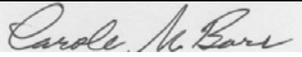
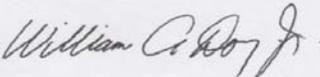
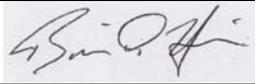
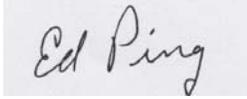
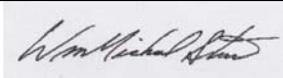
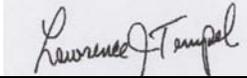
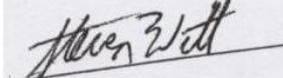
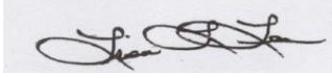




Root Causes Cover Sheet

Economic Growth Region #7: Western Indiana

<b>1. Funding Request</b>			
<b>Requested: \$</b>	<b>Start Date:</b>	<b>End Date:</b>	
<b>2. Designated Grantee</b>			
<b>Organization Name:</b> Western Indiana Workforce Investment Board, Inc.		<b>Telephone Number:</b> 812-238-5616	
<b>Address:</b> 630 Wabash Avenue, Suite 205		<b>Fax Number:</b> 812-238-2466	
<b>Address:</b>		<b>Email Address:</b> wiwibdir@wiwib.com	
<b>City:</b> Terre Haute	<b>State:</b> Indiana	<b>Zip + 4:</b> 47807	
<b>County:</b> Vigo	<b>FEIN:</b> 35-2080570		
<b>3. Contact Person</b>			
<input type="checkbox"/> Mr. <input type="checkbox"/> Ms. <input type="checkbox"/> Dr. <input type="checkbox"/> Other	<b>First Name:</b> Lisa	<b>Last Name:</b> Lee	
	<b>Title:</b> Executive Director, SSI Core Agent	<b>Telephone Number:</b> 812-238-5616	
<b>Address:</b> 630 Wabash Avenue, Suite 205		<b>Fax Number:</b> 812-238-2466	
<b>Address:</b>		<b>Email Address:</b> wiwibdir@wiwib.com	
<b>City:</b> Terre Haute	<b>State:</b> Indiana	<b>Zip + 4:</b> 47807	
<b>Member:</b>	<b>Name</b>		
<b>Lead Team Members</b>			
<b>Name:</b>	<b>Industry:</b>	<b>Title:</b>	<b>Signature:</b>
Carole Barr	Western Indiana Employment & Training Services	Executive Director	
William Dory, II	Greencastle/Putnam Co. Development Center	Executive Director	

Brian Harris	Eli Lilly-Clinton Laboratories	Six Sigma Manager	
Ed Ping	AFL-CIO	Community Services Activities Labor Liaison Representative	
Dr. Jeff Pittman	Ivy Tech Community College	Chancellor	
Wm. Michael Steed	Great Dane Trailers	Human Resources Manager	
Lawrence J. Tempel	Growers Co-op	Agronomy Manager	
Steve Witt	Terre Haute EDC	President	
Lisa Lee	Western Indiana Workforce Investment Board, Inc.	Executive Director, SSI Core Agent	



## Economic Growth Region #7: Western Indiana

### Report 2: Root Causes

## Economic Growth Region #7: Western Indiana

### Report 2: Root Causes

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## EXECUTIVE SUMMARY

## Executive Summary

Indiana's Economic Growth Region Seven is experiencing severe occupational and skill shortages in the health care, manufacturing, and life sciences sectors. The extent to which these shortages are impediments to the growth and competitiveness of the region was discussed in the previous "Skill Shortages Report." Now, the "Root Cause Analysis Report," examines why these shortages exist, and the supply and demand side causes.

In the health care field, employers are having great difficulty finding individuals with the skills to fill openings for both respiratory therapists and radiologist. After extensive research, interviews, surveys, meetings, and analysis two issues were identified as the root causes for these shortages. First, there is not currently the training capacity available to provide interested individuals with the training needed for these jobs. And secondly, it was found that those who are receiving this valuable training often leave the region upon graduation.

The situation is somewhat reversed for the manufacturing sector. Currently, the region is experiencing a severe shortage of manufacturing maintenance employees. While these are demand occupations, with higher than average wage levels and good benefits, the research identified the fact that individuals in the region have very little interest in pursuing careers in manufacturing in general, and most people hold an incorrect view of the duties associated with the maintenance field. It was further identified that even within the manufacturing sector itself, incumbent workers are either not interested in or not aware of the opportunities available in the maintenance field. There also exists a need to organize further the relationship between area educators and manufacturers.

Among the causes identified for the shortage of chemical technicians within the region was a lack of career awareness by students, teachers, parents, and the general workforce, and a lack of adequate career education for students from elementary through high school. Closely related to the first two causes, was the identification of the fact that high school and college students are not enrolling in math, science, and engineering courses at a rate which is able to keep stride with demand. Finally, a root cause for the shortage of chemical technicians lies with the fact that there is a lack of local or national groups that have developed agreed upon skill sets required for this occupation.

While the causes are many, they are not insurmountable. Through the development and implementation of a strong solutions plan, the current skill/occupational shortages can be significantly cut or eliminated over the course of the next two to four years. Close examination of the detailed analysis provided in this report, provides clear direction toward changes which must be undertaken to permanently eliminate these causes.



## REGIONAL COALITION AND INDUSTRY PARTNER ENGAGEMENT

## Regional Coalition and Industry Partner Engagement

Extensive engagement of economic development, business, education, labor, and community based organizations throughout the region. These activities include:

- Strategic Skills Initiative Consortium Meeting
- Strategic Skills Initiative Executive Team Meeting
- Manufacturing Survey
- Health Care Survey
- Instructor/Student Survey
- Interviews with industry representatives.
- Focus Groups in area high schools.
- Administration of WorkKeys Assessment at area high schools.
- Discussion with area counselors and regional directors of careers and technology.
- After all information was gathered, a completed draft of the Root Cause Report went out to all members of the Strategic Skills Initiative Executive Team and Consortium for review and comment.



## HEALTH CARE ROOT CAUSE REPORT

## Radiological Technicians and Respiratory Therapists

### Introduction

Unfortunately, there is no crystal ball that will allow us to predict the future with one hundred percent accuracy. However, it is with a great deal of certainty that we can predict the demand for health care professionals has no where to go but up over the next five to ten years. It is also safe to predict that if we do not tend to these shortages in the present, the gap between supply and demand will continue to widen.

As previously reported, the demand for Radiological Technicians and Respiratory Therapists in Western Indiana is outpacing the supply. It was recently made public that three local hospitals have plans to open surgical centers in the next two years. No hiring projections are available at present, but this will, at least initially, place additional strain on an already overburdened supply system.

### Identification of Root Causes

The following areas were studied to determine if or how they might be contributing to the shortage of Radiological Technicians and Respiratory Therapists in Western Indiana.

#### Employer Recruitment and Retention

Health care providers in the region have reported that the average time to fill a respiratory or radiology position is 90 to 120 days. The inability to fill a critical position in a timely manner starts a cycle that exacerbates the problem by placing an additional burden on those already in the field. Area employer recruitment efforts include the standard practices of employment ads in the local papers, job postings on their individual websites, and listings with the local WorkOne office. In addition they notify local post-secondary institutions, in this case generally Ivy Tech Community College, of openings. These same types of recruitment efforts are deemed effective for filling other positions in their facilities, so effective recruitment is not a major cause of shortages.

Hospitals, the largest employers of Radiological Technicians and Respiratory Therapists, have a strong core of long term employees in both of these fields. Through interviews and surveys, local employers have not cited turnover (at least the common definition of turnover) in these positions as a major concern. Normal attrition, including an aging workforce, continues to create a demand. New healthcare technology is constantly being developed and trained, certified individuals in these fields require retraining or move to another specialty within these areas.

### Education and Training Capacity and Student Completion/Placement

Locally, Ivy Tech Community College is the only training resource for Radiological Technicians and Respiratory Therapists. At present, both programs are filled to capacity. Capacity for both programs hinges on the availability of clinical sites.

The department head of the respiratory care program reported a great shortage of critical care, newborn ICU and pediatric ICU sites for the clinical rotations. The clinical sites currently used cover a geographical area of over 9,000 square miles and include sites in southern Indiana and Eastern Illinois. The cost burden for driving to these sites is the responsibility of the student and instructors make every effort to keep student commuting time and costs to a minimum.

The Respiratory Care program at Ivy Tech started in the fall of 2004 with eight students and the first graduates will be in May 2006. Two of the original students have withdrawn from the program for reasons unknown. The fall 2005 class has fourteen enrolled, which is maximum capacity. CoARC, the accrediting body, has suggested that no expansion be considered until after March 2006, when the accreditation process is completed.

The Radiology program at Ivy Tech generally has 75 to 200 applicants on the waiting list. The program can accept a maximum of 32 students per year. The program maintains an 80 to 90% graduation rate and 75% of the graduates pass the registry exam on the first attempt.

The programs to train these healthcare professionals are already in place and according to sources at Ivy Tech expansion of the programs is a definite possibility. The limiting factor is the shortage of sites for students in these programs to complete the clinical part of the training.

Sixteen students currently enrolled in Respiratory Care program at Ivy Tech who plan to graduate in 2006 and 2007 responded to survey conducted by the Workforce Investment Board. All of the students reside in EGR 7, but five of them indicated they intend to relocate or commute out of the area following graduation. Three of the respondents that intend to work in EGR 7 indicated they intend to continue their education in other areas of health care. Based on the survey and assuming all who responded go to work in their chosen field of study by the fall of 2007, EGR 7 could see a net gain of eleven respiratory care therapists and lose three of those within a few years.

Students in the radiology program expected to graduate in 2006 and 2007 were asked to complete the same survey. Of the 22 respondents, ten reside outside of EGR 7. These ten and five others that live in the region indicated they intend to work outside Western Indiana. Of the seven remaining students that plan to work in the region, six report they intend to

further their education in some area of radiography. The region could see a net gain of seven professionals from these two classes.

Twenty-eight of the students responding expressed a desire to work in a hospital setting. In the past two to three years, there has been a trend for long-term care facilities to hire Respiratory Therapists as full time staff. One of the areas of concern for local hospitals is the migration of qualified Respiratory Therapists to area long-term residential care facilities, as the hours are generally more compatible with family life.

### Student/Worker Career Awareness Access

Based on the waiting lists for the current programs and the completion rate of students in the programs, there is little evidence of a lack of career awareness for Radiological Technicians and Respiratory Therapists. High school focus groups indicate that youth have a basic concept of what these two occupations encompass and health care in general is a high interest area for local students (see appendix).

### Wage Rates and Benefits

Wages for Radiological Technicians and Respiratory Therapists in EGR 7 are generally at or above other areas of the state (see appendix). Entry level wages for Radiological Technicians are slightly lower than other areas, particularly as compared to the Lafayette MSA. However, this does not appear to be a significant factor in the regional shortage. In the student survey, none of the students indicated that Lafayette was their intended work destination. Benefit packages are reported as equitable and fairly standard throughout the industry. The wage expectations of the students who intend to commute or relocate outside the region were, for the most part, no greater than the anticipated wage within the region.

### Description of Root Causes and Their Impacts

Statement of the problem: There is a shortage of qualified Radiological Technicians and Respiratory Therapists in EGR 7.

Analysis of potential causes: From the above discussion, we can eliminate recruitment issues, career awareness issues and salaries as major causes for the shortage. Based on this study training capacity appears to be the most relevant factor in the shortage and the outflow of talent as the next most relevant. Although, these are separate issues, they are somewhat related in the fact that our local Ivy Tech provides training to several students from outside our region who do not intend to work in the region.

Training capacity expansion is limited by the shortage of qualified clinical settings that are needed for students to complete the programs. The lack of clinical sites limits the number of students who can be enrolled; causing students to commute further to participate in clinicals and effecting training institutions outside the region as they compete for clinical sites.

The outflow of talent can be somewhat explained by the number of students enrolled who commute to classes from outside the region. Another cause is that a number of students that complete the programs intend to continue their education and will eventually leave the field, but do not necessarily leave the region or the healthcare profession. Local employers have noted that retaining young professionals in the region is a challenge. This concern has been voiced by a wide variety of employers. There is a perception that the region lacks many of the “big-city” amenities such as the types of nightlife that appeal to young professionals.

Based on the thirty-eight student surveys, if we could make living and working in the region more attractive to young professionals the region could see an additional ten Radiological Technicians and Respiratory Therapists from the students currently enrolled in training. And, if the number of clinical training sites could be expanded, the region could see even greater growth in the number of professionals completing these programs. Increased clinical sites would allow more students, already on waiting lists, to be enrolled. If additional clinical sites became available, even outside our region, it would reduce the number of students from outside the region (currently at ten), who do not intend to work here, allowing additional local students to be enrolled.

In light of the continued expected demand for healthcare professionals, the region needs to increase training capacity and discover ways to retain the professionals that have completed their training.



## MANUFACTURING ROOT CAUSE REPORT

## Manufacturing Maintenance

The root cause analysis which follows is related to maintenance positions within the manufacturing sector which are critical to the continued economic growth and competitiveness of EGR 7. The demand for qualified individuals in maintenance occupations far exceeds the current supply. A recent poll of area manufacturers found that 100% of respondents have experienced difficulty hiring qualified maintenance employees. 75% of respondents expect the number of maintenance employees at their facility to increase over the next five year, while 25% expect the current number to remain level over the same period. No employer predicted a decrease in the number of maintenance workers at their facility. Unless innovative and decisive action is taken very soon the region will continue to struggle with this business impediment well into the next decade. These positions include general maintenance workers, electrical maintenance workers, machine maintenance workers, and first line maintenance supervisors.

## Identification of Root Causes

### Employer Recruitment and Retention:

Area manufacturers report great difficulty recruiting maintenance employees. Employers report that it is not unusual for it to take between four weeks to three months to find a qualified maintenance applicant. In fact, a number of human resource managers have stated on different occasions that it is easier to recruit engineers than maintenance personnel.

In a recent survey done in preparation for this report, area manufacturers were asked where most people hired for maintenance positions in their organizations came from. The second most sited response was that new employees were hired directly from a two year college. But the overwhelming response was that new hires came from another company. Not surprisingly, the reason most sited for why a maintenance employee is terminated was that they were hired away by another company. Further, fifty percent of the respondents completing the survey identified the amount of specialized training needed to assimilate new maintenance hires to the unique demands of the machinery and technology at their facility as intense and typically long term. The continual rotation of maintenance workers from plant to plant is a threat to economic growth; disruptive to business operations and a threat to productivity levels, and ultimately local competitiveness.

Retirement was the second most common reason given for workers leaving this occupation. An aging local population is creating both an increase in demand for maintenance workers and limiting the pool of qualified workers to fill these gaps. In addition, other industries and businesses are also competing for workers with these same skill sets, further exacerbating the situation.

The maintenance field is traditionally a male dominated profession; a fact which effectively reduces the pool of available workers to recruit by fifty percent. This phenomenon is attributed to the cultural stereotype attached to the occupation, not by any desire by employers to exclusively hire males.

**Education and Training Capacity and Student Completion/Placement:**

The training pipeline to deliver workers into the maintenance field is in place in EGR 7. A great number of area high school students who have been assessed in the Work Keys skill areas of applied math, reading, and locating information score at Level 4 or higher. This is a level which provides a strong skill base to successfully complete a maintenance training program.

At the post-secondary level, Ivy Tech Community College offers both certification and associate degree programs in maintenance specialties. The completion rate of those entering the maintenance field to obtain an associate degree is good, and a majority of graduates are believed to stay within or near the region. The problem lies with the fact that enrollment in the program is quite low; a fact which is curious for two reasons. First, maintenance is a high wage, high skill, high demand occupation. Second, there is an abnormally high ratio of students enrolled in the heating and air conditioning program at Ivy Tech. Much of the course work and skill sets of the heating and air curriculum parallel that of maintenance. The work performed and pay rates after graduation are similar in maintenance and heating and air conditioning. The difference is that there are many more jobs readily available in the region for graduates of the maintenance program.

Indiana State University offers a baccalaureate program for those pursuing maintenance supervisory positions. Enrollment rates at ISU are consistent; however, the maintenance supervisory training is part of a distance education network that the university belongs to. Therefore, many graduates are not from the area and are not moving to the area upon graduation.

At the present time, maintenance is not offered as a set of standardized courses of articulated credit between secondary and post secondary institutions. High school courses which carry articulated credit to the post-secondary level are attractive to both students and parents. Including maintenance-related courses in articulation agreements would serve to bring more credibility to the field and increase the interest from parents and students in this career area.

Incumbent workers are welcomed enrollees to maintenance training programs at both Ivy Tech and ISU. While a great number of area manufacturers offer tuition reimbursement programs to their employees, these programs are generally underutilized. Incumbent workers are either not aware of this opportunity to enhance their skill levels and move into a demand field, or are not interested in doing so.

**Student/Worker Career Awareness Access:**

It is often said that perception is reality. Nowhere is this concept truer, than in the area of manufacturing. The image of the sector is one of near turn of the century. Students, teachers, and parents overwhelmingly perceive work in the manufacturing sector as hot, dirty, boring, not secure, and generally an undesirable place to be employed. The most recent affirmation of this attitude took place during focus groups in area high schools in preparation for this report. When asked to write descriptive words related to manufacturing, the responses were three to one negative about the sector.

These same misperceptions carried over to maintenance careers in manufacturing. Most believed work in manufacturing maintenance to be the equivalent of janitorial services. Only one young lady had a clear understanding of the job. Her father happened to be a maintenance mechanic at a local facility, and she was quite proud of that fact.

An analysis of student career interests also confirms the image challenge that manufacturers must address if they are to attract the best and the brightest of the emerging workforce. In 2003, the most recent year such data is available, ninth graders expressed a near equal interest in every career sector they were asked to comment on. However, by eleventh grade, students made clear distinctions between careers they would pursue or not pursue. At this age, health care was the number one area of career interest, with between 21 and 29 percent of students expressing an interest in this field. This was followed by other career areas that, not surprisingly, the students have had personal contact with, such as teachers. Less than three percent of students expressed any interest in a career in manufacturing, regardless of the size of the school. And, of this small percentage, females expressed about half as much interest than their male counterparts.

	Manufacturing Interest	Manufacturing Interest	Mechanical Repair Interest	Mechanical Repair Interest
	9 <sup>th</sup> Grade	11 <sup>th</sup> Grade	9 <sup>th</sup> Grade	11 <sup>th</sup> Grade
Large Schools	11.04%	2.63%	10.24%	2.42%
Medium Schools	7.50%	2.47%	7.50%	3.71%
Small School	11.67%	1.81%	9.44%	4.22%

Source: The Indiana Guidance Report

Complete details regarding all student interest levels can be found in the Appendix- Student Career Interest.

As the issues which create or at least contribute to the perception challenges faced by the manufacturing sector were carefully examined, several points arose:

- Students/communities experience or have knowledge of plant layoffs, closures, or outsourcing. Somehow, announcements of expansions and new openings do not offset the negative headlines.
- Most teachers, counselors, and parents do not promote manufacturing as a career.
- School success is measured by the percentage of students going on to college.
- While 50% of high school students that start college drop out by the end of the first year, there is no safety net in place to direct these people to good optional career paths.
- Some current employees speak very negatively about their jobs.
- Employers do not invest in recruitment of students, whereas colleges collectively spend millions of dollars annually to bring high school students to their doors.
- Students do not have adequate exposure to the modern manufacturing environments which exist in EGR 7.

### Wage Rates and Benefits:

Manufacturing jobs in general, and maintenance positions in particular, pay wages far greater than the average wage for the local area. Further analysis of regional wage and benefit rates related to maintenance positions reveals that EGR 7 manufacturers have steadily, over a five year period, provided maintenance employees with equal or higher salary and benefit rates than peers throughout the state. When compared to other EGRs around the state, electrical maintenance workers enjoy the largest pay differential when compared to their co-workers around the state; sometimes earning up to \$8.00 more per hour. General maintenance and first line supervisors also have earnings, which in most cases, well exceeded those of their peers throughout the state. It is estimated that the rate of manufacturers in EGR 7 which provide direct health-care coverage to their employees equals or exceeds the national rate for manufacturing of 83.7%, although health-care coverage is becoming increasingly challenging to provide. (See Appendix - Wage Data)

### Description of Root Causes and Their Impacts (Ranked in Order of Importance)

1. Image: Correct perceptions of both manufacturing and maintenance occupations and educate on career advantages.

In order to successfully compete in the global economy, area manufacturers must attract a new generation of employees to their doors. Manufacturers today rely on a workforce that is highly competent and innovative. With so many career options available to today's students, manufacturers must make a concerted effort to educate students, teachers and parents on the benefits and opportunities in the manufacturing field, with particular emphasis on shortage areas such as maintenance. But this campaign must not stop at the schools. A recent Pathfinders Study has identified more than 30,000 unemployed and underemployed individuals in the broader west central

Indiana section of the state. As a community, we must find a compelling way to communicate a positive image and address education and training issues. The strong WorkOne regional system is a broad based vehicle which can be used to effectively carry this message.

2. Education Linkages: Strengthen and enhance ties between business, secondary and post-secondary programs.

Western Indiana enjoys a strong partnership between area manufacturers and leaders of the education community. However, there remains a need to develop a structured, long term plan at both the secondary and post-secondary levels to ensure the needs of students and business are being met in the most effective manner possible. Obviously, we won't know when we have arrived at our goals, if we haven't clearly stated what we are to achieve and established a path on which we plan to get there.

3. Lifelong Learning: encourage incumbent workers to increase their own skill levels to meet the qualifications of maintenance positions.

It is human nature to establish patterns of behavior, and then become comfortable in those patterns to the point that deviating from the norm becomes almost unacceptable. It is much the same way for many workers who become comfortable and satisfied in a position with a company. While employers strive to have a happy and satisfied workforce, it is also important that every person work to their potential. If encouraged, workers that accept new challenges in the workplace are rewarded with greater interest and knowledge, and often times, increased wages. Therefore, establishing methods and practices will encourage current employees to move into shortage areas, such as maintenance, will have a great effect on alleviating the current occupational shortage.

Assuming that leaders throughout the region develop and implement, with state and local support, a solutions plan to address the current, severe maintenance skill/occupational shortage, based on the identified root causes, it is not unreasonable to estimate that the reduction of a future shortage could be cut by fifty percent within two to four years, and eliminated within the following three to five years. Students, teachers, parents, those currently employed in manufacturing, and the areas unemployed and underemployed, simply must grasp, first, the many contributions that manufacturing brings to the region. And second, the great career opportunities that are readily available to qualified candidates.



## LIFE SCIENCES ROOT CAUSE REPORT

## Chemical Technicians

### Introduction

EGR 7 will see a significant growth, within the next few months, in its need for Chemical Technicians and others with related education and science backgrounds and/or appropriate transferable skills and skill sets. Biological Technicians, Medical and Clinical Laboratory Technicians and Technologists, Chemists, Food Science Technicians, and Chemical Equipment Controllers and Operators are some of the occupations that require these related skills. According to the U.S. Department of Labor, Employment & Training Administration, other educational preparation such as biochemistry, mathematics, genetics, molecular biology, biochemistry, virology, or biochemical engineering are also potential candidates for these positions. Needed laboratory skills include Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP), notebooking skills, and an understanding of FDA regulatory practices, and quality assurance.

The occupation we determined most closely matched the requirements for the current emerging industry need in pharmaceuticals production was the occupation of Chemical Technician, followed by Chemist. It is currently problematic to find sufficient numbers of people with these skills in EGR 7 and, according to other sources, in other regions of the United States. Industry representatives indicate that an associate's degree and/or related transferable skills are required for the Chemical Technicians, which represents 80% of the expected need. An additional 20% will be positions requiring a bachelor's degree.

### Identification of Root Causes

#### Employer Recruitment and Retention

The recruitment of quality employees with the needed high-level skills is very important to the pharmaceutical, life sciences, and biotechnology organizations and industries. The U.S. Bureau of Labor Statistics predicts that the Biological Technicians occupations category (closely related to Chemical Technicians) will grow by 19.4% between 2002 and 2012 while the Chemical Technicians occupations growth will be closer to 10% nationally. Industry representatives indicate those workers with either Chemical or Biological Technician degrees will be suitable for the emerging pharmaceutical production anticipated in EGR 7. Recruitment of an adequately prepared and sized workforce will be a significant challenge; one that will exceed national trends in its magnitude.

Historically, recruitment of workers has not been an issue for Eli Lilly and Pfizer, the two largest pharmaceutical manufacturing facilities in the region. Positions at these two companies have been among the most coveted by workers. Nor has retention been a concern

for these employers. The recruitment and retention practices of firms that have need of Chemical Technicians, is not seen as a root cause at this point in time.

### **Education and Training Capacity and Student Completion/Placement**

The supply side has some appropriate programs for educating the required employees. However, with the rapidity of new developments and the fact that educational institutions are just becoming aware of this need, it is anticipated that demand will exceed the educational supply for the immediate future.

Discussions with local post secondary institutions, e.g., Indiana State University and Ivy Tech Community College, indicate that they are ready to work with the industry and with their students to meet the expected demand for Chemical Technicians. Indeed, Ivy Tech has already worked closely with industry to develop a new associate degree in Biotechnology and their associate degree in Chemical Technology, both of which are currently open for student enrollment. In addition, the ISU departments of Life Sciences and Chemistry have expressed interest in meeting with industry to develop a mutually beneficial relationship. Currently, many ISU graduates in Life Sciences and Chemistry leave the area to either begin graduate programs and/or to work in another area of the state. Efforts to recruit those students who currently are leaving may entice them to decide to work closer to home.

The U. S. Department of Labor suggests that “the lack of nationally-recognized articulated skills competencies and career ladders as well as sources of training presents a challenge complicated by the rapidly changing environment in which the industry operates.” That description of the problem is certainly true in EGR 7, at the present time.

In addition, the recruitment of workers with transferable skills currently working in declining industries and the establishment of special training activities to prepare them for a role in life sciences occupations may serve as a buffer.

### **Student/Worker Career Awareness Access**

In addition to developing more capacity at the post secondary level, the development of an awareness of potential careers in life sciences/ biotech/pharmaceutical industries needs to begin in the elementary schools and continue through high school. Nationally, the number of students enrolling in science, math, engineering, and other technical fields is decreasing at both the high school and college levels. If this trend continues into the future, it will be difficult to have an adequate pipeline of potential employees with the education and workplace skills for many exciting career fields, including the life sciences.

Focus groups were conducted in two local high schools to determine students' awareness of selected occupations in EGR7. Findings from those discussions included:

- Most students were not at all familiar with the Chemical Technician occupation.
- Students noted that while the Chemical Technician positions paid fairly well, they would be hard, dangerous and complicated work with a lot of pressure.
- Others perceived that the work would be tedious, would require lots of math, and they did not want to work with chemical due to concerns about potential health problems.
- Only one student chose the occupation of Chemical Technician when asked to make a choice. All of the other career options were selected more often than Chemical Technician.
- Most of the students held negative perceptions and attitudes of manufacturing (both chemical and other) and perceived manufacturing as dirty, a bad work environment, with few benefits, bad hours, safety issues, just average salaries, and they might have to work holidays.

Currently, youth, teachers, parents, and job seekers lack clear information about career options in the life sciences or the industrial environment. Business outreach to these audiences has been limited nationally as well as locally.

The significant number of Chemical Technician positions that will be available in the near future will be attractive to those students earning associates degrees at Ivy Tech Community College providing the opportunity for them to remain in the area for these positions. The existence of these positions should also attract students to the associate degree programs at Ivy Tech. In addition, these positions should be seen as an opportunity for others outside EGR 7 and may actually attract people to the region.

Currently, a large percentage of the bachelor's prepared students that will qualify for positions in the emerging pharmaceuticals industry leave the area for further study or for jobs that they find appealing. As the demand for this level of skill increases locally, there is reason to believe that a higher percentage of these college graduates will remain in the area.

### Wage Rates and Benefits

Industry representatives indicate that entry-level annual salaries for the Chemical Technician positions will range from \$30,000 - \$35,000. The salary range for the bachelor degree entry-level chemists will be \$40,000 - \$50,000. Both positions also carry an attractive benefits package. These are very good positions in EGR 7 and we anticipate that there will be much interest.

These salaries are above the average salary for EGR 7. In addition, the graphs in the appendix indicate that EGR7 wages show a favorable comparison with wages in other Indiana MSA regions, including, Lafayette, Indianapolis, and Evansville, IN-Henderson, KY.

In this bar graph, \$0.00 is shown as the average wages paid to Chemical Technicians in the Terre Haute MSA. Therefore, in the 10<sup>th</sup> percentile of salaries, the bars above the \$0.00 line indicate that the Wages in the Terre Haute MSA are slightly lower than those in the comparison regions of Lafayette and Indianapolis, whose bars are above the \$0.00 level. However, in each of the subsequent categories of wages, the 25<sup>th</sup>, median, 75<sup>th</sup>, and 90<sup>th</sup> percentiles, the wages in the Terre Haute MSA are all above the wages paid in Evansville-Henderson, IN-KY; Indianapolis, and Lafayette, IN MSAs, for Chemical Technicians.

The subsequent line graphs indicate comparisons of wages for Chemical Technicians and again these show that wages in the Terre Haute MSA have compare very favorably in comparison to the other Indiana MSA regions.

### Description of Root Causes and Their Impacts

1. **Root Cause** - Lack of Awareness of Life Science/ Biotech/Pharmaceutical careers by high school students, parents, and faculty of K-12 and/or college faculty. Students and incumbent workers are simply not aware of either the requirements or projected demand for Chemical Technicians. Although most people in the region aware of the two major pharmaceutical plants in the region, there is a perception by students in particular that these are not desirable jobs. By enhancing the public awareness of the Chemical Technician positions that are projected to be available in the future, we can begin filling the pipeline to insure a steady flow of qualified professionals in the future. In our student focus groups, only one student indicated any interest in the field of Chemical Technician, even if we are able to triple this number, the demand will continue to be greater than the supply.

If, at the same time, we can make secondary and post-secondary faculty members aware of these career paths, our educational institutions will be more able to respond quickly to the demand for trained individuals. It is of utmost importance that local educational institutions be poised to move quickly to meet the changing demands of these high tech careers.

2. **Root Cause** - Lack of appropriate career education is available from elementary school through high school. Counselors, teachers and employers have remarked on the disconnect between the local businesses and the schools. Bridging this gap will allow students and their parents to become more aware of the careers available in the region. Employers have reported that "home-grown" young professionals are more likely to stay

in the region than those from outside the region. Students cannot consider what they are unaware of.

3. **Root Cause** - Lack of local or national industry groups to develop definitions of agreed upon skill sets and competencies across Life Science/ Biotech/ Pharmaceutical sectors. The rapid growth of biotechnology industries and the constantly changing skill requirements has made it difficult to set national standards.
4. **Root Cause** - The numbers of high school and college students enrolling in mathematics, engineering, and the sciences is declining in the U.S. This alarming trend continues to grow and will need to be countered on a local level through career education and awareness.



## ROOT CAUSE SKILLS REPORT

## Skill Analysis

All defined occupational shortage areas in EGR 7 require basic academic skills and training beyond the high school level. But, what other skills are required and where, if at all, is there overlap between the occupations?

Looking at the ONET skills (see appendix) the area with the most overlap is active listening. It is required for six of the seven identified occupations. Reading comprehension and troubleshooting are required for four of the seven occupations. All other areas ranked by ONET as being in the 69<sup>th</sup> percentile or higher are required for three or fewer of the EGR 7 identified occupations.

Critical thinking skills were important for Radiological Technicians, Respiratory Therapists and Electrical Technicians. However, local manufacturers in response to a survey indicated that Critical Thinking was the most important and in-demand skill for these facilities. Second for manufacturers was the understanding of complex systems, which closely mirrors the ONET skill of troubleshooting that was deemed important for all four of the manufacturing maintenance positions.

Soft skills are of great importance to employers. Active listening, critical thinking, instructing, speaking, social perceptiveness and time management are ONET skills required for one or more of the seven occupations in EGR 7, and can be defined as soft-skills. Manufacturers described skills such as personal responsibility, sociability, self-management and ethics, as the third most important skill required for maintenance workers.

The required technical skills for any position must be mastered if one is to succeed. Beyond that it is also critically important that employees be able to embrace the requirements of the work environment and culture of the workplace. Technical skills allow you to get the job, but soft-skills allow you to keep the job. If soft-skills are to be learned, instruction must begin at a young age and continue throughout life.



## APPENDIX

## Wage Differential Methodology

In order to investigate whether or not EGR7 wage rates among critical occupations might or might not be a root cause for skills shortages, it was necessary to look at wages across multiple geographies and time frames. Information provided by the Strategic Skills Initiative Analysis Toolkit was useful as a springboard during Phase I of the SSI Grant Proposal, but for Phase II it was necessary to utilize the U.S. Bureau of Labor Statistics' Metropolitan Statistical Area (MSA) wage data for deeper analysis.

For wage differentials, wage information for all MSAs from 1999 to 2004 was downloaded from [www.bls.gov](http://www.bls.gov)<sup>1</sup>. Wage differentials for all EGR7 critical occupations were computed by subtracting Terre Haute MSA hourly wage quintiles from competing Indiana MSA hourly wage quintiles. Moving forward in this manner placed Terre Haute at the axis of the wage differential bar chart. A negative differential illustrated a wage where the Terre Haute MSA paid a more competitive than competing Indiana MSAs; a positive differential illustrated a wage where the Terre Haute MSA paid a less competitive wage than competing Indiana MSAs.

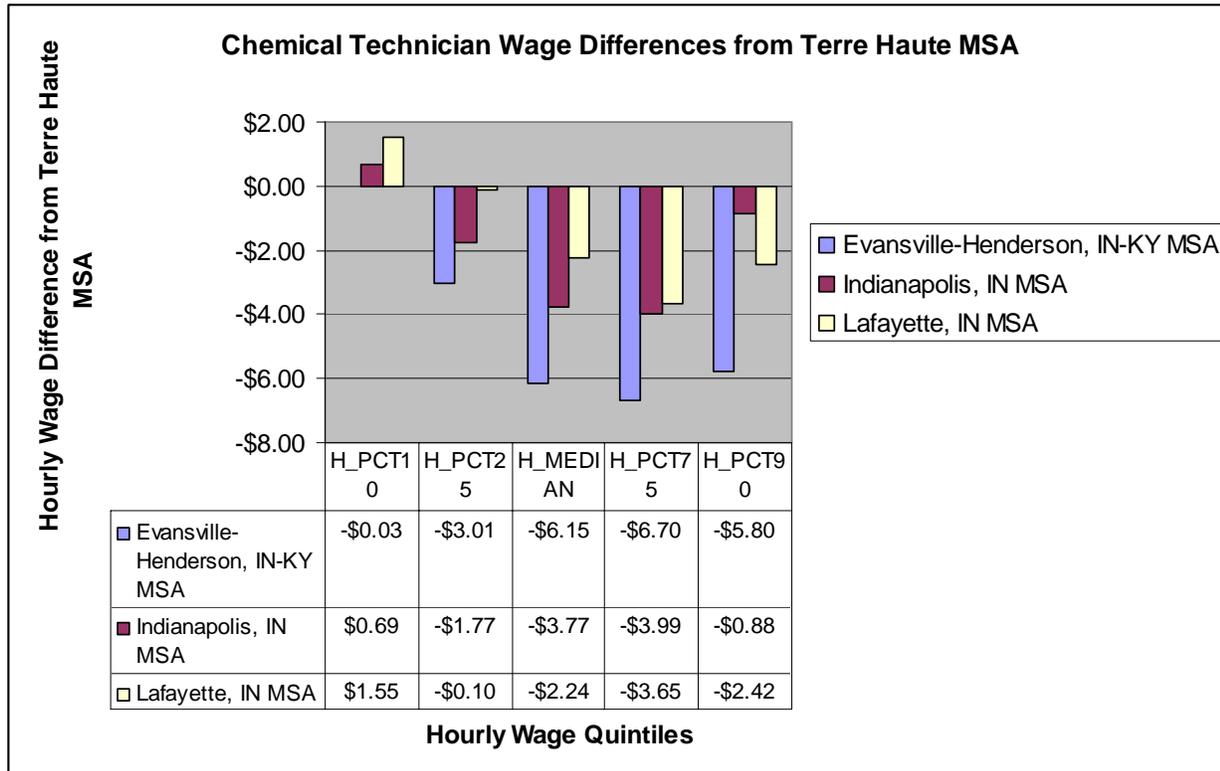
After discovering the differentials, it was necessary to investigate how these wage differentials have or have not changed over time. In order to keep the time series as simple as possible, only one competing Indiana MSA was compared to the Terre Haute MSA for each timer series graph. For each occupation, only two competing MSAs were compared to the Terre Haute MSA. The MSAs chosen were chosen because they exhibited either the largest differential in 2004 with respect to the Terre Haute MSA or the smallest differential with respect to the Terre Haute MSA.

The goal of the wage differentials and time series graphs were to first illustrate the existence or lack of a competitive wage in 2004 with respect to competing Indiana MSAs. The time series graphs' primary focus was to determine if the Terre Haute MSA had lost or gained a competitive edge concerning wages in critical occupations with respect to competing Indiana MSAs. The bar charts and time series graphs illustrating wage differentials are explored individually on the next few pages.

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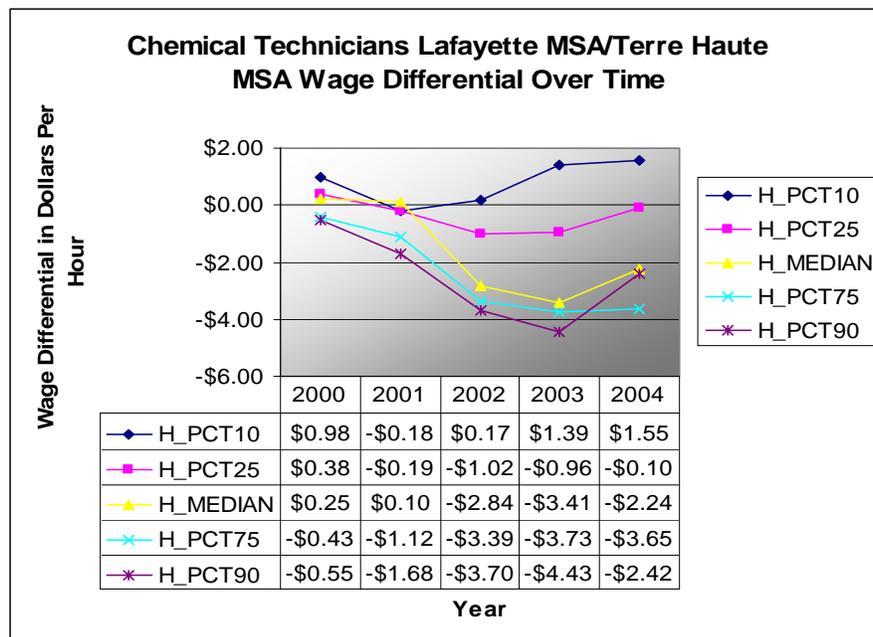
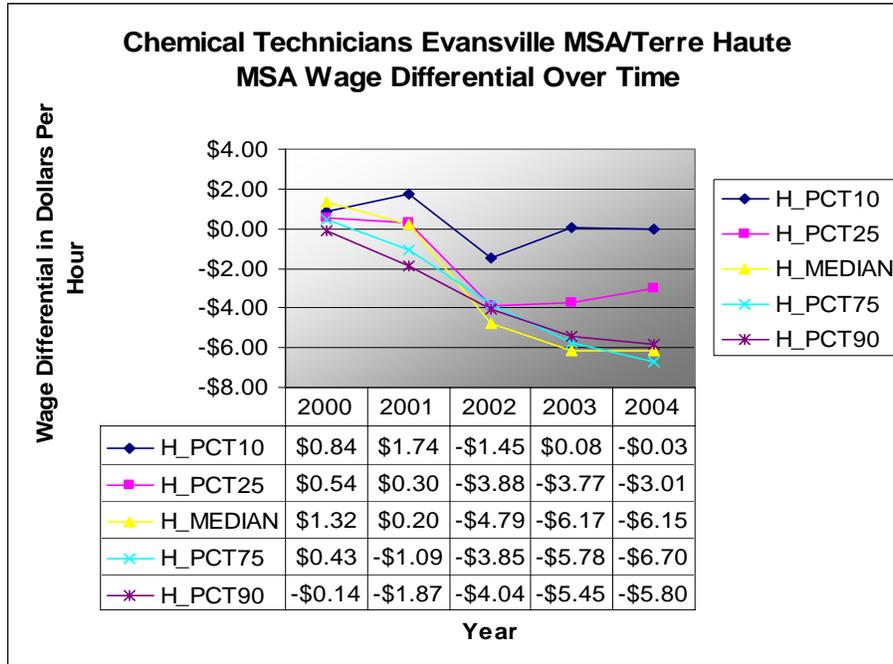
<sup>1</sup> [http://www.bls.gov/oes/oes\\_dl.htm](http://www.bls.gov/oes/oes_dl.htm)

Chemical Technician (19-4031) Wage Differentials



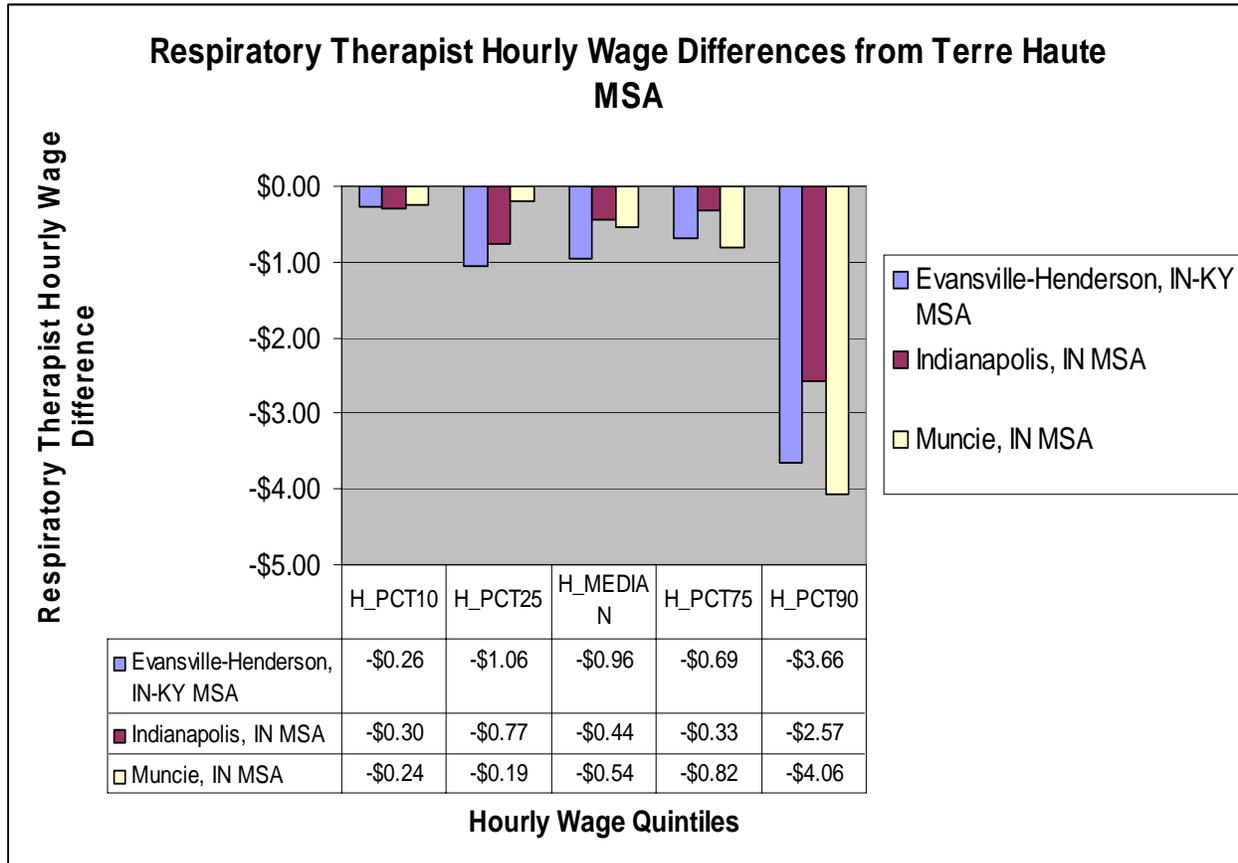
The bar graph illustrates that with respect to key competing MSAs near the Terre Haute MSA, Chemical Technicians working in the Terre Haute MSA earn a more competitive hourly wage. This is true for every quintile except the 10<sup>th</sup> percentile. The lowest paid chemical technicians in the Terre Haute MSA. Looking closer at the differentials it can be seen that the Evansville-Henderson MSA has the largest absolute average differential at -\$4.34/hour and the Lafayette MSA has the smallest absolute average differential at -\$1.37/hour. Building a time series graph of these differentials will show how these differentials have changed over time.

Chemical Technician (19-4031) Wage Differentials Over Time



The two time series graphs show that in 2000, wages between the competing MSAs were very much in line with the Terre Haute MSA. Throughout the course of the past few years, the wage gap between competing MSAs and the Terre Haute MSA have grown dramatically and in such a way that favors Chemical Technicians working in the Terre Haute MSA.

Respiratory Therapists (29-1126) Wage Differentials



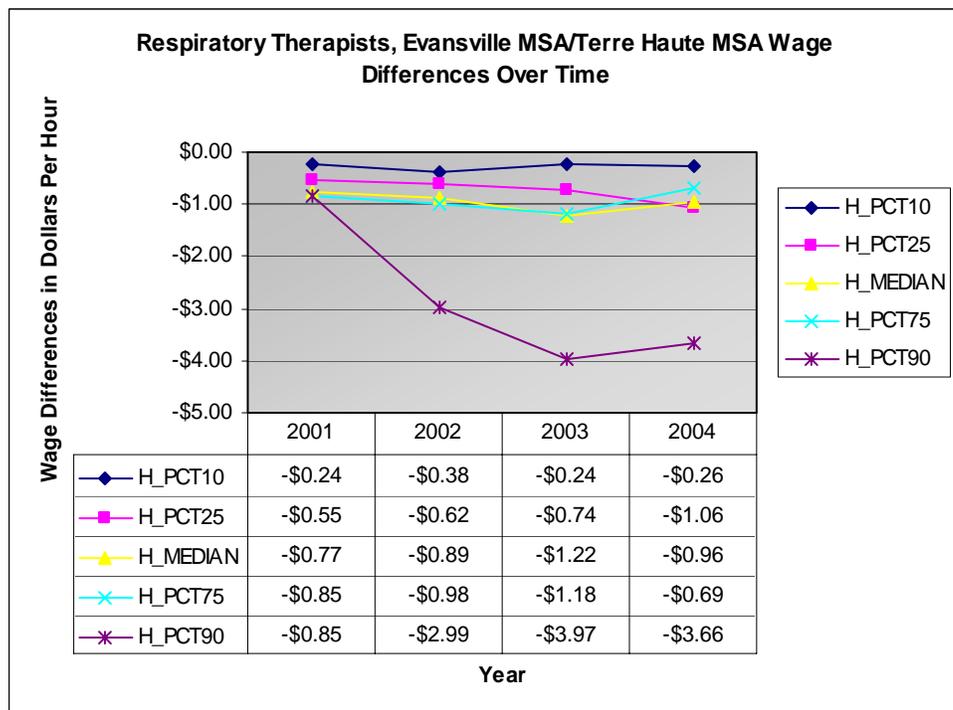
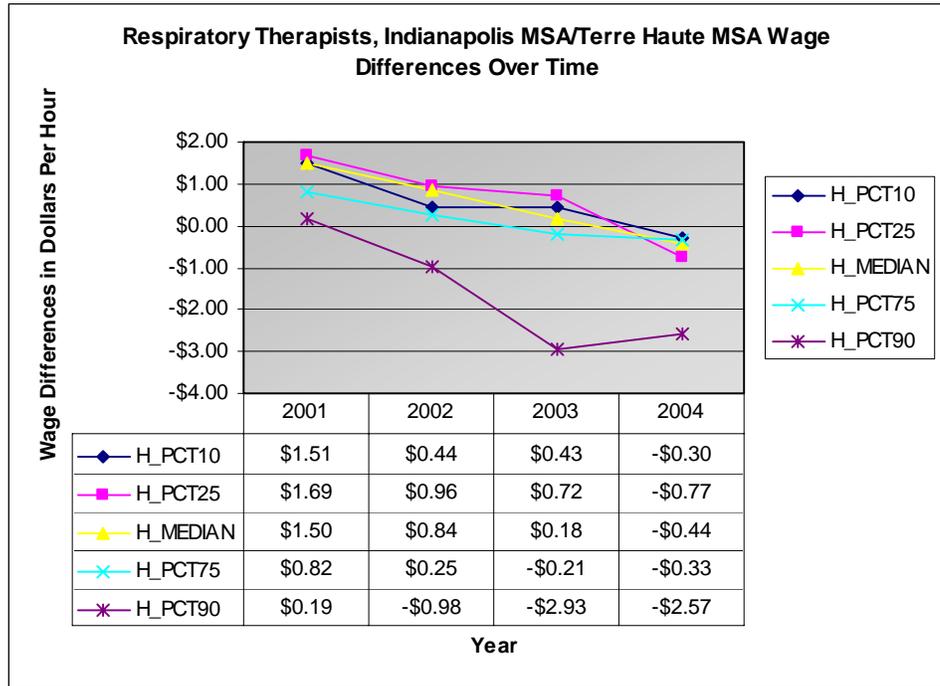
Setting the Terre Haute MSA hourly wage to zero, all quintiles for the three competing MSAs pay Respiratory Therapists less than the Terre Haute MSA. The most dramatic differential is located at the 90<sup>th</sup> percentile. With the exception of the 90<sup>th</sup> percentile wage, competing MSAs lag behind the Terre Haute MSA by about \$1.00/hour or less.

To investigate changes over time, the Evansville-Henderson MSA, with an absolute average differential of -\$1.33/hour and the Indianapolis MSA with an absolute average differential of -\$0.88/hour were chosen for further analysis. Evansville-Henderson had the largest absolute differential and Indianapolis had the smallest absolute differential.

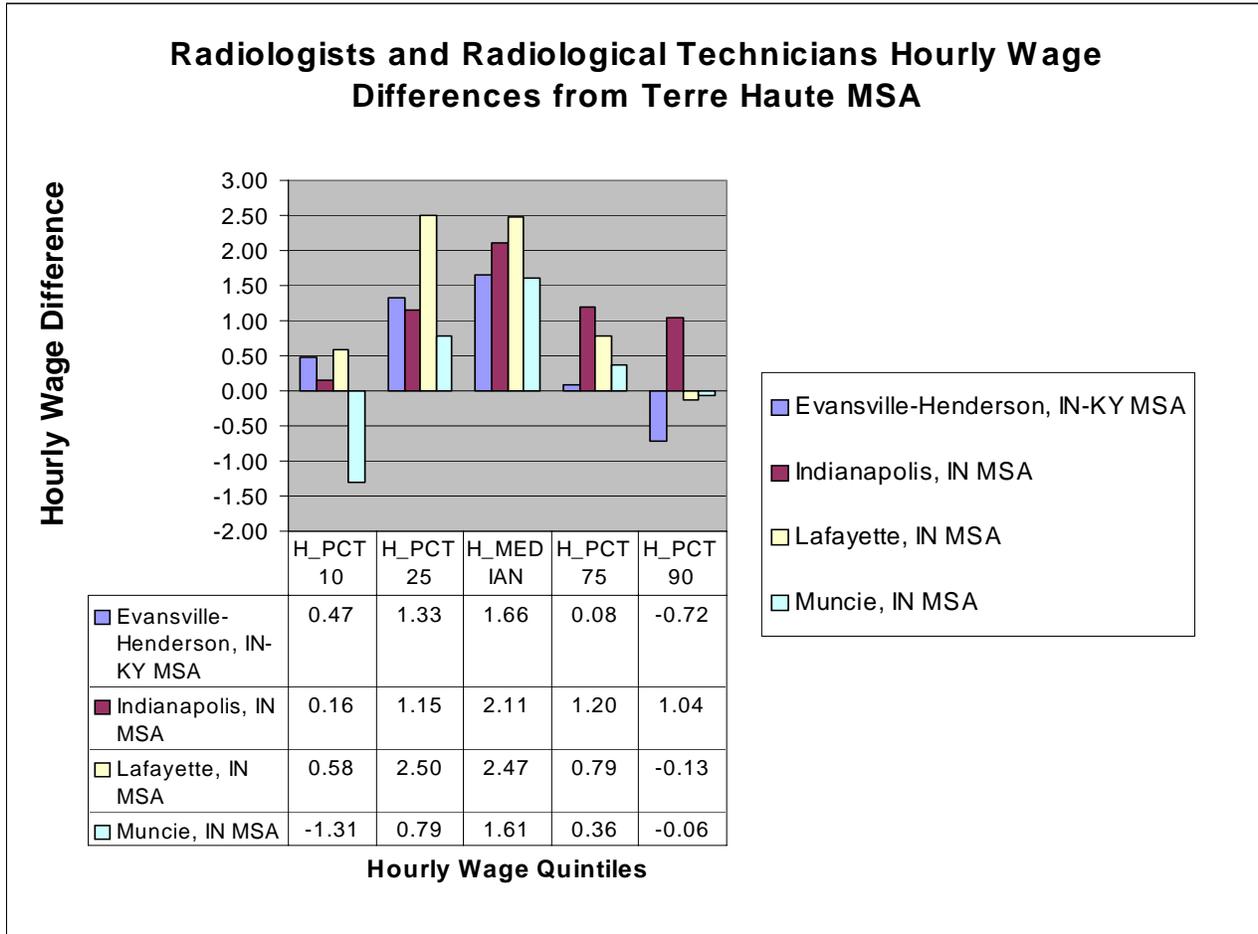
**Respiratory Therapists (29-11026) Wage Differentials Over Time**

Interestingly enough, from the 75<sup>th</sup> percentile and down, the Evansville-Henderson MSA has maintained a fairly constant wage differential with respect to the Terre Haute MSA. The 90<sup>th</sup> percentile has shown the largest divergence over the years from 2001 to 2004.

The Indianapolis MSA, in 2001, paid a more competitive wage to Respiratory Therapists than the Terre Haute MSA. From 2001 to 2004, the differentials from the 75<sup>th</sup> percentile and down have followed a fairly constant negative trend toward showing an overall negative differential in 2004. The 90<sup>th</sup> percentile diverged most with the wage differential peaking in 2003 at -\$2.93/hour.



**Radiologists and Radiological Technicians (29-2034) Wage Differentials**



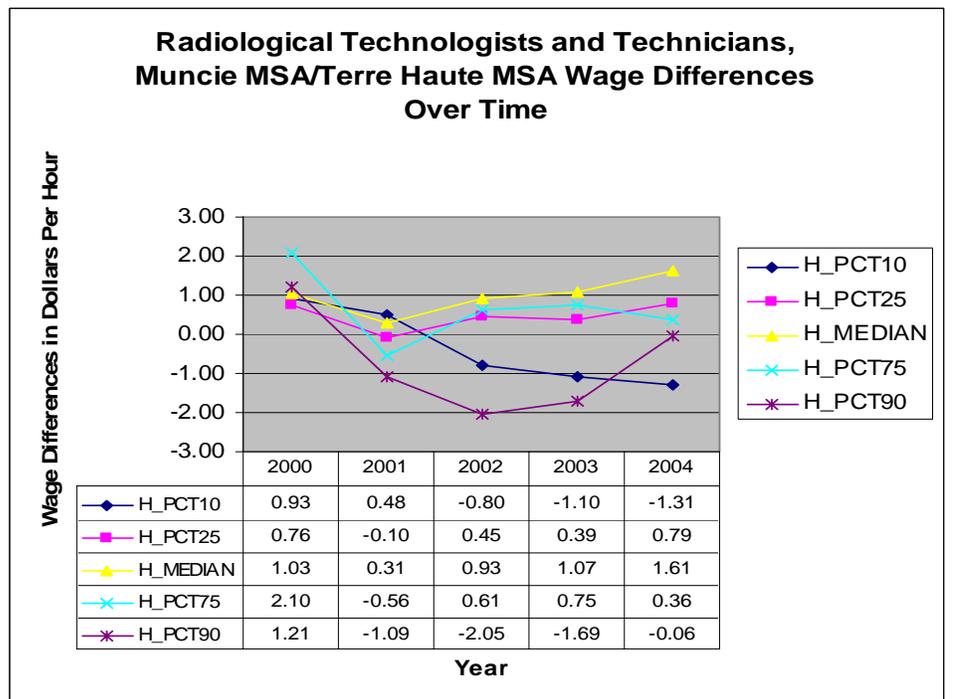
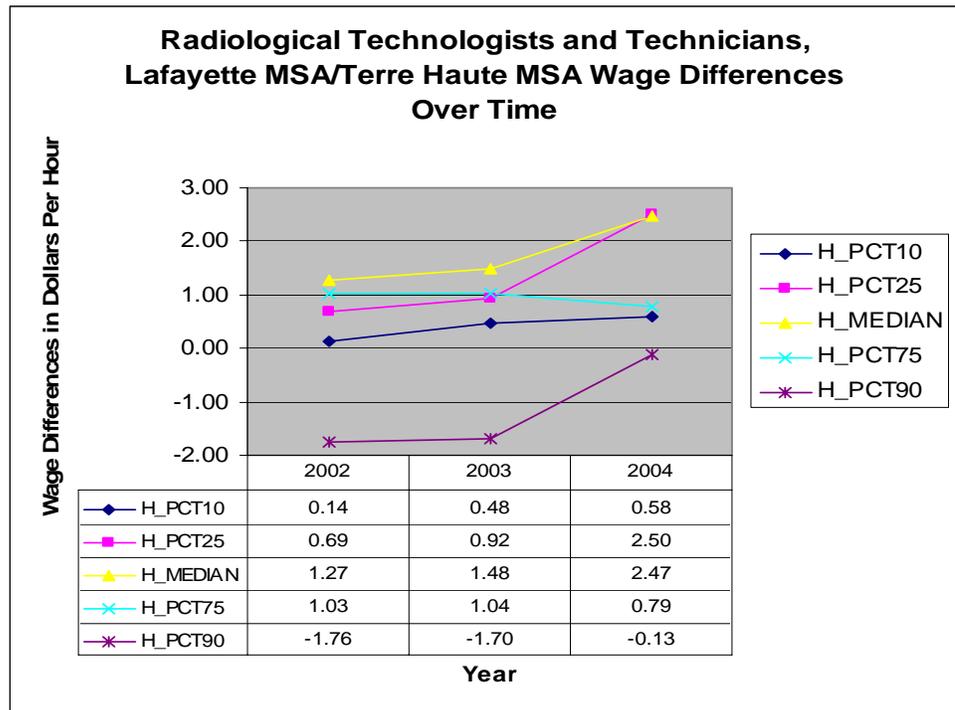
According to wage data taken from the BLS<sup>2</sup>, the Radiologists and Radiological Technicians earn a less competitive wage than their counterparts in competing MSAs. The MSA with the largest absolute average wage differential is the Lafayette MSA with a differential of \$1.24/hour. The smallest absolute average wage differential is exhibited by the Muncie MSA at \$.28/hour. The following time series will show how these have changed over time.

<sup>2</sup> [http://www.bls.gov/oes/oes\\_dl.htm](http://www.bls.gov/oes/oes_dl.htm)

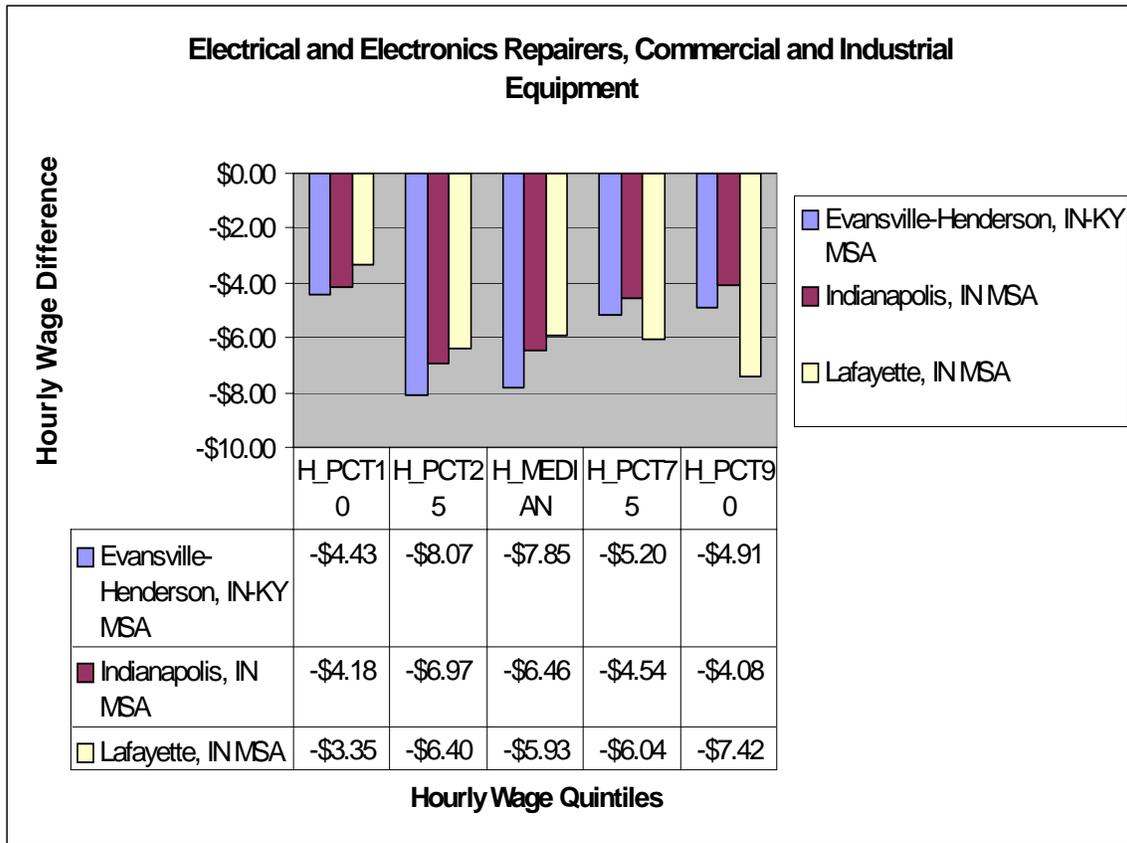
**Radiologists and Radiological Technicians (29-2034) Wage Differentials Over Time**

Looking at the years 2002 - 2004 for the Lafayette MSA differentials, it can be seen that over time the competing MSA has trended toward paying a higher hourly wage to its Radiologists and Radiological Technicians. The largest jump can be seen at the 90<sup>th</sup> percentile where there was more than a \$1.00/hour jump from 2003 - 2004.

Concerning the Muncie MSA, the growth has not been as consistent. The spread of the differentials has increased leaving only the 10<sup>th</sup> percentile as a more competitive wage in the Terre Haute MSA for Radiologist and Radiological Technicians.



Electrical and Electronics Repairers (49-2094) Wage Differentials



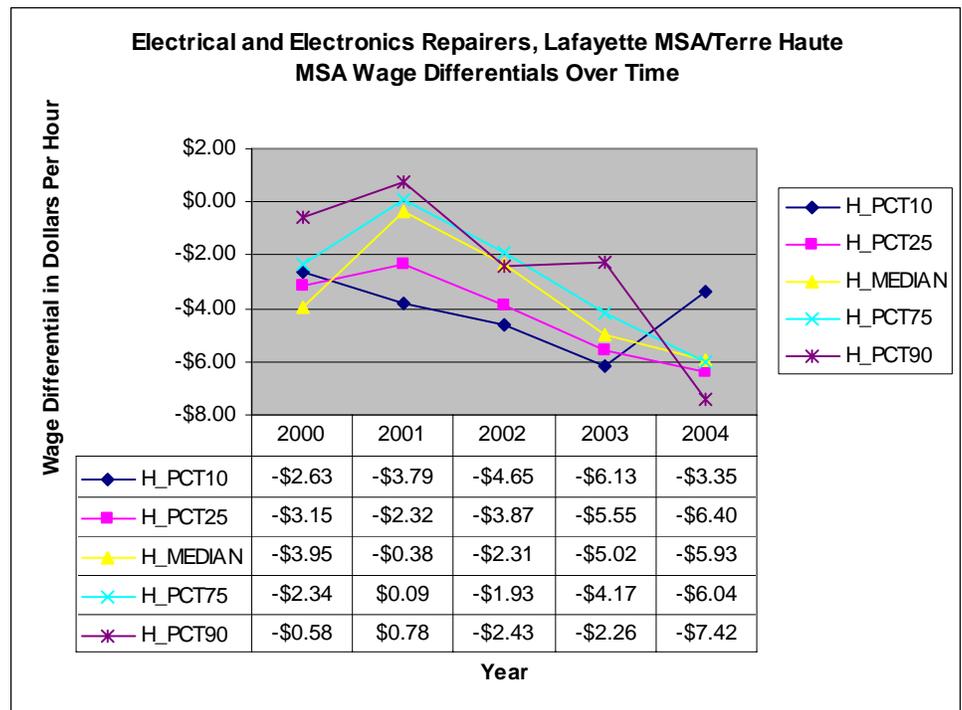
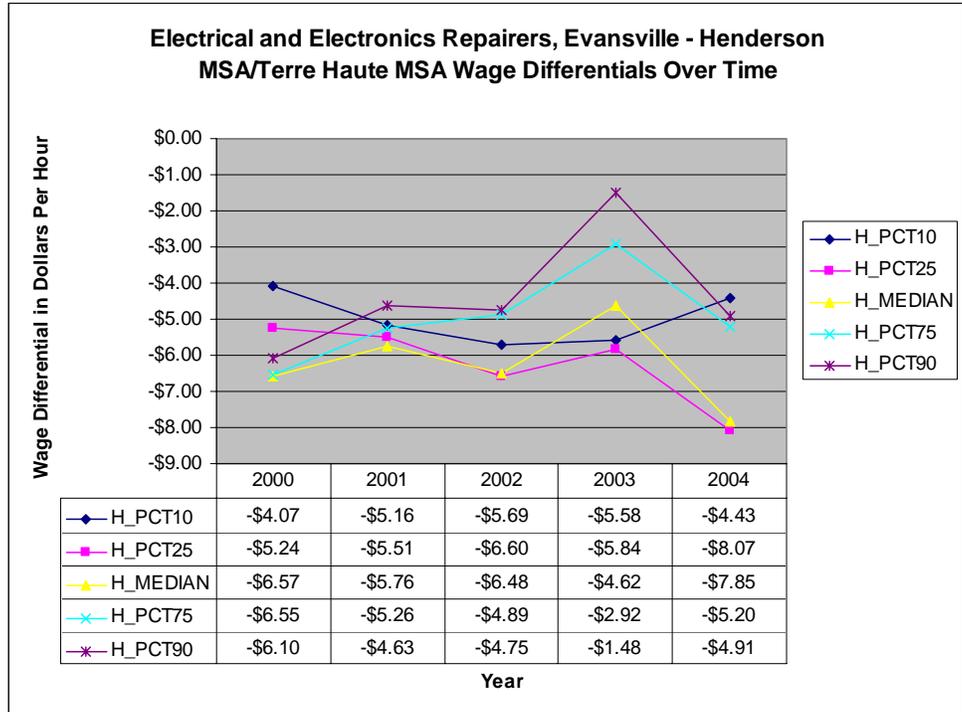
This graph illustrates a rather dramatic difference in wages for Electrical and Electronics Repairers in the Terre Haute MSA. The largest difference is seen at the 25<sup>th</sup> percentile for the Evansville-Henderson MSA. The Terre Haute MSA pays over \$8.00/hour more to its Electrical and Electronics Repairers.

Evansville-Henderson exhibits the largest absolute average wage difference of -\$6.09/hour. The smallest difference, while still large, is seen at the Indianapolis MSA level. The absolute average difference in the Indianapolis MSA is -\$5.25/hour.

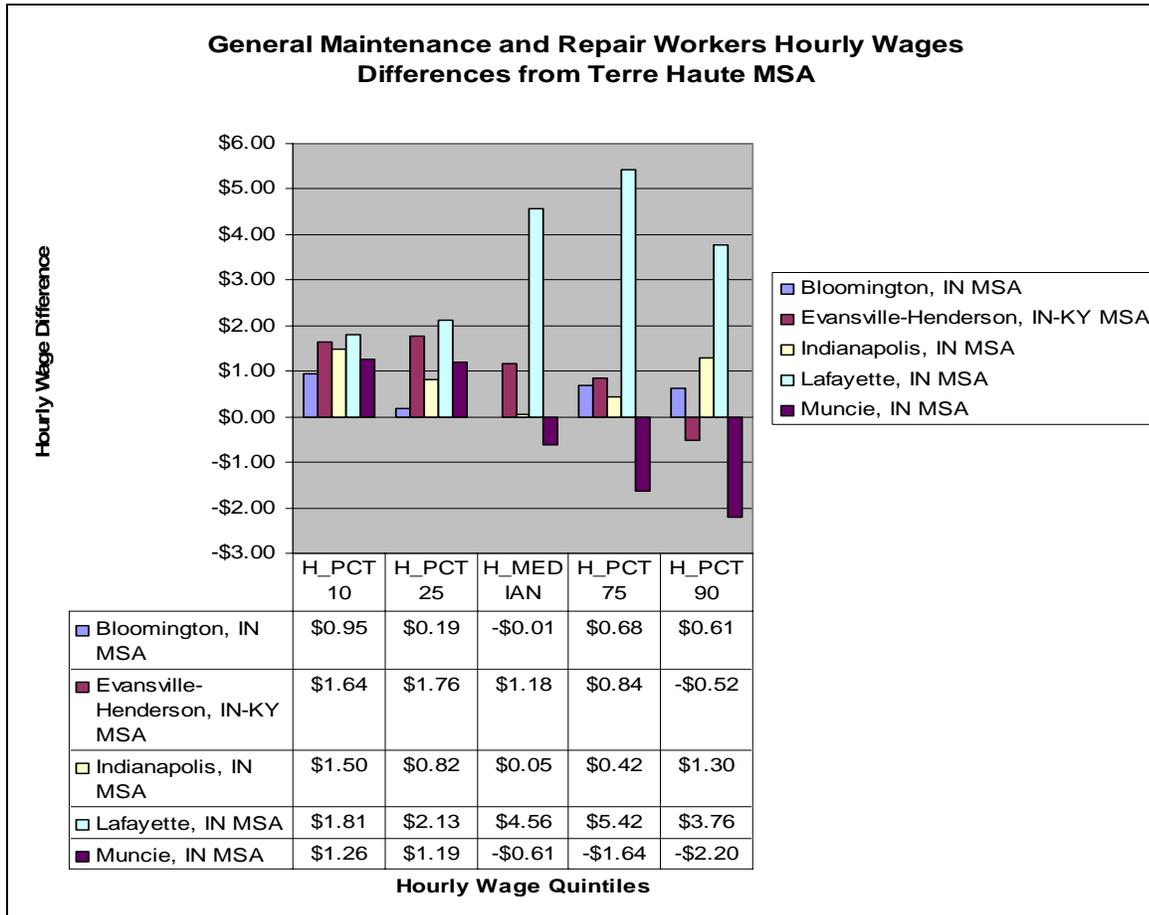
Electrical and Electronics Repairers (49-2094) Wage Differences Over Time

For the Evansville-Henderson MSA, there is little noticeable trend in wage differential change from 2000-2004. Over the past few years, however, it is easy to see that the Terre Haute MSA has paid dramatically more, across all percentiles, to its Electrical and Electronics Repairers.

From 2001-2004, the Lafayette MSA differential has trended downward for every percentile with the exception of the 10<sup>th</sup> percentile, where the differential moved from -\$6.13 to -\$3.35. The time series still shows an increasing differential overall and shows that the Terre Haute MSA pays more with respect to the Lafayette MSA.



General Maintenance and Repair Workers (49-9042) Wage Differentials

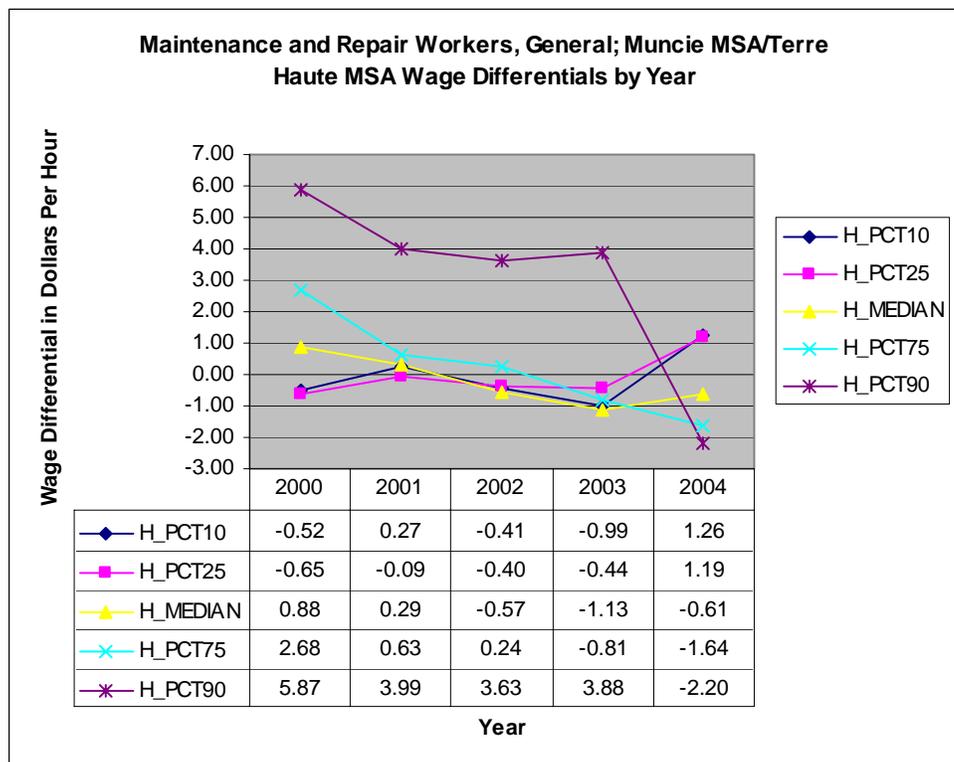
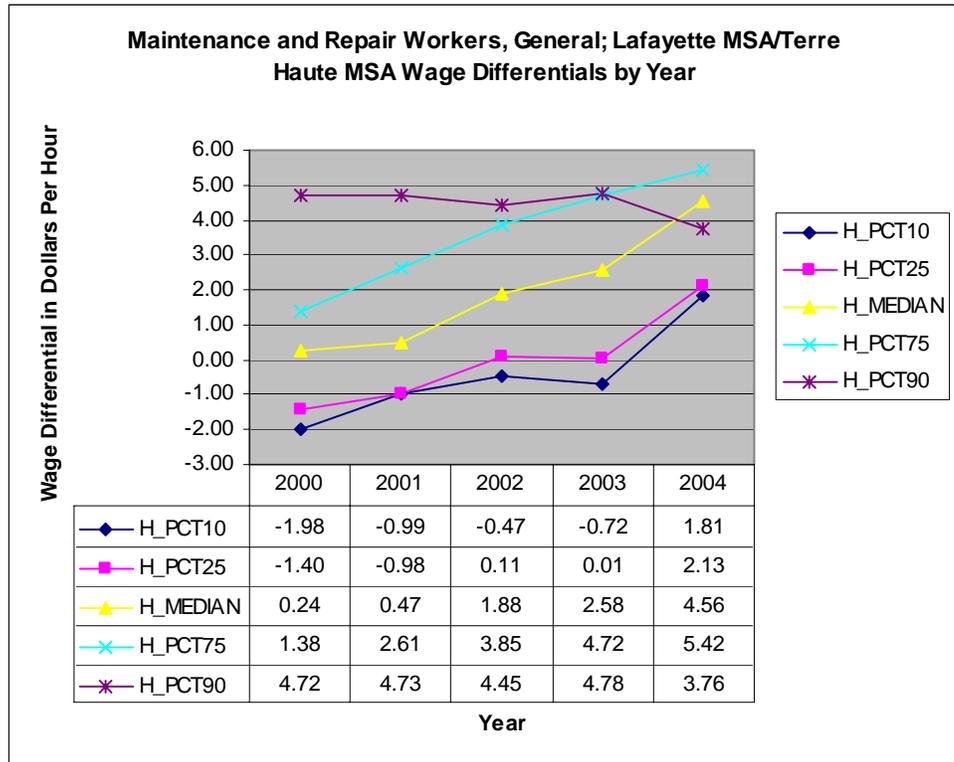


Concerning the differential graph for General Maintenance and Repair Workers is more difficult to immediately see a simple pattern, however, it can be seen that a majority of percentiles illustrate a positive differential and therefore a higher wage in competing MSAs. With that said, the largest absolute average differential is seen at the Lafayette at \$3.54/hour. The smallest absolute average differential is seen at the Muncie MSA at -\$0.40/hour.

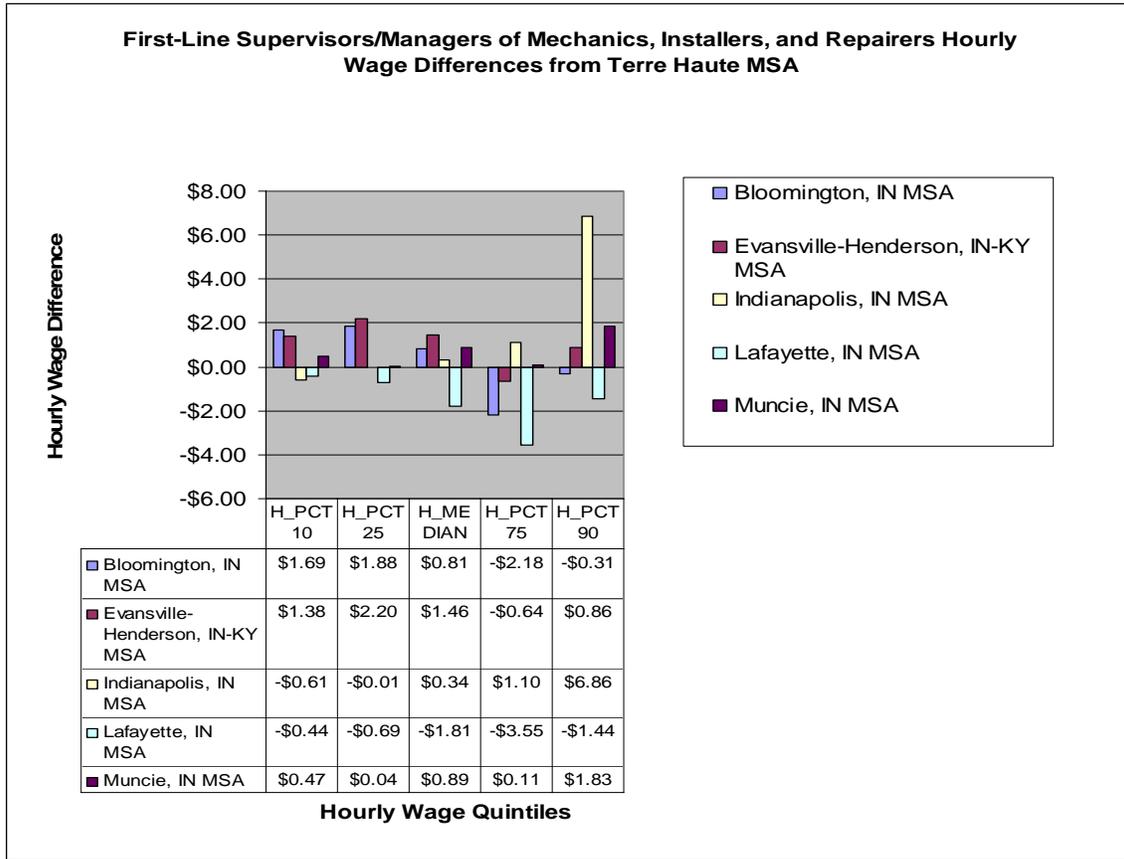
General Maintenance and Repairers (49-9042) Wage Differentials Over Time

It can be seen that with respect to the Lafayette MSA, the Terre Haute MSA has lost any competitive wage edge it had in 2000. With the exception of the 90<sup>th</sup> percentile, all percentiles have increased its positive differential.

At the Muncie MSA level, the largest change can be seen at the 90<sup>th</sup> percentile wage. It has dropped from a positive differential of \$5.87/hour in 2000 to -\$2.20/hour in 2004.

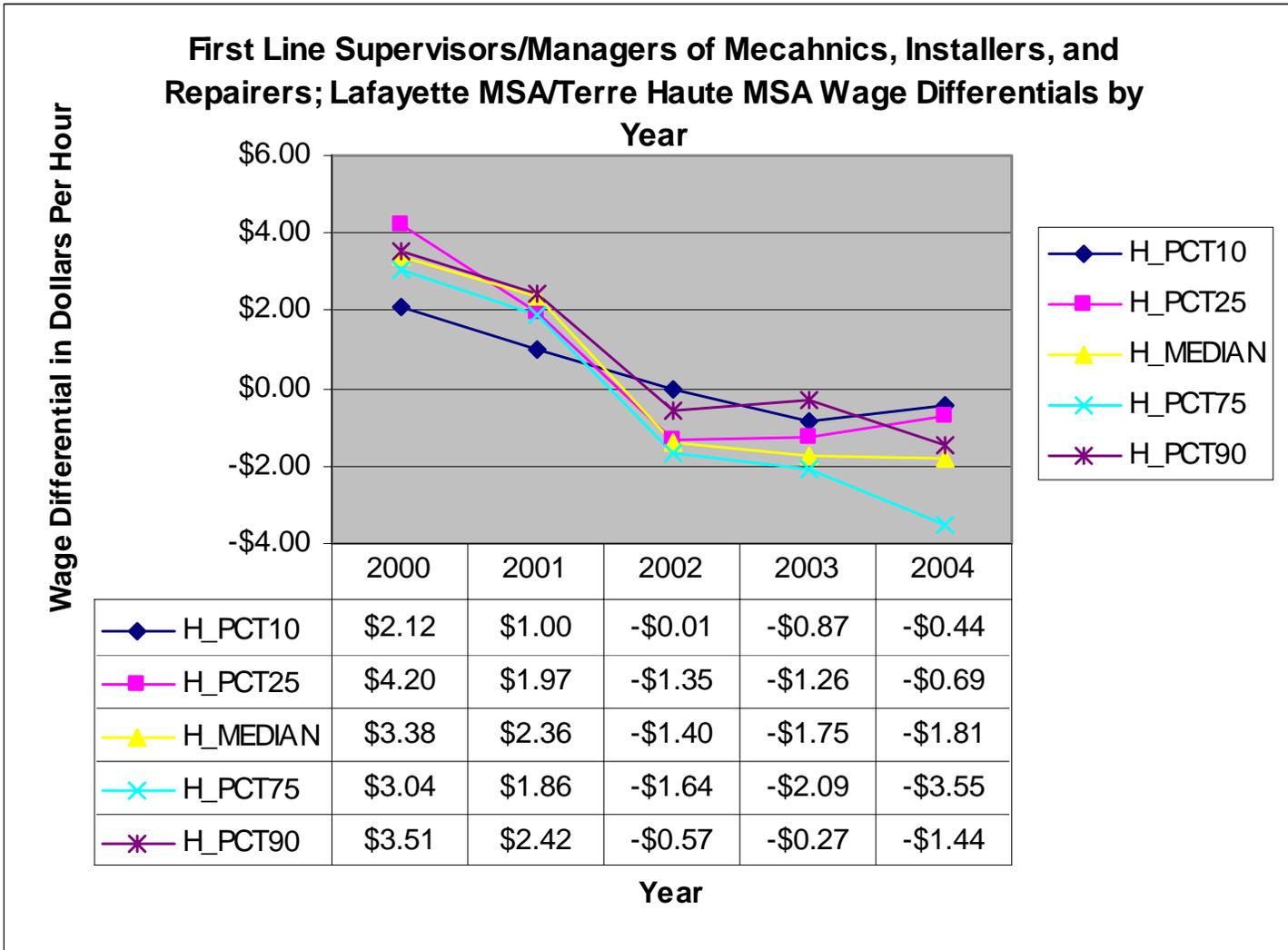


**First-Line Supervisors/Managers of Mechanics, Installers, and Repairers (49-1011) Wage Differentials**



Perhaps SOC 49-1011 is the most complicated graph and most difficult graph from which to extract a single pattern. Instead of focusing on the largest and smallest differential, it is more informative to look at where the greatest trend in wage differential has been seen over the past few years. This greatest and most dramatic trend is at the Lafayette MSA.

First-Line Supervisors/Managers of Mechanics, Installers, and Repairers (49-1011) Wage Differentials Over Time



Most notably, what can be seen in the time series above is that in 2000 the Lafayette MSA paid a more competitive wage to its First Line Supervisors than the Terre Haute MSA. However, over the past few years, that differential has shifted to a negative differential and is most dramatic at the 75<sup>th</sup> percentile. At the 75<sup>th</sup> percentile, the wage differential dropped from \$3.04/hour to -\$3.55/hour.

## Student Career Interest Methodology

Career interests of students still early in their development years are a primary concern when investigating the pipeline of the future workforce. A starting point for investigating career interests of EGR7 students enrolled in Indiana High School is [www.learnmoreindiana.com](http://www.learnmoreindiana.com). The Indiana Guidance Report<sup>3</sup> is an annual survey conducted throughout most of Indiana's High Schools that, among many things, records student career interests.

In order to work with the data it was first necessary to divide EGR7 schools into categories. The categories were small, medium, and large schools. Small schools ranged in class size from 0-100, medium schools ranged from 101-250, and large schools ranged in class size from 251 and up. Responses were also classified according to grade and gender. The survey results listed are taken from the 2002-2003 school year because Terre Haute North did not respond to 2003-2004 or the 2004-2005 school year survey. Being one of the largest secondary education institutions in EGR7, it was important that it was included in the analysis.

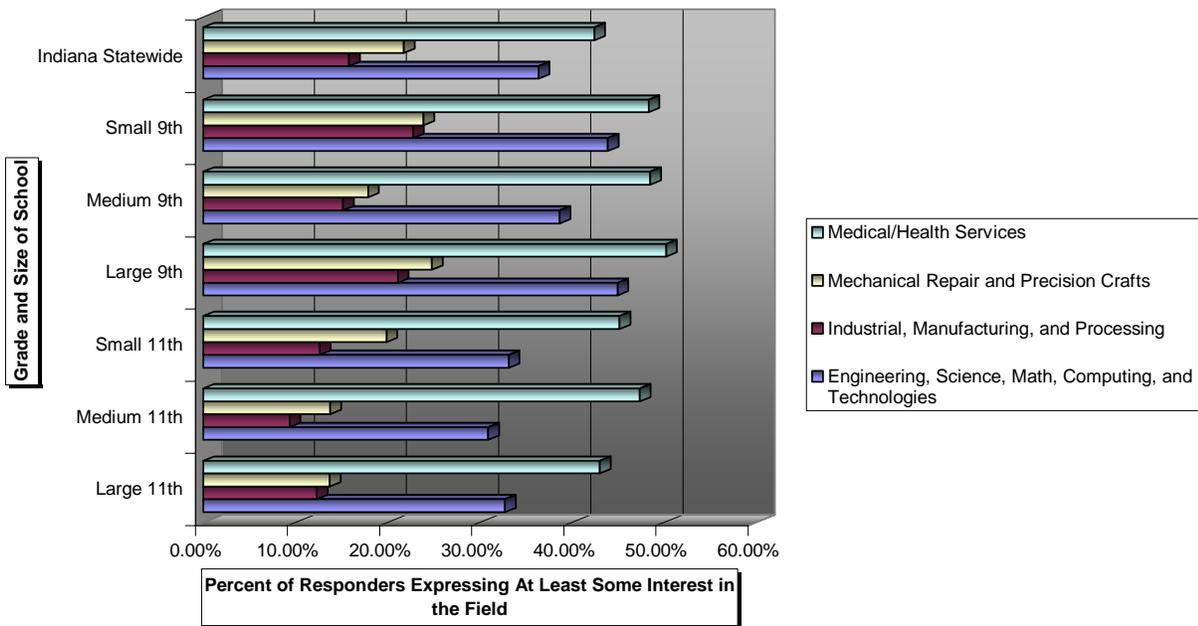
What stands out as one of the largest patterns in the following graphs is the change from 9<sup>th</sup> grade student interests to 11<sup>th</sup> grade student interests. There was no noticeable difference between small, medium, or large schools. The greatest student interest can be seen in the health care industry and one of the smallest interests is seen at careers in manufacturing.

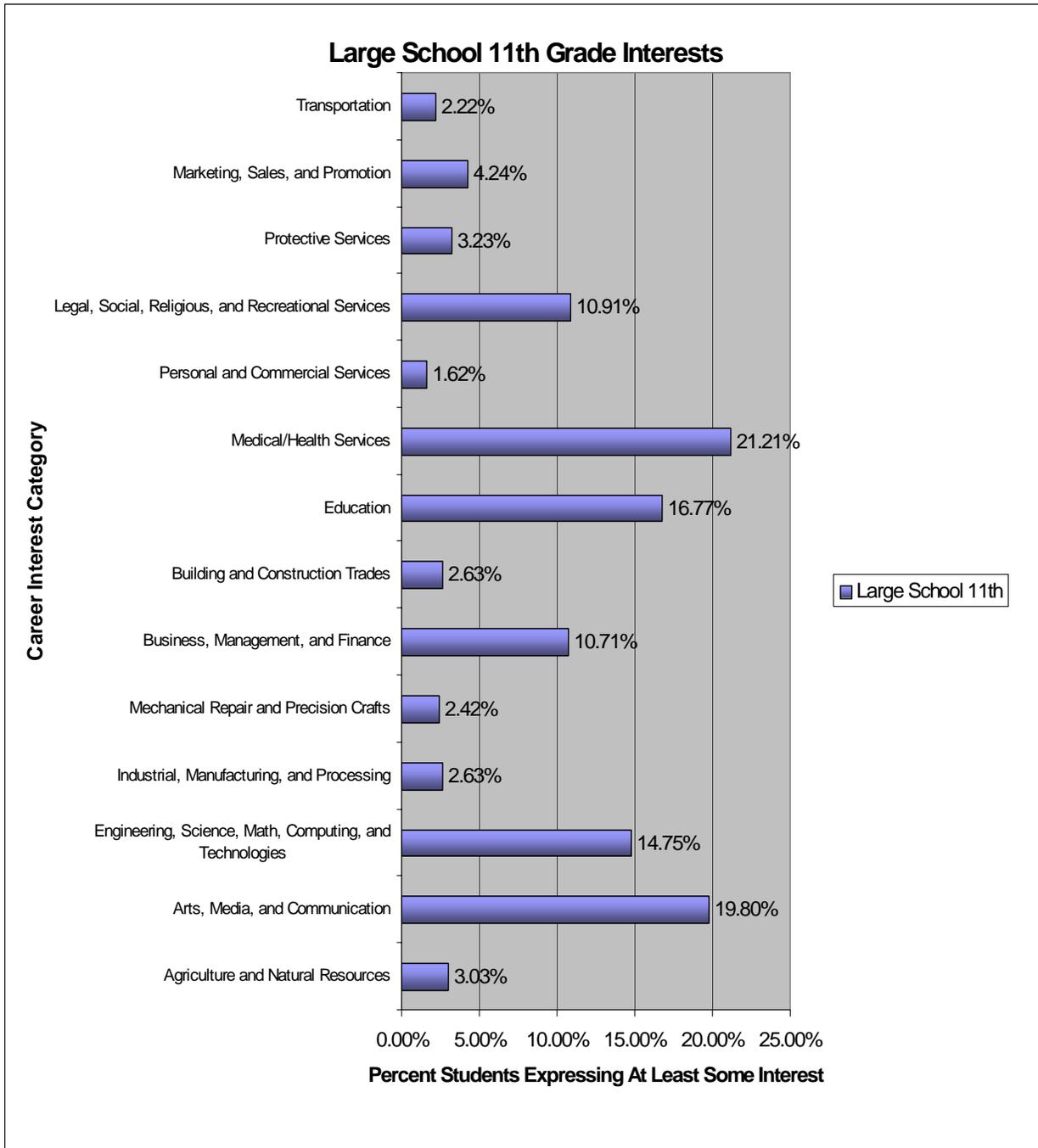
It should be noted that the numbers add up to much more than 100%. The reason for this is that students were allowed to mark more than one category for each level of interest. The numbers reflect the percentage of students who responded to the survey who were at least somewhat interested in a particular career path.

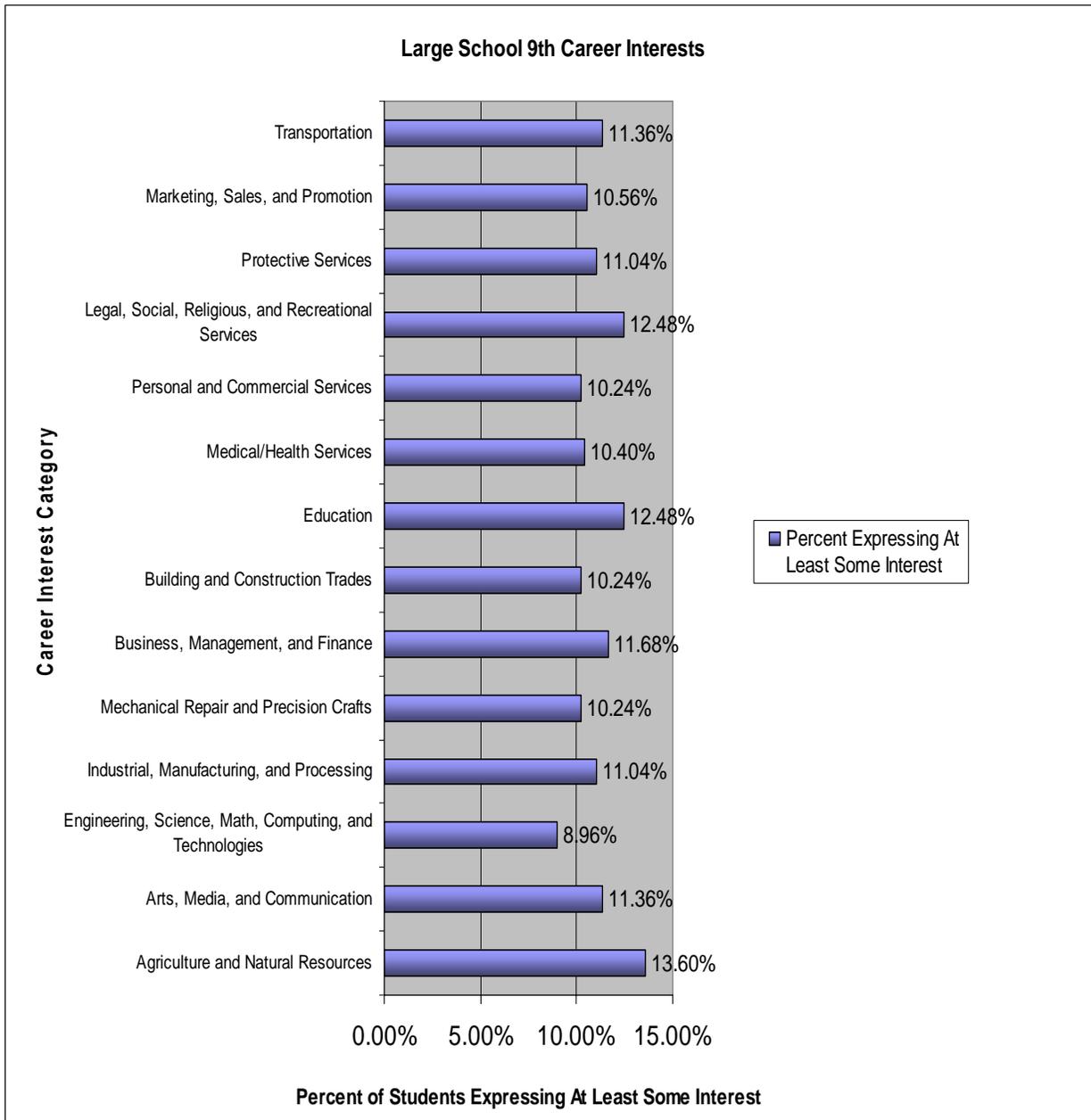
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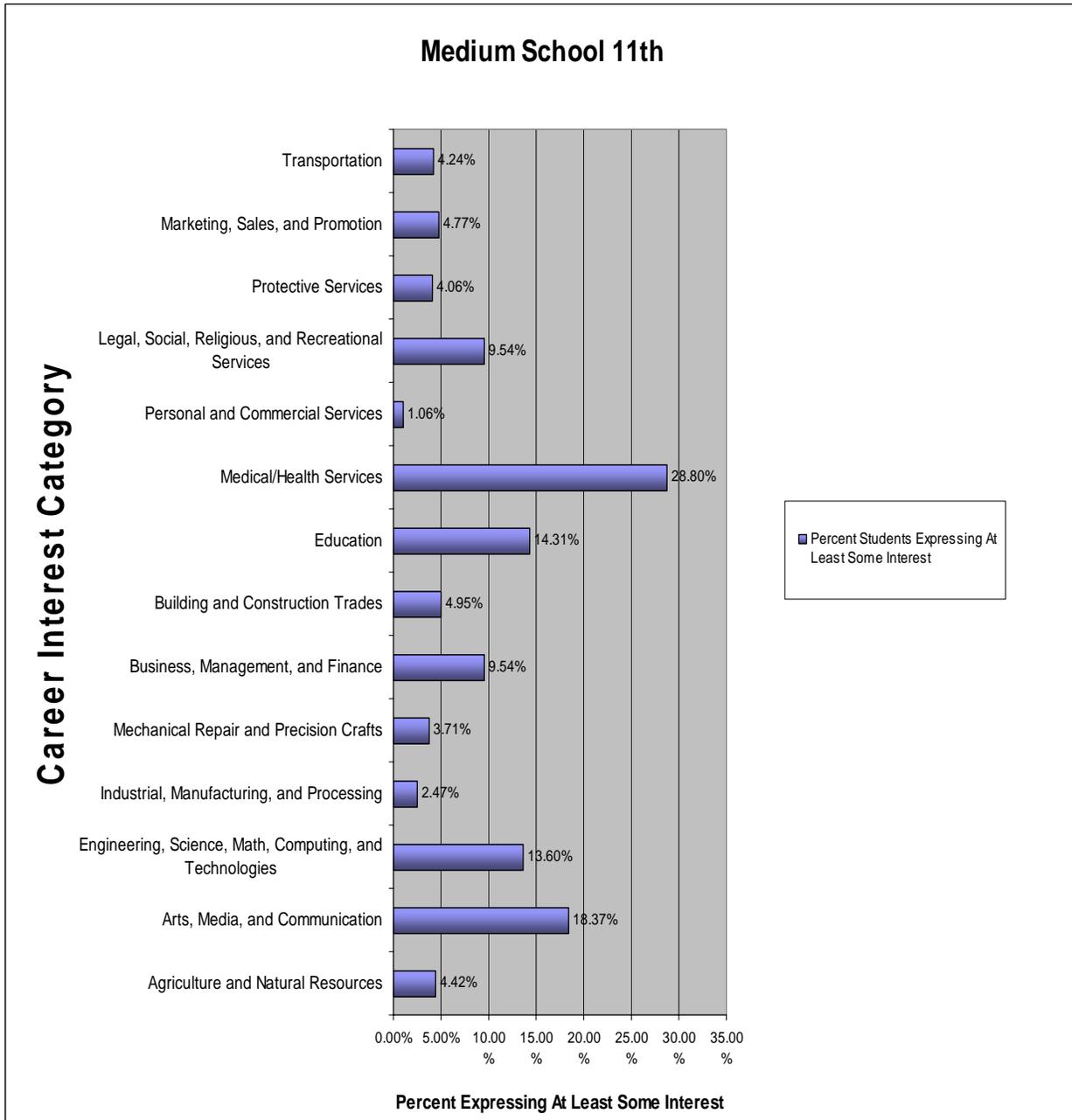
<sup>3</sup> [http://www.learnmoreindiana.com/@counselors/counselors\\_hs/indiana\\_guidance\\_report/](http://www.learnmoreindiana.com/@counselors/counselors_hs/indiana_guidance_report/)

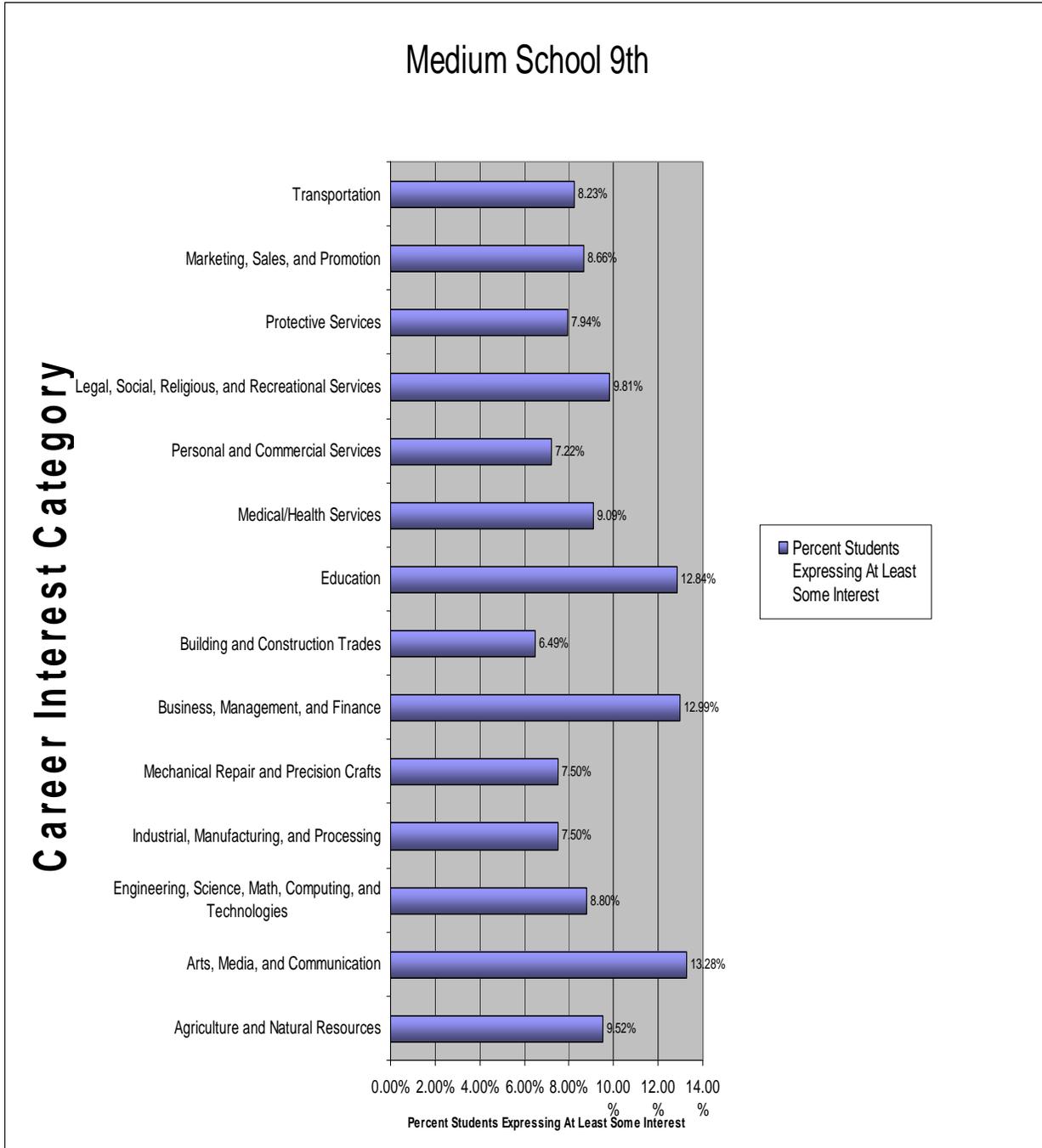
**EGR7 Career interest by Grade and Size of School**

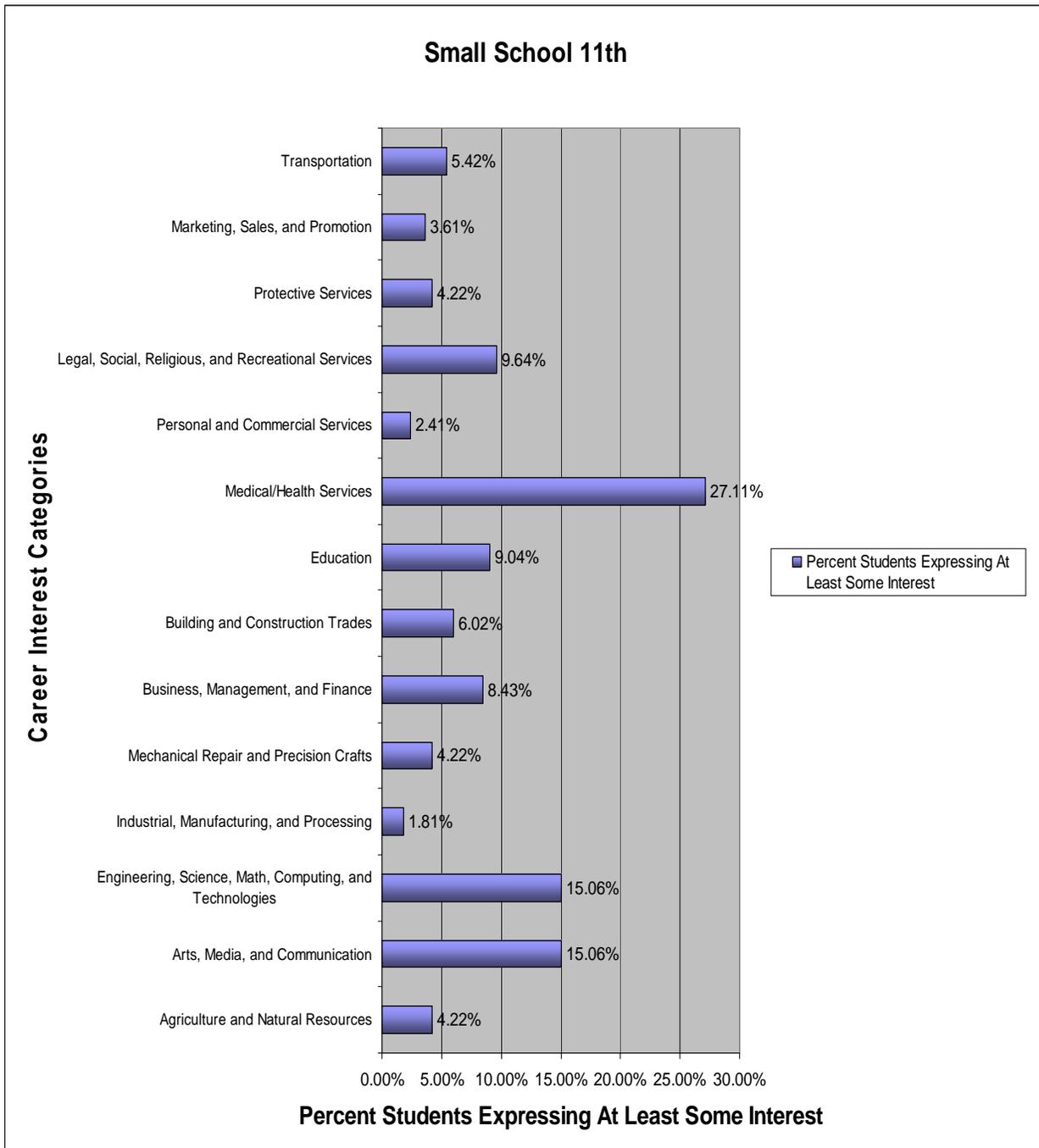


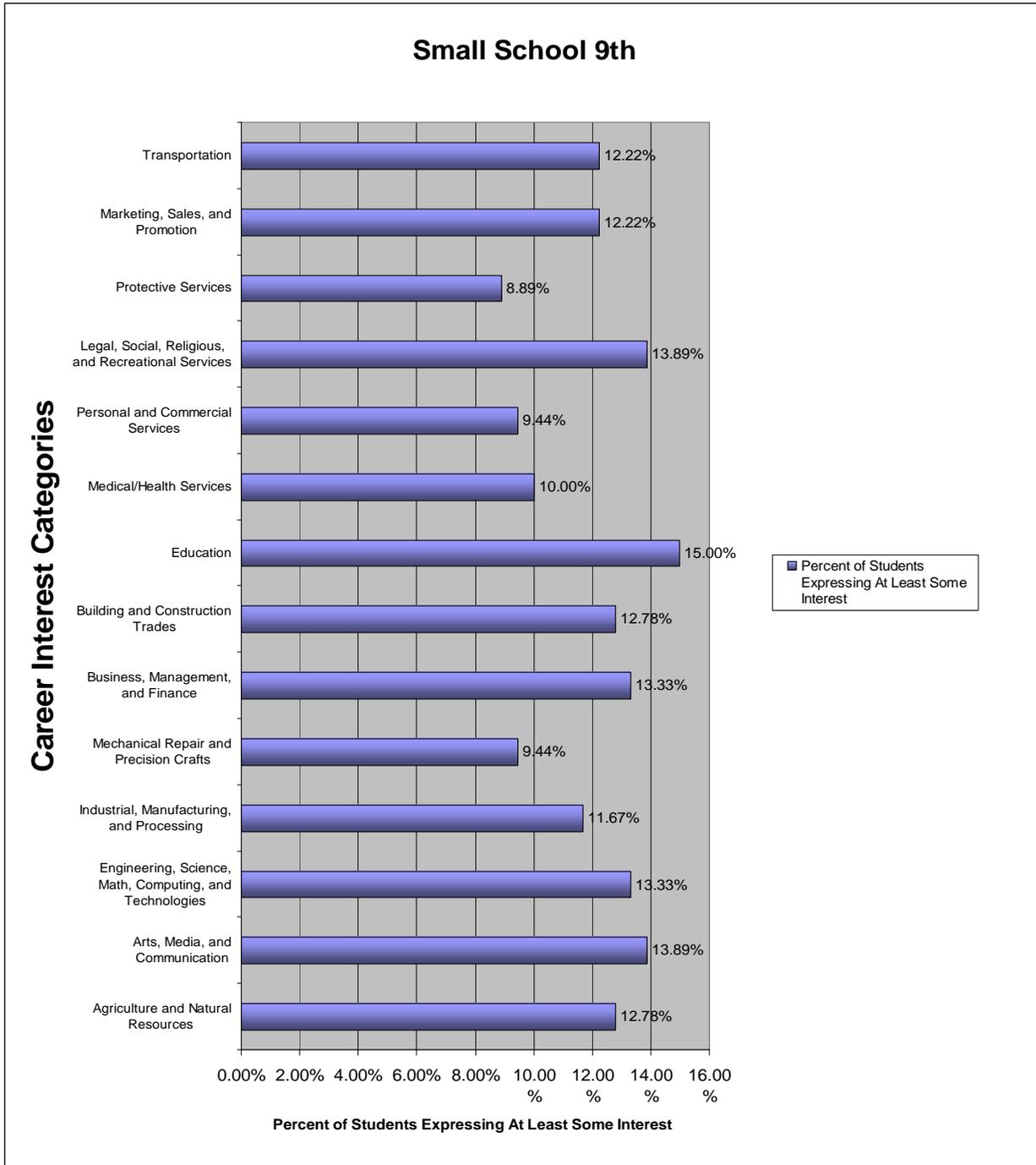












## Skills Overlap

	19-4031	29-1126	29-2034	49-1011	49-2094	49-9042	49-9043
Active Listening	X	X	X	X	X	X	
Coordination			X		X		
Critical Thinking		X	X	X			
Equipment Maintenance				X	X	X	
Equipment Selection				X			X
Installation				X	X	X	
Instructing		X	X	X			
Management of Personnel Resources				X			
Mathematics	X						
Monitoring		X	X				
Operation Monitoring	X	X			X		
Quality Control Analysis	X						
Reading Comprehension	X	X	X	X	X		
Repairing					X	X	X
Science	X						
Social Perceptiveness			X				
Speaking		X	X				
Time Management		X	X	X			
Troubleshooting				X	X	X	X

Active Listening	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Management of Personnel Resources	Mathematics	Monitoring
19-4031	29-2034	29-1126	49-1011	49-1011	49-1011	29-1126	49-1011	19-4031	29-1126
29-1126	49-2094	29-2034	49-2094	49-9043	49-2094	29-2034			29-2034
29-2034		49-1011	49-9042		49-9042	49-1011			
49-1011									
49-2094									
49-9042									

Operation Monitoring	Quality Control Analysis	Reading Comprehension	Repairing	Science	Social Perceptiveness	Speaking	Time Management	Troubleshooting
19-4031	19-4031	19-4031	49-2094	19-4031	29-2034	29-1126	29-1126	49-1011
29-1126		29-1126	49-9042			29-2034	29-2034	49-2094
49-2094		29-2034	49-9043				49-1011	49-9042
		49-1011						49-9043