building and implementing the plan.*¹¹ *The goal of the plan would be to bring the student to the level required to successfully perform within the occupational field of his/her choice.*
- *Help students set goals. More generally, Table 3 – associated with the skill descriptions contained in Appendix B – provides suggestions for goals relating to the minimum educational levels to be achieved by all students to ensure success in the labor market. Note that among the occupations*

requiring a 4-year degree or more, the minimum skill level in all WorkKeys scales is a 4; in fact, levels 5 and 6 are a lot more prevalent. Among occupations requiring less than a 4-year degree, levels 4 and 5 are the most common. Given the skill descriptions of Appendix B, minimum desirable achievement goals could easily be determined for students. Unlike purely academic goals, *these would be directly related to successful occupational performance*. This appears to be a broad educational target worth striving for.

- *Whenever appropriate, assist students to develop alternative career plans.* Unfortunate as it may be, situations will arise in which a student's career plans are utterly unrealistic (given his/her skills at the starting point, and the requirements of his/her occupation of choice). One of the major functions of effective career counseling is to bring to a youth's attention alternatives that may be both realistic and attractive. In this regard, information provided in Tables 1 and 2 on the education necessary for "in-demand" occupations and on the income associated with them, may prove to be a helpful starting point.

Underlying these action-oriented recommendations is an important assumption that should be made explicit, i.e., that there is value in shaping educational content – both for classroom teaching and for individual counseling and tutoring – in ways that promote student success in the workforce. This is not to say, obviously, that this is the sole goal of education. However, an interest in and a concern with the world of work must be present in the curriculum of middle and high school, to ensure that students understand early on what they must do to turn their dreams into reality. We hope that this issue of WorQ-E has made a small contribution in this direction.

APPENDIX A – REPORT METHODOLOGY AND LIMITATIONS

1. Methodology

As observed, *supply* of personnel for an occupation was measured by the output of the educational system, i.e., by the number of degrees awarded by postsecondary institutions, both public and private, and by the number of individuals completing vocational-technical programs in our area's vocational-technical and high schools.¹² Specifically, we utilized the following information:

- The number of degrees awarded by postsecondary institutions, public and private, in 2002 as presented in the web site of the Pennsylvania Department of Education. Note that degrees are not people, and that a few individuals earn more than one. Degrees, in short, are only an approximation of the number of persons entering the labor force with a new postsecondary certification every year.
- Because the above data do not include private, proprietary schools, we utilized the list of such institutions presented in the web site of the Pennsylvania Association of Private School Administrators (PAPSA). We interviewed 47 schools and asked each one of them to provide their number of yearly graduates, and to allocate these graduates (percentage-wise) by major programs offered. Five more were approached but did not respond. We have data, therefore, for over 90% of the schools currently operating, which appear in the PAPSA list.¹³
- The number of secondary students who completed vocational-technical lines of study, either in their high schools or in the region's Area Vocational-Technical Schools (AVTS). This information is available in the web site of the Pennsylvania Department of Education.

Demand of personnel was measured by the occupational projections of the Pennsylvania Department of Labor and Industry for 1998-2008. These projections estimate the number of positions available for each job category on the basis of growth and replacement (of people leaving the workforce) needs. We used as our demand variable the average number of yearly openings for an occupation.¹⁴ As observed in the body of the report, the data are organized by Workforce Investment Areas; the total for the region was obtained by simply adding the figures for the four separate Workforce Investment Boards (WIBs) that encompass Southwestern Pennsylvania.¹⁵

The critical step matching occupations with degrees was done as follows. All degrees awarded are classified according to the Code of Instructional Programs (CIP). Similarly, occupations are organized according to systems – the older one, long used by the Bureau of Labor Statistics (BLS) in its surveys and statistical reports (the OES, or Occupation Employment Statistics code), and the newer

one that has replaced it (the 1998 SOC, or U.S. Standard Occupational Classification). The SOC is gradually supplanting the OES as the national, standard system. However, Pennsylvania's 2008 occupational projections still use OES categories.¹⁶

The key element in the matching was the bridge created by the National Center for Education Statistics, which pairs the Code of Instructional Programs with occupational categories.¹⁷ This crosswalk allows users to find out, for any given educational course of work, the occupations they should be able to fill and whose duties and responsibilities they should be able to meet (at least in principle, i.e., assuming the individual has mastered the skills taught in school). Note that in many (if not most) cases, a degree will open up more than one occupational field for those who earn it. Note also that CIP codes *do not* take into account the *level* of degree awarded. For instance, engineers and engineer technicians are classified within the same set of CIP codes, although the former have at least a Bachelor and the latter hold Associate Degrees. A full understanding of the jobs for which someone is a viable candidate requires both the knowledge of the person's field of study (as indicated by the CIP) and of the level of the person's award.

We also needed to use additional crosswalks, relating OES to SOC occupational categories. This was necessary because the Occupational Outlook Handbook¹⁸, the standard tool in describing jobs and career paths on a national scale, is already organized according to the SOC system. The same is the case with O*NET, which enabled us to link systematically positions with their skill requirements. The Handbook, in turn, was essential to double-check our results against the national picture. Use of these resources, however, increased the complexity of our task (by requiring the translation of data from an OES- to a SOC-based scheme) and introduced additional opportunities for errors in data processing.

2. Use of this Report

The brief description of our data and methods suggests the limitations of our findings. For many reasons detailed below, *this report should be used as a starting point in the process of investigating a job and a career path*. Additional research is needed, and easy to undertake (especially on-line).¹⁹ Our goal is to provide information on the overall labor market picture, and point to directions which interested individuals can pursue in further detail.

Some of the key limitations of our findings are determined by:

- The *demand* data. The projections of Pennsylvania's Department of Labor and Industry (L & I) reflect expected long-term trends in the evolution of the regional economy and industry. They are *not* snapshots of the labor market at any given point in time. We have used L & I data because we

lack comprehensive measures of occupational demand for the region, which are “just-in-time” and taken on a continuous basis. This alone will require the user of this report to do additional research to confirm and refine our conclusions.

- The *supply* data. We have used information on degrees awarded in 2002. This says nothing about the *inventory* of technicians, professionals and skilled workers currently extant in the economy. In fact, a case can be made that few graduates exist in a given occupational field exactly *because* a large inventory of workers and potential employees is available for that occupation. In this view, a large disparity between supply and demand in the present can be explained by the availability in the workforce of an over-supply of qualified personnel for any given field.
- The uncertainties introduced by the use of data compiled in different ways, for different purposes, and classified according to different schemes that must be translated into one another. As an example, the crosswalks referred to earlier, although useful, are far from perfect in allowing the re-classification of information. All the various steps that make possible an overall comparison between supply and demand on a regional scale also increase the likelihood of measurement errors.²⁰

For these reasons, once again, we invite the reader to use our conclusions as a guide and a point of departure in a process of career exploration. One example illustrates the need for such judicious use. Our data analysis in the body of this report indicates that there are excellent job opportunities for supervisors of industrial production workers. Anyone with experience in the manufacturing labor market knows that this is the case. However, a great many of these positions are in large plants in declining sectors of the economy. Furthermore, supervisors are recruited primarily from existing production workers. To access supervisory openings, one must first secure a job as a worker (in, say, a steel or chemical plant). These jobs are relatively scarce as compared with the number of individuals who would like to obtain them. As a result, although supervisors in large manufacturing establishments are indeed needed, this is not an easy or likely career path for a young graduate from a vocational or postsecondary institution. Judgments such as these are commonplace events in any thorough investigation of a given career path.

APPENDIX B – WORKKEYS LEVELS²¹

Here, we give some examples which describe the meaning of the WorkKeys numeric levels for three scales (Applied Mathematics, Reading for Information and Locating Information).

Applied Mathematics Level 3

Persons with Level 3 skills can:

- * Perform basic mathematical operations (addition, subtraction, multiplication, and division) using whole numbers and decimals.
- * Convert a number from one form to another using whole numbers, fractions, decimals, or percentages.
- * Solve problems that are straightforward, involving a single type of mathematical operation.
- * Translate easily from a verbal setup to a mathematical equation when all the information needed to solve the problem is provided in logical order and no unrelated information is included.

Level 3 Sample Question

1. In your job as a cashier, a customer gives you a \$20 bill to pay for a can of coffee that costs \$3.84. How much change should you give back?

A. \$15.26
B. \$16.16
C. \$16.26
D. \$16.84
E. \$17.16

Why this is a Level 3 problem:

- * Examinees must perform a single subtraction operation.

Applied Mathematics Level 4

In addition to the skills at Level 3, persons with Level 4 skills can:

- * Perform one or two mathematical operations (addition, subtraction, multiplication, or division) using several positive or negative numbers.

- * Add commonly known fractions, decimals, or percentages, or add three fractions that share a common denominator.
- * Calculate averages, simple ratios, proportions, and rates, using whole numbers and decimals.
- * Reorder verbal information before performing calculations.
- * Determine which operation(s) to perform and in what order.
- * Read a simple chart or graph to obtain the information needed to solve the problem.

Level 4 Sample Question

1. Over the last five days, you made the following number of sales calls: 8, 7, 9, 5, and 7. To help in planning staff time, you track the average number of calls you make each day. What was your average over the last 5 days?
 - A. 5.8
 - B. 7.0
 - C. 7.2
 - D. 9.0
 - E. 36.0

Why this is a Level 4 problem:

- * There are several steps of calculation.
- * Examinees must calculate the average of a string of numbers.

Applied Mathematics Level 5

In addition to the skills at the previous levels, persons with Level 5 skills can:

- * Look up and calculate single-step conversions within English or non-English systems of measurement or between systems of measurement.
- * Calculate using mixed units and several steps of logic.
- * Calculate perimeters and areas of basic shapes.
- * Calculate percentage discounts and markups.
- * Determine what information, calculations, and unit conversions are needed to find a solution.

Level 5 Sample Question

1. Quik Call charges 18¢ per minute for long-distance calls. Econo Phone totals your phone usage each month and rounds the number of minutes up to the nearest 15 minutes. It then charges \$7.90 per hour of phone usage, dividing this charge into 15-minute segments if you used less than

a full hour. If your office makes 5 hours 3 minutes worth of calls this month using the company with the lower price, how much will these calls cost?

- A. \$39.50
- B. \$41.48
- C. \$41.87
- D. \$54.00
- E. \$54.54

Why this is a Level 5 problem:

- * There are several steps of logic and calculation.
- * Examinees must perform calculations using mixed numbers.
- * Examinees must make two sets of calculations and compare the answers to choose the “best deal.”

Applied Mathematics Level 6

In addition to the skills at the previous levels, persons with Level 6 skills can:

- * Calculate using negative numbers, fractions, ratios, percentages, and mixed numbers.
- * Calculate multiple rates for comparison or use in other calculations.
- * Find basic areas and volumes of rectangular solids.
- * Identify and correct errors in calculations.
- * Solve problems involving considerable setup and multiple-step calculations or conversions.

Level 6 Sample Question

1. You are preparing to tile the floor of a rectangular room that is $15\frac{1}{2}$ feet by $18\frac{1}{2}$ feet in size. The tiles you plan to use are square, measure 12 inches on each side, and are sold in boxes that contain enough tiles to cover 25 square feet. How many boxes of tiles must you order to complete the job?

- A. 11
- B. 12
- C. 34
- D. 59
- E. 287

Why this is a Level 6 problem:

- * There are multiple steps of logic and calculation.
- * Examinees must convert fractions to decimals and then calculate a simple area.
- * Examinees must realize that their answers must be rounded up to the next whole number in order to buy enough tile to complete the job.

Applied Mathematics Level 7

In addition to the skills at the previous levels, persons with Level 7 skills can:

- * Calculate using multiple steps of logic.
- * Calculate multiple areas and the volumes of spheres, cylinders, and cones.
- * Solve problems with more than one unknown.
- * Solve problems involving nonlinear functions, such as rates of change.
- * Calculate by applying basic statistical concepts.
- * Derive information needed to solve problems if incomplete or implicit information is presented.

Level 7 Sample Question

1. The farm where you just started working has a vertical cylindrical oil tank that is 2.5 feet across on the inside. The depth of the oil in the tank is 2 feet. If 1 cubic foot of space holds 7.48 gallons, about how many gallons of oil are left in the tank?

A. 37
B. 59
C. 73
D. 230
E. 294

Why this is a Level 7 problem:

- * There are multiple steps of calculation.
- * Examinees must look up and use the formula for the volume of a cylinder.
- * Examinees must perform the conversion between cubic feet and gallons.

Locating Information Level 3

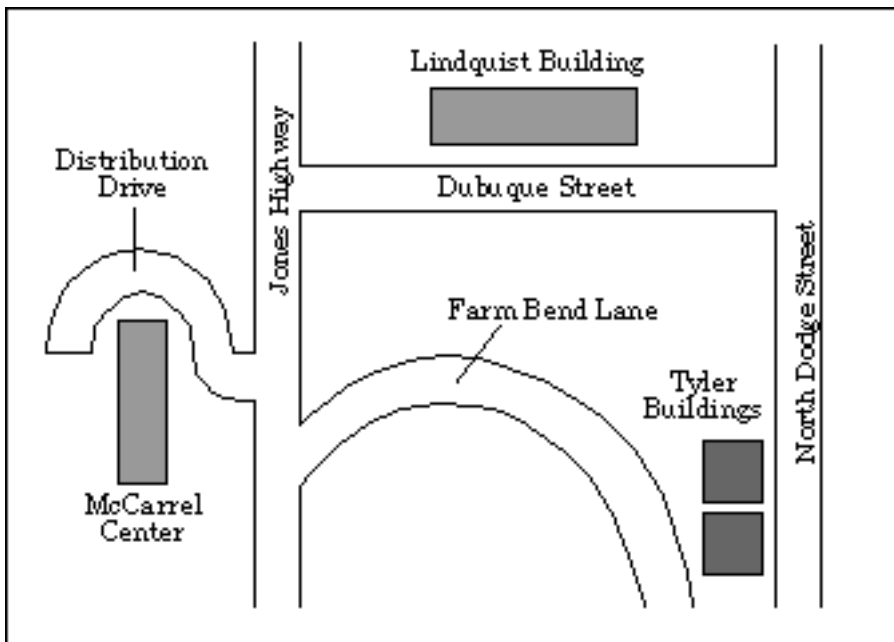
Questions at Level 3 are based on elementary workplace graphics such as simple order forms, bar graphs, tables, flowcharts, and floor plans.

Persons with Level 3 skills can:

- * Find one or two pieces of information in a graphic.
- * Fill in one or two pieces of information that are missing from a graphic.

Level 3 Sample Question

You work for an overnight mail delivery service.



1. You must deliver a package to the Lindquist Building. According to the map shown above, on what street is the Lindquist Building located?
 - A. Distribution Drive
 - B. Dubuque Street
 - C. Farm Bend Lane
 - D. Lindquist Street
 - E. North Dodge Street

Why this is a Level 3 problem:

- * The map is a simple, straightforward graphic with only a few pieces of information.
- * The examinee is required to find only one piece of information.

Locating Information Level 4

Questions at Level 4 are based on straightforward workplace graphics such as basic order forms, line graphs, tables, instrument gauges, maps, flowcharts, and diagrams.

In addition to the skills at the Level 3, persons with Level 4 skills can:

- * Find several pieces of information in graphics.
- * Summarize and/or compare information and trends in a single graphic.
- * Summarize and/or compare information and trends among more than one graphic by determining the relationships among the graphics.

Level 4 Sample Question

You prepare sandwiches in a sandwich shop.

SANDWICH ORDER	
Customer's Name	<u>Ernie Harrison</u>
Phone	<u>333-1130</u>
Pick-up Time	<u>11:45</u>
Sandwich Wrapping	
<input type="checkbox"/> In House (plastic)	<input checked="" type="checkbox"/> To Go (paper)
MEAT & CHEESE	
1. <u>Swiss</u>	2. <u>cheddar</u>
3. <u>roast beef</u>	4. _____
EXTRAS	
1. <u>tomato</u>	2. <u>mustard</u>
3. _____	4. _____

1. According to the sandwich order shown above, what type of sandwich and wrapping has Ernie Harrison ordered, and when is he planning to pick it up?
 - A. Roast beef, Swiss, and cheddar, with tomato and mustard; in paper; at 11:30
 - B. Swiss and cheddar, with lettuce, tomato, and mustard; in plastic; at 11:30
 - C. Swiss and cheddar, with tomato and mustard; in paper; at 11:45
 - D. Roast beef, Swiss, and cheddar, with tomato and mustard; in paper; at 11:45
 - E. Roast beef, Swiss, and cheddar, with lettuce and tomato; in plastic; at 11:45

Why this is a Level 4 problem:

- * The graphic is straightforward.
- * The task is to summarize the information in the graphic.

Locating Information Level 5

Questions at Level 5 are based on complicated workplace graphics, such as detailed forms, tables, graphs, maps, instrument gauges, and diagrams.

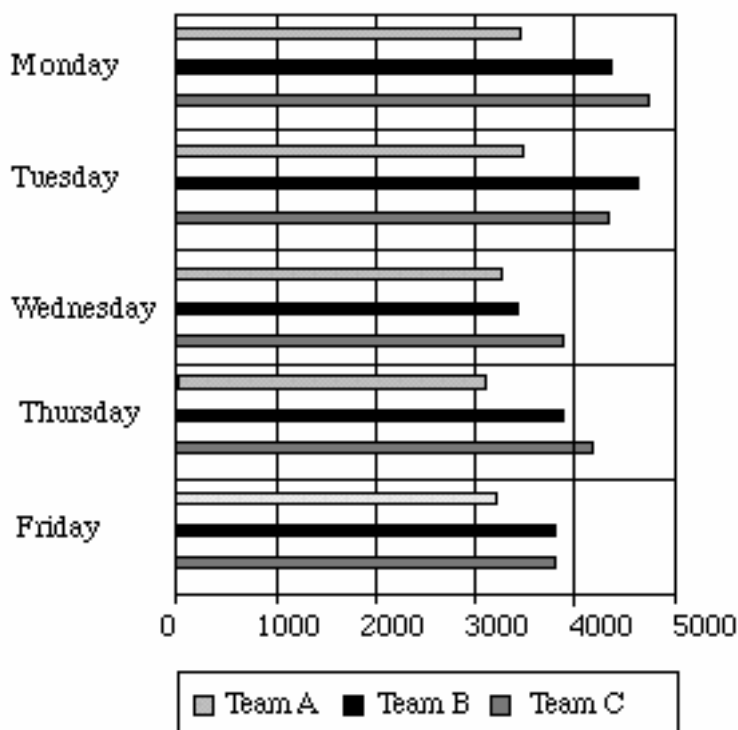
In addition to the skills at the previous levels, persons with Level 5 skills can:

- * Summarize and/or compare information and trends in a single graphic.
- * Sort through distracting information to summarize and/or compare information and trends presented in more than one workplace graphic.

Level 5 Sample Question

You are a line supervisor at a plant that packages dishwashing soap in bottles. Each week you review the production rates for the three teams that work on your line.

Bottle Packaging Production
Week 38



1. According to the bar chart shown above, which team had the highest overall production for Week 38?
 - A. Team A
 - B. Team B
 - C. Team C
 - D. Team A and Team B had the same high production rate.
 - E. Team B and Team C had the same high production rate.

Why this is a Level 5 problem:

- * The graphic is a complicated bar chart.
- * The task is to summarize and compare the information in the graphic.

Locating Information Level 6

Questions at Level 6 are based on complex workplace graphics which are difficult to use because of the great amount of information they contain and/or

because of their challenging presentations. These graphics include very detailed graphs, charts, tables, forms, maps, and diagrams.

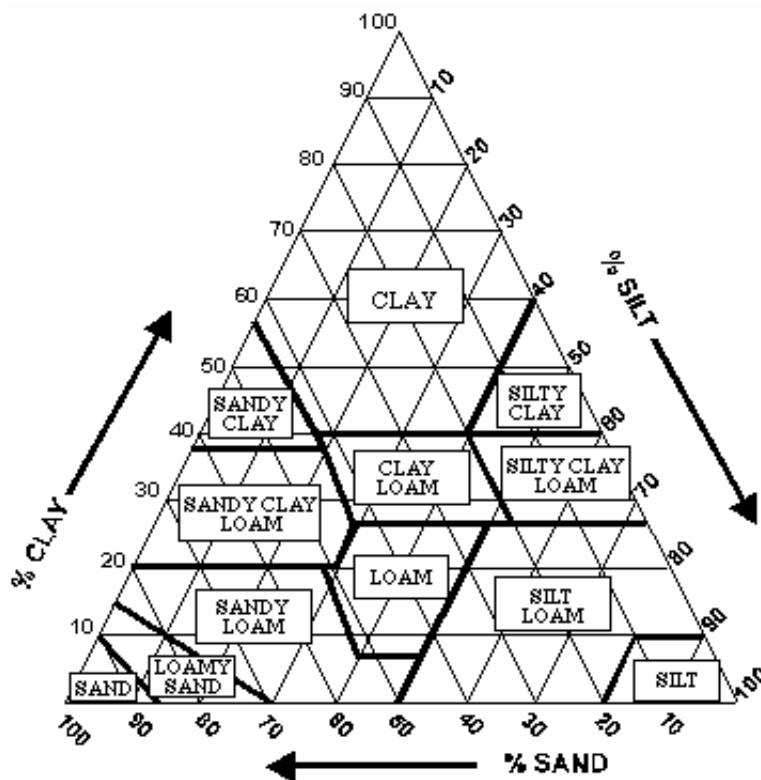
In addition to the skills at the previous levels, persons with Level 6 skills can:

- * Draw conclusions from the information presented in very detailed graphics.
- * Apply information from these types of graphics to specific situations.
- * Analyze data within these types of graphics to make decisions and/or predictions requiring judgments based on the information presented.

Level 6 Sample Question

You are a road contractor and you have analyzed a soil that you want to use for road fill.

1. Your analysis shows that the soil contains 15% sand, 65% silt, and 20% clay. You need to know what the shrink-swell potential is for the soil because it will affect the durability of the road. Based on the following diagram and table, what is the shrink-swell potential at a 30-inch depth for this soil?



Soil name	Texture class	Depth (inches)	Shrink-swell potential
Sarpy	sandy loam	0-7	low
		7-60	low to moderate
Kennebec	silt loam	0-38	moderate
		38-60	low to moderate
Colo	silty clay loam	0-31	high
		31-60	high
Blend	silty clay	0-17	high
		17-29	moderate to high
		29-60	high
Nevin	clay loam	0-28	moderate to high
		28-48	moderate
		48-60	moderate
Kenmoor	loamy sand	0-24	low
		24-60	high

- A. Low
- B. Low to Moderate
- C. Moderate
- D. Moderate to High
- E. High

Why this is a Level 6 problem:

- * It uses complicated graphics with a great deal of information and an unusual presentation.
- * The examinee must apply the information to a described situation, using related graphics.

Reading for Information Level 3

Questions at Level 3 measure the examinee's skill in reading short, uncomplicated workplace documents which use elementary vocabulary. The documents include basic company policies, procedures, and announcements. All of the information needed to answer the questions is stated clearly in the documents, and the questions focus on the main points of the documents. At this level, the wording of the questions and answers is similar or identical to the wording used in the documents.

Persons with Level 3 skills can:

- * Identify uncomplicated key concepts and simple details.

- * Recognize the proper placement of a step in a sequence of events, or the proper time to perform a task.
- * Identify the meaning of a word that is defined within the document.
- * Identify the meaning of a simple word that is not defined within the document.
- * Recognize the application of instructions given in the document to situations that are also described in the document.

Level 3 Sample Question

MEMO

To:

All businesses in Logan City Mall

From:

Philip Charles,
Logan City Mall Manager

Re:

New garbage collection rules

Logan City Mall has hired a new garbage collection company. Speedy Sanitation, Inc. will be collecting garbage from all businesses starting next Monday. Collection days will not change. The pick-up time will be one hour later.

Each business will be given one blue garbage can to use. Each business may ask for 2 extra garbage cans. You may have a total of 3 garbage cans. You will not need yellow collection tags anymore. Full garbage cans must weigh less than 30 pounds. Put your garbage in bags before putting it in the garbage cans. Put your garbage cans in the alley behind your business's back door.

1. Starting next Monday, what is the greatest number of garbage cans each business is allowed to have?
 - A. 1
 - B. 2
 - C. 3
 - D. 15
 - E. 30

Why this is a Level 3 workplace document:

- * The sentences are simple and direct—most put the subject first and the verb second: *Speedy Sanitation, Inc., will be collecting garbage from all businesses, starting next Monday.*

- * The short paragraphs are made up of short sentences: *Collection days will not change.*
- * There are direct instructions for simple tasks: *Put your garbage cans in the alley behind your business's back door.*
- * The vocabulary is elementary: *collection, pick-ups.*
- * The information needed in order to fulfill duties is directly and clearly stated—the examinee does not need to read between the lines or draw any conclusions.

Reading for Information Level 4

At Level 4, the workplace documents are slightly more complex than those at Level 3. They contain more detail and describe procedures which involve a greater number of steps. Some documents describe policies and procedures with a variety of factors which must be considered in order to decide on appropriate behavior. The vocabulary, while elementary, includes words that are more difficult than those at Level 3. For example, the word “immediately” may be used at this level, whereas at Level 3 the phrase “right away” would be used. At this level, the questions and answers are paraphrased from the document.

In addition to the skills at Level 3, persons with Level 4 skills can:

- * Identify important details that are less obvious than those in Level 3.
- * Recognize the application of more complex instructions, some of which involve several steps, to described situations.
- * Recognize cause-effect relationships.
- * Determine the meaning of words that are not defined in the document.

Level 4 Sample Question

Greenfield Memorial Hospital

During and after a snowstorm, there will be both route and schedule changes for the hospital employee bus. The bus will run 15 minutes early, so be at your stop early. The bus will not stop at Bellevue Square or the Stadium. Employees usually boarding at those places will be picked up at the Eastdale Mall stop. Olive Street will be closed, so people usually picked up at that stop must walk to the Spring Street stop. If your stop is on a hillside, wait at the city bus stop closest to the top of the hill, so that the driver can stop safely. At stops where the snow has been piled deep at the curb, be prepared to board out in the street. Ice storms may cause the shuttle service to be canceled for a period of time. Listen to your local radio station after an ice storm. Any cancellations will be announced regularly.

1. Bellevue Square is your usual stop. After a snowstorm, you should go to which stop?
 - A. Bellevue Square
 - B. Eastdale Mall
 - C. Olive Street
 - D. Spring Street
 - E. The Stadium

Why this is a Level 4 workplace document:

- * Sentences are more complex, although still direct and clear: *The bus will run 15 minutes early, so be at your stop early.*
- * Sentence structure is varied—some introductory phrases are used: *At stops where the snow has been piled deeply at the curb, be prepared to board out in the street.*
- * There are a greater number of details—which stops will be closed, where to board on a hill, where to listen for cancellation notices.
- * Information needed is still directly and clearly stated—the examinee does not need to read between the lines or draw any conclusions.

Reading for Information Level 5

Workplace documents at Level 5 are more detailed, more complicated, and cover broader topics than those at Level 4. Words and phrases may be specialized (e.g., jargon and technical terms), and some words may have multiple meanings. Questions at this level typically call for applying information given in the document to a situation that is not specifically described in the document. All of the information needed to answer the questions is stated clearly in the document, but the examinee may need to take several considerations into account in order to choose the correct responses.

In addition to the skills at the previous levels, persons with Level 5 skills can:

- * Identify the paraphrased definition of a technical term or jargon that is defined in the document.
- * Recognize the application of technical terms or jargon to stated situations.
- * Recognize the definition of an acronym that is defined in the document.
- * Identify the appropriate definition of a word with multiple meanings.
- * Recognize the application of instructions from the document to new situations that are similar to those described in the document.
- * Recognize the application of more complex instructions to described situations, including conditionals and procedures with multiple steps.

Level 5 Sample Question

Goldberg's Auto Parts is served by more than fifty different accounts, each with its own sales representative, company name, corporate address, and shipping address. As a shipping and receiving clerk at Goldberg's, you are required to return defective merchandise to the manufacturer.

Standard procedure for returning an item begins with your written request to the company for authorization. Always send the request to the corporate address, not to the shipping address. Unless the company file folder contains a form for this procedure, write a business letter to the manufacturer supplying the item's stock number, cost, and invoice number; the date it was received; and the reason for its return. The manufacturer's reply will include an authorization number from the sales representative, a sticker for you to place on the outside of the box to identify it as an authorized return, and a closing date for the company's acceptance of the returned item. If you do not attach the provided sticker, your returned box will be refused by the manufacturer as unauthorized, and you will need to obtain a new letter, authorization, sticker, and closing date. Always send a returned box to the shipping address, not to the company's corporate address.

1. What should you do if you lose an authorization sticker?
 - A. Send a request for a return authorization along with the rejected part directly to the manufacturer's shipping address.
 - B. Send a request for return authorization along with the rejected part directly to the manufacturer's corporate address.
 - C. Repeat the standard procedure to obtain a new letter, authorization, sticker, and closing date.
 - D. Use a sticker from another company's folder.
 - E. Send the rejected part to your sales representative.

Why this is a Level 5 workplace document:

- * Sentences are longer, more complex—information needed is still directly stated, but it is harder to understand because of the phrasing: *If you do not attach the provided sticker, your returned box will be refused by the manufacturer as unauthorized, and you will need to obtain a new letter, authorization, sticker, and closing date.*
- * Paragraphs are more complex.
- * The reading contains many steps to be followed and details to be considered.
- * The vocabulary is more difficult: *corporate, defective.*
- * Instructions include a conditional: *Unless the company file folder contains a form for this procedure, write a business letter to the manufacturer supplying the item's stock number, cost, and invoice number; the date it was received; and the reason for its return.*

Reading for Information Level 6

Workplace documents at Level 6 are significantly more difficult than those at the previous level. The presentation of the information is more complex; documents may include excerpts from regulatory and legal documents. The procedures and concepts described are more elaborate. Advanced vocabulary, jargon, and technical terms are used. Most information needed to answer the questions correctly is not clearly stated in the documents. The questions at this level require examinees to generalize beyond the stated situation, to recognize implied details, and to recognize the probable rationale behind policies and procedures.

In addition to the skills at the previous levels, persons with Level 6 skills can:

- * Recognize the application of jargon or technical terms to new situations.
- * Recognize the application of complex instructions to new situations.
- * Recognize, from context, the less common meaning of a word with multiple meanings.
- * Generalize from the document situations not described in the document.
- * Identify implied details.

- * Explain the rationale behind a procedure, policy, or communication.
- * Generalize from the document to a somewhat similar situation.

Level 6 Sample Question

Section 113.18

A lawful fence shall consist of:

1. Three rails of good substantial material fastened in or to good substantial posts not more than ten feet apart.

OR

2. Three boards not less than six inches wide and three-quarters of an inch thick, fastened in or to good substantial posts not more than eight feet apart.

OR

3. Three wires, barbed, with not less than thirty-six iron barbs of two points each on each rod of wire; or four wires, two thus barbed and two smooth. The wires are to be firmly fastened to posts not more than two rods apart, with not less than two stays between posts, or with posts not more than one rod apart without such stays, the top wire to be not more than fifty-four or less than forty-eight inches in height. The bottom wire should be not less than twelve or more than eighteen inches above the ground. The middle wire should be not less than twelve or more than eighteen inches above the bottom wire.

OR

4. Wire either wholly or in part substantially built and kept in good repair, the lowest or bottom rail, wire, or board to be not more than twenty or less than sixteen inches from the ground, the top rail, wire, or board, between forty-eight and fifty-four inches in height; and the middle rail, wire, or board, not less than twelve or more than eighteen inches above the bottom rail, wire, or board.

1. A farmer's fence has three barbed wires attached to posts spaced two rods apart with two stays between posts. The top wire is forty-nine inches in height. The bottom wire is ten inches above the ground. Why is the fence NOT lawful under Section 113.18?

- A. The fence must have four wires, two smooth and two barbed.
- B. The fence posts should be spaced closer together.
- C. The top wire should be higher.

- D. There should be more stays.
- E. The bottom wire should be higher.

Why this is a Level 6 workplace document:

- * The document is an excerpt from a regulatory document.
- * The sentences are more formal and complex: *Three boards not less than six inches wide and three-quarters of an inch thick, fastened in or to good substantial posts not more than eight feet apart.*
- * The paragraphs are filled with details and information: *Three wires, barbed, with not less than thirty-six iron barbs of two points each on each rod of wire; or four wires, two thus barbed and two smooth. The wires are to be firmly fastened to posts not more than two rods apart, with not less than two stays between posts, or with posts not more than one rod apart without such stays, the top wire to be not more than fifty-four or less than forty-eight inches in height. The bottom wire should be not less than twelve or more than eighteen inches above the ground. The middle wire should be not less than twelve or more than eighteen inches above the bottom wire.*

Reading for Information Level 7

The questions at Level 7 are similar to those at Level 6 in that they require the examinee to generalize beyond the stated situation, to recognize implied details, and to recognize the probable rationale behind policies and procedures. However, the workplace documents are more difficult: the density of information is higher, the concepts are more complex, and the vocabulary is more difficult. Documents include jargon and technical terms whose definitions must be derived from context.

In addition to the skills at the previous levels, persons with Level 7 skills can:

- * Recognize the definitions of difficult, uncommon jargon or technical terms, based on the context of the reading materials.
- * Figure out the general principles underlying described situations and apply them to situations neither described in nor completely similar to those in the document.

Level 7 Sample Question

Section 108

- a. Notwithstanding the provisions of Section 106, it is not an infringement of copyright for a library or archive, or any of its employees acting within the

scope of their employment, to reproduce no more than one copy or phonorecord of a work, or to distribute such copy or phonorecord under the conditions specified by this section if

1. The reproduction or distribution is made without any purpose of direct or indirect commercial advantage;
 2. The collections of the library or archive are (i) open to the public, or (ii) available not only to researchers affiliated with the library or archive or with the institution of which it is a part, but also to other persons doing research in a specialized field; and
 3. The reproduction or distribution of the work includes a notice of copyright.
- b. The rights of reproduction and distribution under this section apply to a copy or phonorecord of an unpublished work duplicated in facsimile form solely for purposes of preservation and security, or for deposit for research use in another library or archive of the type described by clause (2) of subsection (a), if the copy or phonorecord reproduced is currently in the collections of that library or archive.
- c. The right of reproduction under this section applies to a copy or phonorecord of a published work duplicated in facsimile form solely for the purpose of replacement of a copy or phonorecord that is damaged, deteriorating, lost, or stolen, if the library or archive has, after a reasonable effort, determined that an unused replacement cannot be obtained at fair cost.
1. Based on the information above, which of the following conditions would prohibit a city employee from photocopying an unpublished manuscript?
 - A. If the photocopy is to be sent to a public research library that does not have a copy of the manuscript
 - B. If the photocopy would not produce any income for the city library
 - C. If the city library's original copy of the manuscript is in danger of damage through use
 - D. If the city library is accessible to any and all citizens and researchers
 - E. If the employee makes only one copy of the manuscript as a secure transcription

Why this is a Level 7 workplace document:

- * The sentences are more complex, and the paragraphs are significantly denser: *The right of reproduction under this section applies to a copy or phonorecord of a published work duplicated in facsimile form solely for the purpose of replacement of a copy or phonorecord that is damaged,*

deteriorating, lost, or stolen, if the library or archive has, after a reasonable effort, determined that an unused replacement cannot be obtained at fair cost.

- * The writing style is complex and legal: *The right of reproduction under this section applies to a copy or phonorecord of a published work duplicated in facsimile form solely for the purpose of replacement of a copy or phonorecord that is damaged, deteriorating, lost, or stolen, if the library or archive has, after a reasonable effort, determined that an unused replacement cannot be obtained at fair cost.*
- * The vocabulary is difficult: *notwithstanding, infringement, commercial advantage, affiliated, scope, facsimile, archive, phonorecord.*
- * The information needed is not directly stated—examinees are expected to understand that it is not permissible for a library employee to duplicate a recording of an author reading from an unpublished manuscript if the recording will be sent to a research library that does not already have a copy of the manuscript. Paragraph (b) states: *The rights of reproduction and distribution under this section apply to a copy or phonorecord . . . for deposit for research use in another library . . . if the copy or phonorecord reproduced is currently in the collections of that library or archive.*

APPENDIX C – COMPARISON OF STUDIES

This report is one of two recent similar research projects on the local job market conducted by two separate institutions: the Center for Economic Development at the H.J. Heinz III School of Public Policy and Management at Carnegie Mellon University, and the Center for Competitive Workforce Development at the Institute of Economic Transformation at the John F. Donahue School of Business at Duquesne University.

Both pieces of research were initiated partly in response to research by Ken Gray at the Pennsylvania State University (see end note 6). Although the projects were slightly different, both came to some similar conclusions. Whereas one report focused on “in-demand” occupations, the other focused on “middle ground occupations.” Although the subject, scope, data, and methodologies used by each research team varied, both support one common theme: that a large number of currently filled jobs and expected job openings require less than a four year degree and pay above average compensation.

Both reports can be found on the web at www.iet.duq.edu/ccwd and <http://www.smartpolicy.org/pdf/middleground.pdf>. For reference here are the major differences between the two research efforts.

Item	CED	CCWD
Geographical Scope	Six county MSA: Allegheny, Beaver, Butler, Fayette, Washington, and Westmoreland County. (This analysis took place before the addition of Armstrong County.)	Nine county WIB: Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Washington and Westmoreland.
Projection data source:	Pennsylvania Department of Labor and Industry, Long-Term Occupational Employment Projections for Metropolitan Statistical Areas: Pittsburgh MSA, 2000-2010.	Pennsylvania Department of Labor and Industry, Long-Term Occupational Employment Projections by Workforce Investment Areas, 1998-2008.
Projection scope	Projected jobs and job openings analyzed through 2010.	Projected job openings analyzed through 2008.
Existing jobs data source	Bureau of Labor Statistics, Occupational Employment and Wage Estimates, Pittsburgh MSA, 2001.	Not measured.
Occupational subgroup studied	Middle ground occupations.	In-demand occupations.
Criteria for subgroup studied	(1) Occupation does not require a 4 year degree (2) Occupation pays above average wages.	(1) Local demand for workers to fill occupation is 150% of local supply. (2) Occupation pays at or above \$12.50/hour. (3) 50 local openings a year expected for occupation.
Wage criteria	Average annual wage of \$33,010 based on BLS Data (Occupational Employment and Wage Estimates, 2001). Hourly would be \$15.87. (2080 hours in full-time year).	\$12.50/hour based on 1.5% poverty thresholds for a family of 4, (Census Bureau Poverty Thresholds, 2002).
Source of educational requirement estimates for occupation	Pennsylvania Department of Labor and Industry.	Bureau of Labor Statistics Occupational Outlook Handbook: 2002-2003 edition.

ENDNOTES

¹ It should be pointed out that the data used in this study are time-specific – the demand projections of Pennsylvania’s Department of Labor and Industry cover the period to 2008. They are relevant to today’s High School students, but not to those entering High School in, say, 2006. The type of analysis undertaken here must be repeated, therefore. We believe, however, that the strategies and action implications outlined in this brief are pertinent and applicable regardless of the changing content of labor market information.

² Note that those who earned a high school degree only without completing a vocational-technical program were not counted as part of the regional output. They were not considered as quite prepared to enter the workforce.

³ We thank Bill Ceriani of the Pennsylvania Department of Labor and Industry for supplying the files with the projected occupational demand.

⁴ The methodological details of this effort, as well as its numerous challenges and limitations, are detailed in Appendix A.

⁵ It should be pointed out that a report focused not on the *actual* number of openings but rather on the *fastest growing* occupations, would produce a perspective and results different from the current one. We would be examining occupations likely to produce significant numbers of jobs in a somewhat distant future rather than *now*. This alternative way of looking at the matter is important and complementary to the approach taken here. It will be the object of future issues of *WorQ*.

⁶ Kenneth C. Gray and Edwin L. Herr (2000). *Other Ways to Win: Creating Alternatives for High School Graduates*. Second Edition, Corwin Press, Inc.

⁷ We are indebted to Keys2Work for preparing the WorkKeys profiles of the occupations highlighted in this report. WorkKeys® is a system of ACT™, Inc. WorkKeys® is a registered trademark of ACT, Inc. All WorkKeys products and materials are copyrighted by ACT, Inc. ACT is a trademark of ACT, Inc. See <http://www.act.org>. Keys2Work holds the local license for WorkKeys.

⁸ For an explanation of OES codes see Appendix A.

⁹ As of January 2004 WorkKeys has been adopted by 100 school districts in Southwestern Pennsylvania, and over 30,000 students have been tested and received Workkeys scores.

¹⁰ See Appendix A for sources for research on occupations.

¹¹ WorkKeys has associated software – Keytrain – that can help with the creation and implementation of skills action plans.

¹² Note that those who earned a high school degree only without completing a vocational-technical program were not counted as part of the regional output. They were not considered as quite prepared to enter the workforce.

¹³ We thank Tim McMahon of Triangle Tech and Richard Dumaresq of PAPSA for their help with this piece of research.

¹⁴ We thank Bill Ceriani of the Pennsylvania Department of Labor and Industry for supplying the files with the projected occupational demand.

¹⁵ The four WIBs in Southwestern Pennsylvania, with their respective counties listed in parenthesis, are: Three Rivers (Allegheny), Tri-County (Armstrong, Butler, Indiana), Westmoreland-Fayette, and Southwest Corner (Beaver, Greene and Washington).

¹⁶ A good overview of the new SOC and its relationship to the OES can be found in Bureau of Labor Statistics, Revising the Standard Occupational Classification System. U.S. Department of labor, Bureau of Labor Statistics: 1999 (June). The report number is 929. It is available at the BLS web site, <http://www.bls.gov>.

¹⁷ See <http://nces.ed.gov/pubs2002/cip2000/index.asp>

¹⁸ The Handbook can be found at <http://www.bls.gov/oco>.

¹⁹ See for instance Talent Pittsburgh (<http://www.talentpittsburgh.org> and PAPSA (<http://www.papsa.org>), the Pennsylvania Association of Private School Administrators. From Talent Pittsburgh and/or PAPSA, interested users can access the web sites of private proprietary schools and community colleges. One good way of checking “hot” occupations is to find out which courses these schools have recently added to their curricula, and the enrollment in each. If the information is not available on-line, the web site will let the user know how to contact the educational institution. One e-mail or phone call will answer lots of questions. The private proprietary schools listed in PAPSA, in particular, are organizations that respond quickly and effectively to market trends. A conversation with their admission officers can be extremely useful to learn the prospects of specific occupations. Those investigating these matters must also consult the BLS Occupational Outlook Handbook – see footnote 19.

²⁰ This is a very generic overview of the methods used to prepare and analyze our data. For details please contact the Center for Competitive Workforce Development at <http://www.iet.duq.edu/ccwd/>.

²¹ WorkKeys® is a system of ACT™, Inc. WorkKeys® is a registered trademark of ACT, Inc. All WorkKeys products and materials are copyrighted by ACT, Inc. ACT is a trademark of ACT, Inc.