

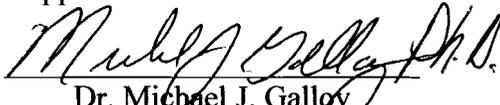
AN ANALYSIS OF THE REASONS STUDENTS ENROLL IN THE MACHINE TOOL
OPERATION AND TOOL & DIE MAKING DIPLOMA PROGRAMS AT WAUKESHA
COUNTY TECHNICAL COLLEGE

by

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ABSTRACT

The purpose of this study was to identify the factors that contributed the greatest to a student's decision to select either the Machine Tool Operation or Tool & Die Making diploma programs at Waukesha County Technical College. The research questions were focused in three major areas: the impact of past participation in technical education courses in high school on degree selection; the influence a person or an event may have had on a student's decision to enroll; and how an awareness of the employment opportunities available for graduates affected a student's decision making process. The intent of this study was to discover the items that had the greatest influence on these students and their decision for electing to enroll into one of these two program areas. This study was conducted through the use of a 13-question survey administered to twenty-one (21) first year, full-time students who were enrolled in either the Machine Tool Operation or Tool & Die Making diploma programs at Waukesha County Technical College. Nineteen (19) students responded to the survey. The results of this research study reflect that an awareness of

the available employment opportunities for graduates from these program areas seemed to have had the greatest influence on a student's decision to enroll in either the Machine Tool Operation or Tool & Die Making diploma programs at Waukesha County Technical College. Past participation in high school technical education courses and the influence of a person or event did not appear to have a major influence on students' decision to select either of these two program areas.

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Chapter I: Introduction

During 2004 manufacturing accounted for 13% of the gross domestic product (GDP) produced in the United States. The average annual pay for workers employed in the US manufacturing sector averaged \$45,916 during this same period. The amount of companies nationwide that were identified as being “manufacturing establishments” which make up this sector numbered 378,142 (Eisen, Jasinowski, & Kleinert, 2005). In the United States, the manufacturing sector makes up a significant portion of the nation's economy. As manufacturing goes through a transformation due to the impact of globalization, a number of issues are occurring that threaten the viability of this nation to remain competitive in the worldwide marketplace of manufacturing.

One major issue facing manufacturing in the United States is the inability of employers in finding qualified candidates to fill many of the skilled positions that are available. One of the more compelling predictions comes from the 2005 Skills Gap Report - A Survey of the American Manufacturing Workforce. “This human capital performance gap threatens our nation's ability to compete in today's fast-moving and increasingly demanding global economy. It is emerging as our nation's most critical business issue” (Eisen, Jasinowski, & Kleinert, 2005, p. i). The 2005 Skills Gap Report pointed out that 80% of survey respondents indicated that they were currently experiencing a shortage of qualified workers. Ninety percent of respondents to the survey indicated a moderate to severe shortage of finding qualified skilled employees such as machinists, craft workers, and technicians. Certain regions of the country can and will experience severe shortages of these types of skilled workers due to area demographics (Bureau of Labor Statistics, 2005; Wisconsin Manufacturers and Wisconsin's Technical Colleges, 2005).

In 2004, Wisconsin manufacturing accounted for 512,630 total jobs within the state. Wisconsin manufacturing jobs generated more than \$46 billion in gross product, which averages out to \$90,000 in gross product per employee. Out of this amount, \$14 billion in manufacturing goods ended up as exports (The MPI Group, 2005). In June 2005, the Wisconsin Manufacturers and Commerce Association conducted their annual CEO survey which helps track the performance of the State's economy. One of the survey questions asks, (As a company) "If you are having trouble, why?" The number one answer to this question reported by 66.6% of the survey respondents was "Lack of qualified applicants" (p. 4). Machinists and Tool & Die Makers are part of this skilled machining area of manufacturing.

Employers in Waukesha County whose businesses are based in manufacturing are also encountering similar experiences with regards to this national and statewide trend of companies that are having difficulty in finding qualified workers in certain skilled trade areas (Statewide Environmental Scan Initiative, 2004). Waukesha County is located 15 miles west of the city of Milwaukee and 60 miles east of the city of Madison. Waukesha County makes up 580 square miles in which approximately 375,000 people reside. Waukesha County has over 12,000 employers who employ more than 218,000 people. The largest employment sectors in Waukesha County are manufacturing (26%), services (25%), and retail (16%).

In Waukesha County, the number of available district wide job openings for workers with a background in Machining or Tool & Die Making far exceeds the number of graduates from the local technical college, which is Waukesha County Technical College (WCTC). In Waukesha County, from July 1, 2003 until June 30, 2004, the Employment Opportunity Center at Waukesha County Technical College listed the following: 538 full-time positions available for Machine Tool Operators; and 376 full-time positions available for Tool & Die Makers within

Waukesha County (Waukesha County Technical College, 2004). These 914 total positions were validated as being unduplicated and being offered by employers within the boundary of Waukesha County (Waukesha County Technical College, 2004). The total number of requests from Waukesha County employers the following calendar year, July 1, 2004 until June 30, 2005 showed a total of 1292 requests for Machine Tool Operators and Tool & Die Makers (Waukesha County Technical College, 2005).

Machinists (or Machine Tool Operators) use tools such as milling machines, lathes, machining centers, and grinders to produce precision metal parts (Bureau of Labor Statistics, 2004). Tool & Die Makers also use these tools to produce other tools, dies, and special holding devices that enable machines to create a wide range of products in manufacturing (Bureau of Labor Statistics, 2005). This type of skilled worker typically serves an apprenticeship, which can take between 4 and 5 years to complete. An apprenticeship is a specifically focused on-the-job training where the worker/apprentice is guided through a process of learning numerous tasks required to perform the duties of a Machinist or a Tool & Die Maker in a proficient fashion.

WCTC offers diploma programs within the Industrial Division to assist individuals in becoming a Machinist or Tool & Die Maker. WCTC is located in the city Pewaukee within Waukesha County. WCTC is part of the Wisconsin Technical College System. The two diploma programs offered are the 1 year Machine Tool Operation program and the 2 year Tool & Die Making program. The Machine Tool Operation program is a 35 credit, 1 year technical diploma program that prepares students for entry-level work in the machine profession. The Tool & Die Making program is a 69 credit, 2 year technical diploma program that prepares students for entry level work in the Tool & Die Making profession of machining.

These diploma program areas were listed as the highest two in terms of average hourly wages upon graduation when compared to the sixteen total programs offered by the WCTC Industrial Division. The average hourly wage based upon the 2003 WCTC graduate follow-up report for students from the 1 year Machine Tool Operation program was \$17.77. The average hourly wage from the same follow-up report for students from the 2 year WCTC Tool & Die program was listed as \$22.66 an hour based upon completion of their apprenticeship (Waukesha County Technical College, 2004).

In 2004 there were 8 graduates from the 1 year Machine Tool Operation diploma program and 9 graduates from the 2 year Tool & Die Making diploma program at WCTC.

Statement of the Problem

The problem is that throughout the WCTC district, the requests from area employers for graduates from the WCTC Machine Tool Operation / Tool & Die Making diploma programs far exceeds the number of students who graduate from the program.

Purpose of the Study

The purpose of this study is to identify the factors that influenced WCTC students in their decision to enroll into the Machine Tool Operation / Tool & Die Making diploma programs during the 2006 school year. This information will be gathered during the spring 2006 semester by the use of a survey that will be provided to all first year students presently enrolled in either of these two program areas during this time.

Research Questions

This study will address the following research questions:

1. To what degree(s) do the students presently enrolled in either the Machine Tool Operation or Tool & Die Making diploma programs at WCTC feel that their high school educational experience helped spark an interest for their selecting either of these two program areas as a career choice?
2. Was there a particular person or event that influenced the students' decision to enroll into either the Machine Tool Operation or Tool & Die Making diploma programs at WCTC as a career choice?
3. Are students aware of the employment opportunities that are available to graduates from the Machine Tool Operation or Tool & Die Making programs at WCTC, and did awareness of these opportunities influence their decision for enrolling?

Significance of the Study

This study will provide valuable insight as to the factors that can influence a student's decision for choosing to enroll into the Machine Tool Operation / Tool & Die Making diploma programs at WCTC. The information gained from this study will be able to be used by WCTC to create strategies that could increase enrollment in these two high demand program areas.

1. Data from this study can be used to provide district high schools and WCTC counselors with relevant information pertaining to job opportunities available in the Machine Tool Operation / Tool & Die Making profession.
2. Area employers and respective professional organizations will be able to use this information to help formulate strategies for increasing awareness of the Machine Tool Operation / Tool & Die Making profession as a viable career choice.

3. Students will be able to use this information as a reference for determining the number of available district job openings based upon yearly tracking of these two program areas at WCTC.
4. The Marketing Department at WCTC will be able to use this information to help promote increased student enrollment in the Machine Tool Operation / Tool & Die Making programs. This increased enrollment could help provide more qualified employees for some of the requests of local employers for workers in this trade area.

Assumptions

The following assumptions are made with regards to this study:

1. It is assumed that respondents will not bias their responses to the survey. The participants will not do anything to detract from the validity of this survey by knowingly providing information that is not true.
2. The data collected is not skewed based upon the time of the year it was collected. Survey distribution will be done during the latter part of spring 2006. Survey data collected during this time should produce no appreciable difference as compared to data collected during any other time of the year.
3. Collected data from the survey participants' high school curriculum experience will be accurate and honest. The survey participants will be forthright and truthful in their recollection of the courses they had in high school. They will not misrepresent their past high school experiences (i.e. stating they took a home economics course if in fact they did not).

Limitations of the Study

The following are limitations of this study:

1. Survey participants' backgrounds will be from the skilled machining technology area. The people being surveyed are presently enrolled in the first year of the 1 year Machine Tool Operation program or the 2 year Tool & Die Making program at WCTC.
2. The study is restricted to students who are presently enrolled at WCTC. Former students from these two WCTC program areas and potential incoming students are not included in this study.
3. Employers who hire graduates from these two programs areas will not be included in this study. Local professional organizations that represent these two program areas will not be included in this study. WCTC Manufacturing Technology Advisory Board Members will not be included in this study. Counselors, either technical college or high school, will not be included in this study.

Definition of Terms

The following definitions are used throughout this study:

Machine Tool Operation program – A one (1) year technical diploma program offered at WCTC that prepares students for entry level employment into the skilled trade of precision machining.

Tool & Die Making program – A two (2) year technical diploma program offered at WCTC that prepares students for entry level employment into the skilled trade of tool making/mold making.

Waukesha County Technical College (WCTC) - One of 16 State of Wisconsin Technical Colleges located in the city of Pewaukee in southeastern Wisconsin. WCTC has a second satellite campus in downtown Waukesha. The main campus is located between Milwaukee Area Technical College to the East, and Madison Area Technical College to the West.

Chapter II: Literature Review

Introduction

This chapter will review the literature that describes the demand for skilled trade workers in manufacturing, the employment opportunities available to students who select the skilled trade area of machining as a manufacturing career choice, and the factors that contribute to the career choice decisions of high school students. The two major categories of workers unique to this skilled trade machining area are Machinists and Tool & Die Makers. The nature of this review will be focused in three areas. First, literature that describes the magnitude of the worker shortage and reasons it may exist will be reported. Next, the review will identify the employment opportunities that are available to qualified candidates in this skilled trade area of machining, with a special focus placed on this skilled trade sector from a local perspective. Finally, the review will address the factors that may impact the career selection process of high school students.

Worker Shortage

A few years ago, any mention of a worker shortage with regards to the manufacturing sector would have been looked upon with a raised eyebrow and slight suspicion. A statement such as “America is about to experience the greatest labor shortage in its history” (Zeiss, 2004, ¶ 1) would have seemed almost irrational, especially if linked to manufacturing. However, this issue of an impending labor shortage is occurring and being written about with greater frequency and urgency. The number of people working or looking for work as part of the labor force in the United States is projected to reach 162.1 million by 2014. This is an increase of almost 15 million people when compared to the labor force from 2004 (Toossi, 2005).

One of the more compelling predictions with regards to the significance of this labor shortage comes from the 2005 Skills Gap Report which stated that in order for the manufacturing sector to be able to compete successfully in a global economy, the need to secure a highly skilled and innovative workforce will be the main factor in determining the future of our nation's overall economic health (Eisen, Jasinowski, & Kleinert, 2005). Another finding from this skills gap survey stated that more than 90% of the survey respondents indicated a moderate to severe shortage of finding qualified skilled production employees such as machinists, craft workers, and technicians. The Skills Gap Report 2005 identified the following reasons for some of these trends in workforce availability: reduction of Baby Boomers who are in the workforce; changing attitudes about career and job satisfaction amongst Generation Y-ers; changing job requirements; and manufacturing's negative perception by society (Eisen, Jasinowski, & Kleinert, 2005). Machinists and Tool & Die Makers make up a portion of this manufacturing sector that is suffering from a lack of skilled production employees.

By the year 2020, there is a projected need for 10 million new skilled workers. This prediction is partially based on today's Baby Boomer generation of skilled workers who will be retiring within the next 15 to 20 years (Eisen, Jasinowski, & Gabrys, 2003). Projected job opportunities for Machinists and Tool & Die Makers should continue to be excellent because the workers who possess these necessary skills are growing at a much slower rate when compared to the number of workers who are retiring from this skilled trade area (Bureau of Labor Statistics, 2004).

Much of the future workforce that might fill this gap will be individuals who are presently between the ages of 18 and 40. Generation Y-ers are individuals who are 25 years or younger. This new generation of employees are looking for a different work experience than that

of their parents (most of which are Baby Boomers). Generation Y-ers are financially motivated looking for the best compensation package and not afraid to ask for it. In addition, they have experienced a world where things are available at a push of a button (i.e. internet, cell phones). Finally, they are attune to the need for work life balance (Lancaster & Stillman, 2002). This new work force is not looking for, nor expecting lifetime employment. “Young people bring technology-savvy skills, a global and diverse orientation, and ability to think in ways that are critical to competitive advantage” (Eisen, Jasinowski, & Kleinert, 2005, p. 9).

As Baby Boomers retire, many of these skilled positions are becoming more difficult to fill due to the level of technological expertise and training needed to function in this skilled trade environment of machining. At the basic level, people entering this field should be mechanically inclined, good problem solvers, have an ability to work independently, and be able to do highly accurate work within 1/1,000th of an inch. High school and vocational courses in mathematics (trigonometry), blueprint reading, and drafting are important (Bureau of Labor Statistics, 2004). Machinists and Tool & Die Makers typically serve a four to five-year apprenticeship. This apprenticeship serves as a detailed and focused training environment that is necessary for establishing the required fundamental skills to perform this type of precise high-level work. When asked what type of skills employees will need more of over the next 3 years, over 53% of the respondents to the 2005 Skills Gaps survey indicated technical skills (Eisen, Jasinowski, & Kleinert, 2005). The nature and sophistication of these jobs has evolved over the years due to the influx of computer-integrated technology. This technology is required for the daily operation of equipment that is a necessary component in much of today's manufacturing environment. The Skills Gap Report also described employers requesting basic employability skills (attendance,

timeliness, and work ethic) at a 53% rate of high importance (Eisen, Jasinowski, & Kleinert, 2005).

A study reported in the white paper *Keeping America Competitive: How a Talent Shortage Threatens U.S. Manufacturing* suggested that the negative perception of this industry is tied to outdated stereotypes of the old assembly line as well as a perceived state of decline (Eisen, Jasinowski, & Gabrys, 2003). When students were asked to describe a position in the manufacturing sector, words that were often used were “factory work,” “repetition,” “dirty,” and “long hours with low pay” (Eisen, Jasinowski, & Gabrys, 2003, n.p.). When parents and teachers were asked similar questions, the same types of attributes were described. Many of the responses by parents and teachers indicated a lack of awareness of the employment outlook in this career area (Eisen, Jasinowski, & Gabrys, 2003). The media has had a huge influence on this perception. As an example, in a series of articles in the *Milwaukee Journal* in December, 2003 titled, “Made in China, The New Industrial Revolution,” the authors painted a bleak picture of the future of jobs in the manufacturing sector. What the articles focused primarily on was the impact of globalization on the lower tiered production positions as they related to manufacturing. The general public has difficulty accurately deciphering the difference between the lower tiered positions and those of the higher level positions that are held by Machinists and Tool & Die Makers. Consequently, the general public is unaware of the possibilities awaiting those who pursue a career as a Machinist or a Tool & Die Maker.

Another factor contributing to the slow rate of growth for workers going into this trade, comes from a study done by the Wisconsin Department of Workforce Development (Grasso, 2006). In their study, one factor identified as being partially responsible for contributing to this worker shortage phenomenon was derived from using a study statistic identified as fertility rate.

This fertility rate statistic stated that a number of 2.1 was the necessary rate needed for a population to sustain itself. This is the number of births tallied to each woman within a population. The current fertility rate figure for Wisconsin is 1.9, which means that the state's population is not being replaced with sufficient numbers with regards to the rate of mortality (Grasso, 2006). For the manufacturing sector in Wisconsin, this phenomenon also becomes a greater issue due to the large amount of people who are retiring from manufacturing-related jobs throughout the state. Wisconsin ranks 2nd in the nation in terms of manufacturing-related jobs, with the number being about 386,000 people who are employed in this area.

Employment Opportunities

What opportunities are there now in the manufacturing skilled trade sector? According to labor economist Tony Carnevale, they appear to be quite significant. He predicted a serious lack of skilled workers beginning in 2005 and growing to approximately 5.3 million by 2010 (cited in Zeiss, 2004). In a League for Innovation publication, United States Senator Tom Harkin wrote a chapter that spoke about the dramatic crisis that America is facing from a rising skills gap and worker gap, and how this will contribute significantly to skilled employment opportunities in the manufacturing sector (Harkin 2003).

This overview provided a pretty broad-based look at manufacturing opportunities in general, but what helps substantiate these predictions is some specific national and regional studies that verify the numbers related to these manufacturing openings. Duquesne University's Center for Competitive Workforce Development conducted a manufacturing sector survey in a 10 county-wide region around Pittsburgh, Pennsylvania. Results of the survey estimated 2560 job openings at area manufacturing companies in this 10 county-wide region (McKay, 2005). In Woburn, Massachusetts, Boston Centerless Inc., a maker of highly precise metal parts, hired

recruiters to help them find five machinists at a bounty of \$500 a head. They were only able to locate three (Aepfel, 2004).

A research report *Building the Workforce for the 21st-Century*, done by the Wisconsin Technical College System in 2005 was conducted to solicit input of manufacturing employers' anticipated trends for their companies. Nearly two thirds of the employers surveyed projected that they would be in need of hiring more employees within the next two years. Only 5% of the respondents anticipated a decrease. When asked about the most critical hiring and training needs in regards to their business, the number one response was being able to secure workers with a machine tool/metalworking background (Wisconsin Manufacturers and Wisconsin's Technical Colleges, 2005).

The Employment Opportunity Center at Waukesha County Technical College tracked district-wide employer job requests for the following positions from July 1, 2003 to June 30, 2004. For Machine Tool Operation (Machinists) there were 538 full-time positions available. For Tool & Die Making there were 376 full-time positions available (Waukesha County Technical College, 2004). This was an increase in requests from 2002-2003, but noticeably less than the 1460 total positions that were requested by area employers for Machinists and Tool & Die Makers throughout the WCTC district in 2005 (Waukesha County Technical College, 2005).

Career Selection

With all the available opportunities, why are not more high school seniors choosing a career as a Machinist or Tool & Die Maker? Two research studies will be used to present a response to this question. Michael Borchert, in his research paper titled "Career Choice Factors of High School Students," posed a variety of questions to high school seniors to uncover what influenced their career choices (2002). Borchert contended that most students were not making

an informed decision when it came to career selection. The three areas he focused on in this study were environment, personality, and opportunity factors. His study intended to uncover the magnitude of these issues on the career selection process (Borchert, 2002). Terry Garringer completed a study titled, "Analysis of Current Trends in Vocational Choices of Students at Oak Creek High School," in which he asked junior and senior students currently enrolled in technology courses what impact the participation in these courses may have had on their selecting a career in a technical area. The study focused on the impact of technology courses to prepare students for emerging technology, as well as how these courses prepared students to assist in making a career choice in a vocational or technical career field (Garringer, 2004).

Parents, teachers, and counselors typically play an important role in determining the career choices selected by students (Borchert, 2002). Since parents and teachers alike may have a negative perception of careers in the manufacturing sector, this may be a significant issue concerning why students are not seeking out this profession (Eisen, Jasinowski, & Gabrys, 2003). Both of the surveys posed questions concerning the involvement of others in course selection. In addition, Borchert (2002) asked the level of influence of parents, friends, teachers, and counselors in career selection. Borchert found there to be little to no significance between career choice and the influence of others. Borchert did suggest that "students may unknowingly define their thinking based on the ideas and suggestions of the people in their support group" (Borchert, 2002, p. 66). Garringer found a similar result when he posed two questions on parental and guidance counselor involvement in course selection. The students had a neutral response to those statements (Garringer, 2004).

Borchert defined opportunity as those areas that represented other alternatives available to the students post high school (2002). Questions included the financial impact of choice

(current employment, cost of school, and earning potential of a career), school availability, military options, and area employment opportunities (2002). Borchert's study concluded that students were aware of the economic issues concerning the cost of college, as well as the impact of career selection on earning potential. Students who had parents with higher levels of education responded that knowing of these opportunities was a determining factor in their career selection, while those students who saw their parents' education as being under average, felt that this was a limiting factor to their being made aware of the same opportunities. His conclusion also stated that students may either over or underestimate these issues in career selection (Borchert, 2002). Garringer's study also included questions concerning opportunity. The focus was on the impact of technology courses in assisting in career choice, program of study in a 4-year college, enrollment in technology/vocational courses after high school, and a realization of the need for additional training post-high school to compete for higher paying jobs (Garringer 2004). In all but one of the questions related to opportunity, respondents indicated agreement or higher. These results indicated a significant impact of participation of technology courses in educating students to available education and career choices in the field of manufacturing technology (Garringer, 2004).

The final area that Borchert (2002) studied on career choice concerned the affect of individual personality on career selection. Questions on the survey included age in which the students began to think about a career, individual choice in course selection, impact of grades, individual career research, and consideration of jobs held traditionally by the opposite sex. Student's "personality" had the strongest correlation to career choice compared to the factors of environment or opportunity (Borchert, 2002). The study concluded that the students who were involved early in career consideration felt that grades did not limit their choices. Conversely, the

opposite was true for those who did not start early. Borchert's final conclusion was that students must drive career decisions based on their knowledge of themselves (Borchert, 2002). Garringer also asked for input on individual course selection, but he also went on to inquire as to whether participation in technology courses helped to improve performance in other general areas of study, improved self-esteem and self-confidence, enjoyment of "hands-on" experiences, and personal knowledge of skills and abilities. Overwhelmingly, all but one of these statements once again received an agreement or better score. It is clear from this study that participation in technology courses has positively influenced these students toward individual selection of a career in technical or vocational area, reinforcing Borchert's findings toward students driving career selection based on personal awareness (Garringer, 2004).

Chapter III: Methodology

Introduction

This chapter will describe the five key components that were used to identify the methodology for this research project. The first component will identify the selection and description of the sample. The second section will describe the instrumentation used to collect data. The third section will describe how data collection was handled. The fourth component describes what type of data analysis was used. The last component discussed describes the limitations of this study.

Subject Selection and Description

The intended subjects were first-year students who were presently enrolled at Waukesha County Technical College for the 2005-2006 school year. They have selected either the 1 year Machine Tool Operation diploma program or the 2 year Tool & Die Making diploma program as their educational career choice. This sample of research subjects was made up of primarily young males between the ages of 18 and 30 years old.

Instrumentation

The instrument used for this study was a Likert scale survey of 13 different descriptive statements that were designed to identify the levels of agreement that a student may place on various factors that contributed to their decision to enroll in the Machine Tool Operation / Tool & Die Making diploma programs at Waukesha County Technical College. The survey took approximately 10 minutes on average for the survey respondents to complete. Numerical values were assigned to the different levels of agreement for each statement. The agreement rating scale was as follows, Strongly Agree-5, Agree-4, Neutral-3, Disagree-2, and Strongly Disagree-1. These values were then added to produce a total sum value, a mean value, and then a

percentage value for each statement. This data was then used to prioritize some of the factors that influenced survey participants in their selection of the Machine Tool Operation / Tool & Die Making diploma programs at Waukesha County technical College. No measures of validity or reliability have been documented since this survey is designed specifically for this research study. There was no attempt to identify survey participants by gender, age, race, or educational background.

Data Collection Procedures

This survey was conducted on-site at Waukesha County Technical College during the Spring semester of 2006 during regularly scheduled school lecture hours. The intended survey participants were those students who were enrolled in either the Machine Tool Operation or the Tool & Die Making diploma program. The survey was distributed by respective instructors in the Manufacturing Technology Department to these students during one of their designated scheduled lectures for either of these two groups. Each participant was informed of their voluntary participation in this study. To comply with all federal and state regulations with regards to running this type of survey, the following information was included as part of the consent form for this survey instrument.

As a student enrolled in either the Machine Tool Operation or the Tool & Die Making diploma program at Waukesha County Technical College, you are being asked to participate in a survey to determine the factors that contributed to your selecting one of these two program areas as your field of study. Your responses will remain strictly confidential and results from this survey will be used to implement strategies for increasing enrollment into these two program areas at WCTC. By completing the survey, you agree to participate in the project entitled, An Analysis Of The Reasons Students

Enroll In The Machine Tool Operation And Tool And Die Making Diploma Programs At
Waukesha County Technical College.

Data Analysis

The data calculations and analysis from this study were completed manually. The data came from a Likert scale based survey, so the information was ordinal in nature and all appropriate descriptive statistics were utilized. This data attempted to answer the research questions as reported in Chapter I.

Limitations

The following are limitations of this study:

1. This instrument has no measures of validity or reliability. Only one technical college school district will be participating in this study, therefore, any results should be used cautiously to infer to other districts of similar size.
2. Survey participants' backgrounds were from the skilled machining technology area. The people surveyed were presently enrolled in the first year of the 1 year Machine Tool Operation program or the 2 year Tool & Die Making program at WCTC.
3. The study was restricted to students who were presently enrolled at WCTC. Former students from these two WCTC program areas and potential incoming students were not included in this study.
4. Employers or graduates from these two programs areas were not included in this study. Local professional organizations that represent these two program areas were not included in this study. WCTC Manufacturing Technology Advisory Board Members were not

included in this study. Counselors, either technical college or high school, were not included in this study.

Chapter IV: Results

Introduction

The purpose of this study was to identify factors that may have influenced students in their selection of the Machine Tool Operation/Tool & Die Making diploma programs at Waukesha County Technical College. Factors such as technical education courses they took in high school, guidance from family, friends, teachers, or counselors, and a possible general awareness of employment opportunities related to these two areas of study comprised the foundation for this survey instrument. Results of the study were gathered by the use of a 13-question survey that was administered to twenty-one (21) full-time students enrolled in these two program areas. Nineteen (19) surveys were returned for analysis. (See Appendix A for survey instrument and Appendix B for statistical results.)

Demographic Information

The survey subjects were first year students who were enrolled at Waukesha County Technical College during the 2006 school year. They were enrolled in either the 1 year Machine Tool Operation diploma program or the 2 year Tool & Die Making diploma program as their educational career choice. Both of these diploma program areas have identical first years of study. The research subjects were all males between the ages of 18 and 40 years old. The nineteen (19) surveys that were returned for analysis represented 90.5% of the total possible participants.

Research Question #1

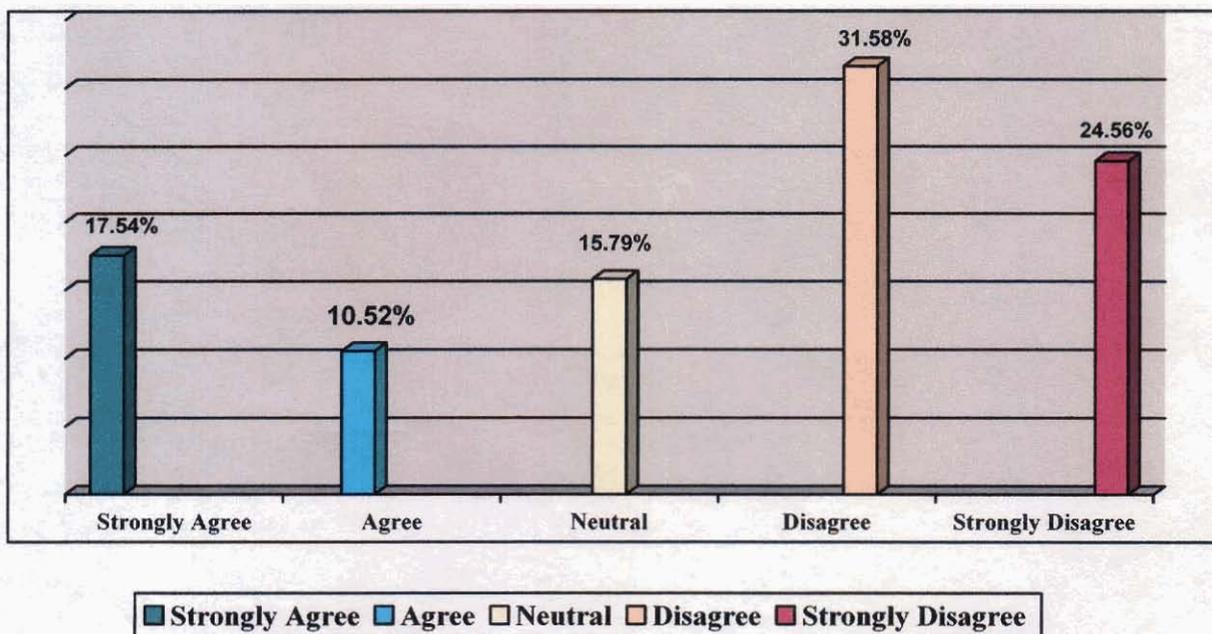
To what degree(s) do the students presently enrolled in either the Machine Tool Operation or Tool & Die Making diploma programs at WCTC feel that their high school

educational experience helped spark an interest for their selecting either of these two program areas as a career choice?

Survey questions one (1), three (3), and nine (9) were used to address Research Question #1. The individual percentages for each of these respective survey questions are as follows:

Question #1: Participation in technical education courses.	Question #3: School offered a wide variety of technical education courses.	Question #9: School field trip to WCTC.
SA = 31.6%	SA = 15.8%	SA = 5.3%
A = 5.3%	A = 21.1%	A = 5.3%
N = 26.3%	N = 10.5%	N = 10.5%
D = 21.0%	D = 31.6%	D = 42.1%
SD = 15.8%	SD = 21.1%	SD = 15.8%

Composite Percentages for Research Question # 1



Survey questions one (1) and two (2) in Research Question #1 were asked to confirm Garrienger's correlation between attendance and availability in technical course work and selection to choose enrollment in technical or vocational courses after high school (2004).

Question three (3) was utilized to determine whether exposure to WCTC and the predetermined content delivered with a field trip affected students' career choice. In analyzing the data compiled for Research Question #1, there does not appear to be any significant statistical confirmation that participation and exposure to technical education courses and field trips had a high level of influence on these students' decision to enroll into the Machine Tool Operation / Tool & Die Making program areas at WCTC. Only 28.06% of the respondents agreed with these statements collectively; 56.14% disagreed while 15.79% were neutral. A review of the individual survey questions indicates a slightly different set of results.

For survey question number one (1), approximately 37% of students agreed that their participation in a technical education courses in high school influenced their decision to enroll into one these program areas at WCTC. For this same question, approximately 37% of students disagreed that technical education courses they took in high school influenced their decision to enroll into one of these program areas. Approximately 26% of respondents were neutral to this question.

In survey question number three (3), approximately 37% of students agreed that their high school offered a wide range of technology education courses as electives, where as approximately 52% of survey respondents disagreed. Approximately 11% of respondents to this question were neutral.

In survey question number nine (9), approximately 11% of students agreed that coming to WCTC on a field trip influenced their decision to enroll into one of these program areas. Those that did not agree with this statement numbered 79% with the remaining 10% being neutral.

Research Question #2

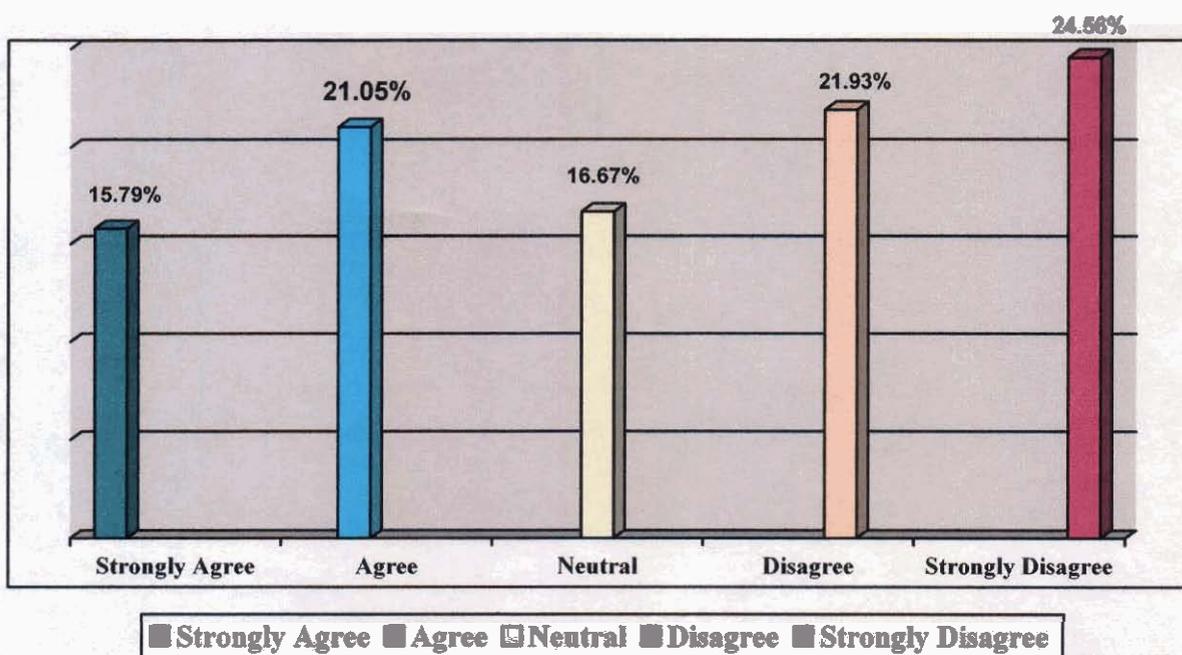
Was there a particular person or event that influenced students to enroll into either the

Machine Tool Operation or Tool & Die Making diploma programs at WCTC as a career choice?

Survey questions four (4), five (5), six (6), seven (7), ten (10), and eleven (11), were used to address Research Question #2. The individual percentages per question are as follows:

Question #4: Guidance Counselor influenced.	Question #5: Technical Education Instructor influenced.	Question #6: Family Member influenced.
SA = 0.0% A = 10.5% N = 21.1% D = 21.1% SD = 47.4%	SA = 5.3% A = 21.1% N = 15.8% D = 21.1% SD = 36.8%	SA = 15.8% A = 26.3% N = 26.3% D = 15.8% SD = 15.8%
Question #7: Friend influenced.	Question #10: Radio and or TV ads influenced.	Question #11: Family and friends supported decision.
SA = 10.5% A = 31.6% N = 15.8% D = 26.3% SD = 15.8%	SA = 0.0% A = 15.8% N = 10.5% D = 42.1% SD = 31.6%	SA = 63.2% A = 21.0% N = 10.5% D = 5.3% SD = 0.0%

Composite Percentages for Research Question # 2



In analyzing the data compiled for Research Question #2, some specific influences that contributed to the students' decision to enroll into either of these program areas at WCTC is identified. This research question attempted to uncover the influence that family, friends, educators, and counselors may have had on a student's decision making process. The specific survey questions were selected to test Borchart's and Garringer's results related to the influence of others in a student's career choice. An additional question was added to determine the impact of friends on a student's decision process. Factors such as media recruitment (radio, t.v.) ads by WCTC were also examined to see if they had an influence on the student's decision to enroll into either of these program areas. Finally, one component of this research question was to identify the level of support that a student felt they received from their family and friends, once they had made the decision to commit to WCTC for their postsecondary education in either of these two program areas.

In reviewing the composite results for Research Question #2, similar to Research Question #1, there does not seem to be overall agreement that influence by an outside force affected a student's decision to enroll in either of the two degree programs. Only 36.84% agreement was found to this series of survey questions while there was 46.49% disagreement with the series of survey questions. Neutral responses made up 16.67%.

Survey question number four (4) asked if a high school guidance counselor had influenced their decision to enroll into either of these two program areas at WCTC. Those students that agreed to being influenced by their high school guidance counselor was approximately 10%, while those that disagreed numbered approximately 68%. Neutral responses numbered 22%. This question had the lowest percentage of overall agreement and mean (1.95).

Survey question number five (5) asked if a technology education instructor from high

school influenced students' decision to enroll into either of these two program areas at WCTC.

Those students who agreed that they had been influenced to enroll due to their tech-ed instructor in high school numbered approximately 26% where those that disagreed numbered 58%. The number remaining neutral to this question was approximately 16%.

Survey question number six (6) asked if a family member had influenced their decision to enroll into either of these two program areas at WCTC. Approximately 42% agreed that a family member had influenced their decision, where 32% disagreed that a family member had influenced their decision. The remaining 26% were neutral to this survey question.

Survey question number seven (7) asked if a friend of theirs had influenced them in their decision to enroll into these two program areas at WCTC. Approximately 42% agreed that they had been influenced by a friend to enroll, whereas 42% disagreed. The remaining 16% were neutral to this question.

Survey question number ten (10) asked if radio or TV ads promoting WCTC had influenced them in their decision to enroll into either of these program areas. Approximately 16% agreed that they did, 74% disagreed, and the remaining 10% were neutral to this question.

Survey question number eleven (11) asked the students if their family and friends were supportive of their decision to enroll into the Machine Tool Operation/Tool & Die Making program at WCTC. Those that agreed with this statement numbered approximately 84% where those that disagreed numbered 5%. Neutral responses equaled 11%. This question had the highest level of overall agreement, mean (4.42) and lowest level of neutral responses.

Research Question #3

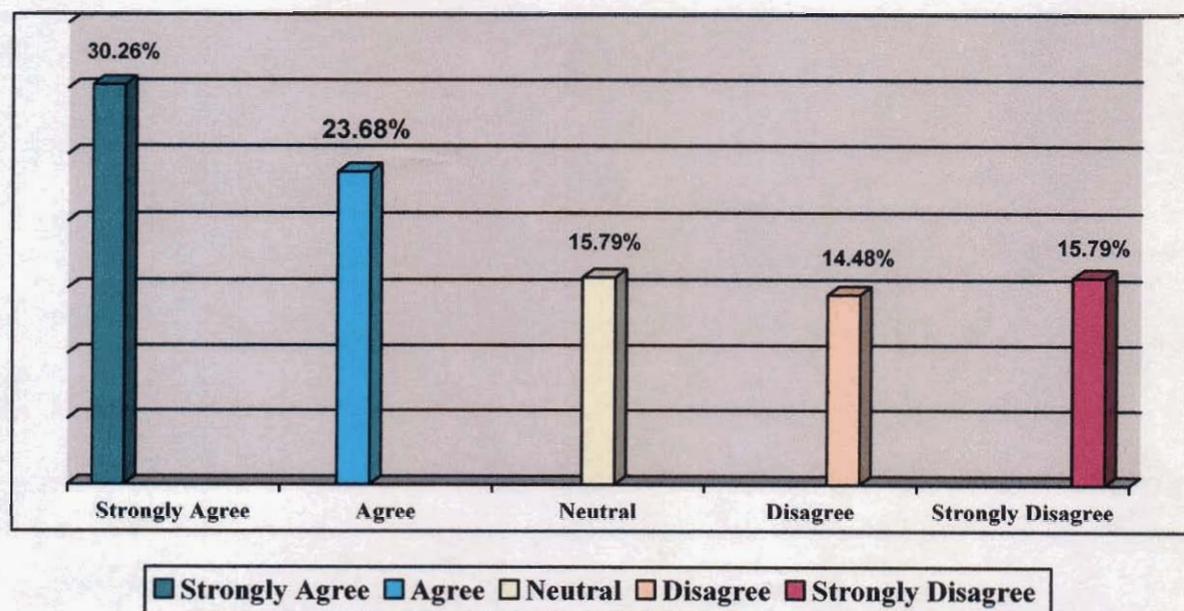
Are students aware of the employment opportunities that are available to graduates from the Machine Tool Operation or Tool & Die Making programs at WCTC, and did awareness

of these opportunities influence their decision for enrolling?

Survey questions two (2), eight (8), twelve (12), and thirteen (13), were used to address this Research Question #3. The individual percentages per question are as follows:

Question #2: Technical Education Instructor awareness of career options.	Question #8: Promotional visit WCTC awareness of career options.	Question #12: Own awareness of career options.
SA = 21.05% A = 21.05% N = 21.05% D = 15.8% SD = 21.05%	SA = 5.3% A = 5.3% N = 21.0% D = 26.3% SD = 42.1%	SA = 47.4% A = 31.6% N = 10.5% D = 10.5% SD = 0.0%
Question #13: More students would select if awareness of career options.		
SA = 47.4% A = 36.8% N = 10.5% D = 5.3% SD = 0.0%		

Composite Percentages for Research Question # 3



Survey questions two (2), eight (8) and twelve (12) in Research Question #3 were included to determine the origin of a students' information concerning the career outlook in machining beyond high school. Both Borchart and Garringer found a correlation between an awareness of opportunity and career selection (2002) (2004). In analyzing the data compiled for Research Question #3, an awareness of employment opportunities beyond graduation appears as a significant statistical influence on survey respondents. Close to 54% of respondents agreed that being aware of the amount of employment opportunities after graduation was a major factor in their decision to enroll into these two program areas. This series of questions received the highest overall level of agreement with the lowest level of overall disagreement (approximately 31%). Another component of Research Question #3 was asking survey participants if they felt more students would enroll into these two program areas if they knew about the job opportunities. This question was asked to determine the impact of this type of information on future students' decision to enroll.

Survey question number two (2) asked the students if a technology education instructor from their high school informed them of career opportunities available in the area of machining. Those that agreed that their tech-ed instructor in high school had informed them of these opportunities numbered approximately 42%. Those that disagreed numbered 37%. And those that were neutral numbered 21%.

Survey question number eight (8) asked if a promotional visit by a WCTC instructor influenced their decision to enroll into the Machine Tool Operation / Tool & Die Making program(s) at WCTC. Those that agreed that it had numbered approximately 11%, where those that disagreed numbered 68%. The remaining 21% were neutral.

Survey question number twelve (12) asked the students if they were aware of the job opportunities available to graduates from either of these two program areas at WCTC.

Approximately 80% agreed that they were aware of the job opportunities available. Those that disagreed numbered 10% and those that were neutral numbered 10%. While a high degree of students are aware of the opportunities, how respondents to the survey came about this information is not entirely clear.

Survey question number thirteen (13) asked the students if they felt more people would enroll into these two program areas at WCTC if they knew about the job opportunities available to graduates. Approximately 84% agreed that more people would enroll into these two program areas with 5% disagreeing and the remaining 11% being neutral to this question. This question received the highest overall level of agreement with the lowest level of disagreement as compared to all the questions on the survey. However, it had the second highest mean at 4.26. It is clear that there is a strong opinion in this survey group regarding the value of awareness of career opportunities and future students.

Chapter V: Discussion, Conclusion, Recommendations

Introduction

The purpose of this research study was to identify the factors that influenced WCTC students in their decision to enroll into either the Machine Tool Operation or Tool & Die Making diploma programs during the 2006 school year. The areas examined were how students' high school educational experience impacted their decision to enroll, the level of influence a particular person or event had in making their decision, and finally, the extent in which awareness of employment opportunities was a factor in choosing to enroll. The information gained from this study will be able to be used by WCTC to create strategies that could increase enrollment in these two high employment demand program areas. In this chapter, the discussion section will compare and contrast the literature reviewed in Chapter II to the results of the study that was conducted and reported on in Chapter IV. The summation of the findings of this research project, along with the implications will be addressed in the conclusion section of this chapter. The final section in this chapter will discuss recommendations to be made with regards to the topic of this research study.

Discussion

The literature reviewed in Chapter II provides a comprehensive look at the worker shortage and employment opportunities that are and will be available to people with a background in the skilled trades area of machining. People such as Machinists and Tool & Die Makers occupy this skilled trade area. The information gathered in Chapter II points to a need to create an awareness and appreciation of the type of work activities that go into being part of this skilled trade profession. Projections done for this trade area by government and professional organizations and employers verified not only the impending need for skilled workers in this

area, but also the present lack of qualified workers available to occupy this area. With all the information available on this subject regarding this skilled worker shortage, it would appear that the general public would also know of these opportunities and it would then ultimately be reflected by increased enrollment in the colleges' program areas of machining. This has not been the case.

The survey questions that addressed this level of awareness were included within Research Question # 3: survey question two (2); survey question eight (8); survey question twelve (12); and survey question (13). Research survey question twelve (12) asked the students if they were aware of the job opportunities available to graduates from the Machine Tool Operation / Tool & Die Making program at WCTC. A total of 79% of respondents agreed that they were aware of the job opportunities available to graduates in this area. When the same students were asked in survey question thirteen (13) if they felt more people would enroll in these two program areas at WCTC if they knew about the job opportunities available to graduates, 84% responded affirmatively. Borchart's research confirmed that students' awareness of opportunity post high school (including earning potential and area employment opportunities) did have an impact on career choice. However, their individual "personality" was a greater impact in career selection. When, how much, and what information students gathered concerning career choice was important (2002). These two survey questions received two of the highest averages at 4.16 and 4.26 respectively. The question now is where did and where should that information come from.

Survey questions two (2) and eight (8) attempted to uncover the origins of students' information on career opportunities. When asked in survey question two (2) if a technology education instructor from their high school informed them of career opportunities available in

machining, 42% responded that they had been informed, but 37% felt that they had not been informed about these opportunities. The data collected from students regarding their high school experience and knowing of these available job opportunities in machining, is not significantly reflected by the survey responses. It is almost an even split with regards to the students belief that their high school instructor had made them aware of these opportunities in machining. Survey question eight (8) attempted to draw a link between a promotional visit by an instructor and impact on an enrollment decision. It is common protocol during these visits that instructors provide both employment opportunities and earning potential as a selling feature of a career in Machine Tool Operation or Tool & Die Making. The response to this survey question showed relatively little agreement at 10.6% which would indicate either little impact of the material provided by the instructor during a visit or the possibility that the respondent did not experience a visit. This series of survey questions had the highest overall composite level of agreement at 54%. So while it is clearly evident that information concerning available opportunities is critical, it is unclear as to where respondents gained this information from.

Chapter II also discussed the impact that people and events can have on a student's decision in making career choices for their post-high school education. Borchart and Garringer both uncovered from their surveys that there was little to no significance between career choice and the influence of others (2002) (2004). The results from the survey questions under Research Question # 2 concurred with this finding. Research Question #2 sought to solicit the information regarding whether a person or event influenced a student's decision for choosing to enroll into the Machine Tool Operation / Tool & Die Making programs at WCTC. Survey question four (4) along with survey question five (5) asked if a high school guidance counselor or a technical education instructor had a direct influence on their decision to enroll into these two program

areas. Survey questions six (6) and seven (7) asked if a family member or friend influenced their decision to enroll. Survey question ten (10) collected data on the possible influence media ads played on students' decision to enroll. When reviewing the individual survey responses, only question six (6) had a greater agreement response than disagreement. These results confirmed what Borchart and Garringer found concerning the impact of others in career decisions.

However, while the survey results do not indicate that an outside influence affected a students' decision, question eleven (11) confirms a high level of support that the students felt they received from family and friends once they decided to enroll into the Machine Tool Operation / Tool & Die Making programs at WCTC. One could make the case that while family and friends did not influence students, they do play a big role in supporting the student's ongoing development and their selection of the Machine Tool Operation and Tool & Die Making as a career area.

The final area for review in this study was the affect of a high school student's educational experience on their decision to enroll in the Machine Tool Operation or Tool & Die Making diploma programs. Garringer found that participation in technology courses did positively influence students toward a career in the technical or vocational area (2004). The composite and individual results from those survey questions contained in Research Question #1 do not support Garringer's results. The results found there to be minimal significance that the survey respondent's high school education experience was a major contributor in provoking their interest to enroll into these program areas as compared to the other research question results. A field trip to WCTC also was not an indicator of an influencer to choose either the Machine Tool Operation or Tool & Die Making programs.

In reviewing the survey data collected that created the composite percentages, Research Question #3 received the highest level of agreement supporting the notion that both Garringer

and Borchert uncovered concerning the importance of self-awareness of opportunities. Given the data available not only concerning worker shortage and employment opportunity this provides WCTC with a great marketing opportunity.

Conclusions

Results of the survey indicate that employment opportunities seem to have had the greatest impact on a student's decision for their selection of the Machine Tool Operation / Tool & Die Making programs at WCTC. Exposure to or participation in technical education courses in high school did not appear to create a significant amount of influence on the students decision for choosing to enroll into these two program areas at WCTC.

A high percentage of survey respondents indicated receiving support from family and friends for their decision in selecting to enroll in these two program areas. The highest level of agreement (84%) of all survey questions was reached for number thirteen (13) that asked if enrollment would increase in these program areas if more people knew of the available job opportunities. This awareness of job opportunities seems to be the strongest common factor in determining the student's decision for selecting these program areas.

The implications of these findings are that a person's awareness of job opportunities appears to have significant influence on their decision in selecting a career within this area of machining. The results of the survey indicate a potential for increased enrollment at WCTC in these program areas if WCTC could develop strategies to increase awareness to the general public (with a focus on potential students) of employment opportunities specific to these diploma program areas.

Recommendations

The students that have found their way to WCTC into these two program areas have

some how arrived in spite of an apparent lack of early information regarding this profession. To further this area of study, consideration should be given to an expanded survey tool which might solicit a more detailed response from survey participants in the form of more essay types of answers regarding specific questions as to why they chose to enroll into these program areas. In addition, given Borchart's strong correlation between technical education in high school and consideration for attendance in technical classes in a post-secondary environment (58% agreement), a study that included more questions concerning availability of technical courses and their level of involvement might be of value. Also, it would be useful to determine how technical education courses at the high school level are being offered. Are the tech-ed courses hands-on, or have they evolved into more theory based type exploratory offerings? If we are to determine the best place to provide information about current opportunities in this field, one would need to know where students are getting their information today.

As the literature review pointed out, employers in the future will have a very difficult time attracting and retaining many types of workers across the skilled trade areas. Future research on this topic might want to look at what professional organizations involved in the machining trades are doing to increase awareness of employment opportunities.

As a college, WCTC might want to conduct personal interviews with students who are already enrolled in these program areas to find out what was the stimulating factor that caused them to enroll at WCTC? The information obtained by these interviews could possibly provide WCTC with insight as to how people are influenced in their decision for career selection. This information could then be utilized to form various recruitment strategies not only in the machining area at the WCTC, but also across many other program areas. A quick snapshot

of this research study, points to the students' awareness of job opportunities as being a significant catalyst for their decision in selecting these two program areas to enroll in.

This study has provided some insight as to the factors that contributed to a student's selection of the Machine Tool Operation or Tool & Die Making programs at WCTC. With the need for skilled employees at a national and local level steadily increasing, it would serve the best interests of the profession, WCTC, and our nation to look into new ways of disseminating information that could help match up potential students to numerous available job opportunities.

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Appendix A: Survey Instrument

1st year Students enrolled in Machine Tool Operation (MTO) / Tool & Die Making at WCTC

Directions: Review the ratings scale and carefully read each statement. *CIRCLE* the number that best describes your individual point of view after each statement.

	5 = Strongly Agree	4 = Agree	3 = Neutral	2 = Disagree	1 = Strongly Disagree			
				SA	A	N	D	SD
1. Technology education courses I took in high school influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
2. My technology education instructor from high school informed me of career opportunities available in machining beyond high school.	5	4	3	2	1			1
3. My high school offered a wide range of technology education courses as electives.	5	4	3	2	1			1
4. A high school guidance counselor influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
5. A technology education instructor from high school influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
6. A family member influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
7. A friend influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
8. A promotional visit by a WCTC instructor influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
9. Coming to WCTC as part of a high school field trip influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
10. Radio and/or TV ads about WCTC influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
11. My family and friends were supportive of my decision to enroll in the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
12. I was aware of the job opportunities available to graduates from the MTO / Tool & Die Making program at WCTC.	5	4	3	2	1			1
13. I feel more students would select the MTO / Tool & Die Making program at WCTC if they knew about the job opportunities available to graduates.	5	4	3	2	1			1

End of Survey

Appendix B: Mean and Number of Respondents / Response Statement

Number of Respondents: 19 of 21 – 90.5% Participation

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree

	Mean	SA = 5	A = 4	N = 3	D = 2	SD = 1
1. Technology education courses I took in high school influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	3.16	6	1	5	4	3
2. My technology education instructor from high school informed me of career opportunities available in machining beyond high school.	3.05	4	4	4	3	4
3. My high school offered a wide range of technology education courses as electives.	2.79	3	4	2	6	4
4. A high school guidance counselor influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	1.95	0	2	4	4	9
5. A technology education instructor from high school influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	2.37	1	4	3	4	7
6. A family member influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	3.11	3	5	5	3	3
7. A friend influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	2.95	2	6	3	5	3
8. A promotional visit by a WCTC instructor influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	2.05	1	1	4	5	8
9. Coming to WCTC as part of a high school field trip influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	2.00	1	1	2	8	7
10. Radio and/or TV ads about WCTC influenced my decision to enroll in the MTO / Tool & Die Making program at WCTC.	2.11	0	3	2	8	6
11. My family and friends were supportive of my decision to enroll in the MTO / Tool & Die Making program at WCTC.	4.42	12	4	2	1	0
12. I was aware of the job opportunities available to graduates from the MTO / Tool & Die Making program at WCTC.	4.16	9	6	2	2	0
13. I feel more students would select the MTO / Tool & Die Making program at WCTC if they knew about the job opportunities available to graduates.	4.26	9	7	2	1	0