8-1997

Registration of Apprenticeship Programs and the Turnover of Skilled Trade Employees

Dennis J. Bona
Western Michigan University

Follow this and additional works at: http://scholarworks.wmich.edu/dissertations

Part of the Management Sciences and Quantitative Methods Commons, Strategic Management Policy Commons, and the Training and Development Commons

Recommended Citation
Bona, Dennis J., "Registration of Apprenticeship Programs and the Turnover of Skilled Trade Employees" (1997). Dissertations. 1648.
http://scholarworks.wmich.edu/dissertations/1648

This Dissertation-Open Access is brought to you for free and open access by the Graduate College at ScholarWorks at WMU. It has been accepted for inclusion in Dissertations by an authorized administrator of ScholarWorks at WMU. For more information, please contact maira.bundza@wmich.edu.
REGISTRATION OF APPRENTICESHIP PROGRAMS AND
THE TURNOVER OF SKILLED TRADE EMPLOYEES

by

Dennis J. Bona

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Education
Department of Educational Leadership

Western Michigan University
Kalamazoo, Michigan
August 1997
REGISTRATION OF APPRENTICESHIP PROGRAMS AND THE TURNOVER OF SKILLED TRADE EMPLOYEES

Dennis J. Bona, Ed.D.
Western Michigan University, 1997

The primary purpose of the study is to provide empirical evidence that refutes arguments made by employers who resist registering an apprenticeship program because they believe it will increase turnover of their skilled trade employees. To do this, data were collected to test the hypothesis that companies that have a registered apprenticeship program experience less turnover of their skilled trade employees compared to companies that do not. Secondary hypotheses were also developed to compare turnover ratios with union orientation, size, and wage structure of employers to help validate the results and demonstrate alternative explanations for turnover of skilled trade employees. The hope is that with this information, apprenticeship practitioners will be able to influence employers to register an apprenticeship program.

A state-wide survey was conducted and 188 companies (55%) responded from a randomly selected sample of 340 companies or 11% of the manufacturing firms in Michigan that currently provide training for their skilled trade employees. This stratified sample represented 8,731 skilled trade employees from small (52%), medium (33%), large (15%), union (28%), and nonunion (72%) companies. There were 100 companies that had registered apprenticeship programs and 88 that did not. The demographics of the sample did reflect the approximate characteristics of the whole population.
No conclusions could be drawn about the primary hypothesis that companies that have registered apprenticeship programs experience less turnover than companies that do not have a registered apprenticeship program. Similarly, tests comparing wage structure with skilled trade employee turnover were inconclusive as well. Two of the secondary hypotheses were supported, however, indicating that both the size of the employer and union orientation are related to skilled trade employee turnover.

This study provided no evidence that registering an apprenticeship program has any influence on the turnover of skilled trade employees, which may be considered a supportive statement with respect to the primary purpose of this study.
INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700 800/521-0600

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
For Diane, Leisa, and Greg

Without their tolerance, support, and encouragement,

this would have been only a study that should have been done.
# TABLE OF CONTENTS

**LIST OF TABLES** ................................................................. iv  
**LIST OF FIGURES** ............................................................... v  

**CHAPTER**  
I. PURPOSE OF THE STUDY .................................................... 1  
II. REVIEW OF SUPPORTIVE LITERATURE ................................. 6  
   Apprenticeship ................................................................. 6  
   Turnover ............................................................................. 9  
   Consequences ..................................................................... 10  
   Causes .............................................................................. 12  
   Training and Employee Turnover ........................................... 14  
   Federal and State Apprenticeship Initiatives ......................... 16  
   School-to-Work ................................................................. 16  
   Tech Prep ........................................................................... 18  
   School to Registered Apprenticeship ..................................... 19  
   Summary of Supportive Literature ....................................... 19  
III. METHODOLOGY ................................................................. 21  
   Population .......................................................................... 21  
   Instrumentation ................................................................... 22  
   Data Collection .................................................................... 24  
   Hypotheses and Analysis of Results ...................................... 26
# Table of Contents—Continued

## CHAPTER

### IV. ANALYSIS OF RESULTS ................................................................. 29
- Population ......................................................................................... 29
- Hypothesis Testing ............................................................................ 32
  - Hypothesis 1: Apprenticeship and Turnover Ratio ...................... 32
  - Hypothesis 2: Secondary Variables Versus Apprenticeship and Turnover Ratio ............................................................... 33
  - Hypothesis 3: Secondary Variables and Turnover Ratio ............ 33
- Nonrespondents ................................................................................ 37

### V. CONCLUSIONS ................................................................. 40
- Hypothesis Testing ............................................................................ 40
- Recommendations for Further Study ............................................. 43
- Summary ........................................................................................... 44

## APPENDICES

A. Apprenticeship/Turnover Survey .................................................. 46
B. Letter to Community College Contact ......................................... 49
C. Directions for CC Contact .............................................................. 51
D. Survey Cover Letter ....................................................................... 53
E. Human Subjects Institutional Review Board Approval .................. 55
F. Progress Update to CC Contact ..................................................... 57
G. Results of Survey Returns .............................................................. 59

## BIBLIOGRAPHY ................................................................. 62
LIST OF TABLES

1. Negative Consequences of Employee Turnover ............................................ II
2. Work and Nonwork Variables That Affect Turnover ................................. 14
3. Distribution of Sample With Respect to Registration Status and Union Orientation ....................................................... 30
4. Distribution of Sample With Respect to Employer Size and Registration Status ............................................................................................ 31
5. Composite Statistics Sorted by Registration Status, Union Orientation, and Size of Employer .............................................................. 31
6. Turnover Ratio x Registration Status ......................................................... 32
7. Turnover Ratio x Registration Status and Employer Size .......................... 34
8. Turnover Ratio x Registration Status and Union Orientation ................... 34
9. Turnover Ratio x Registration Status and Wage Structure ....................... 35
10. Turnover Ratio x Employer Size and Union Orientation ........................... 36
11. Comparison of Turnover Ratio by Registration Status and Region .......... 38
12. Nonrespondents’ Responses to Question #1 ........................................... 39
LIST OF FIGURES

1. Data Collection Chart .................................................. 26
CHAPTER I

PURPOSE OF THE STUDY

In spite of recent efforts by both federal and state government to encourage business and industry to use apprenticeship as the primary system for training their skilled trade workforce (Federal Committee on Apprenticeship, 1992), employers continue to resist registering their apprenticeship programs with the U.S. Department of Labor—Bureau of Apprenticeship and Training (B.A.T.). According to Michigan B.A.T. field representatives and apprenticeship coordinators from Michigan community colleges, the reason most often cited for their resistance is the perception that by registering their program, employers will be awarding their skilled trade employees a "passport" for new employment. The passport they are referring to is actually an Apprenticeship Completion Certificate, commonly referred to by labor unions as a Journeyman's Card. To put it another way, employers believe that participation in a registered apprenticeship program has a negative effect on the turnover of their skilled trade employees.

The purpose of this study is to determine the effect registered apprenticeship programs have on skilled trade employee turnover. In other words, an attempt was made to answer the question: Do companies that have registered apprenticeship programs have a higher turnover of skilled trade employees when compared to companies that do not have a registered apprenticeship program? The Department of Labor—Bureau of Apprenticeship and Training has maintained that the answer to that question is "no" but has not produced recent empirical evidence to substantiate
its claim. It is this contention that leads to the following conceptual hypothesis: Companies that have registered apprenticeship programs have less turnover of skilled trade employees compared to companies that do not have registered apprenticeship programs.

To measure this relationship, skilled trade employee turnover was compared between employers that have a registered apprenticeship program and those that do not. Additional variables, including geographical location, size of the employer, and union orientation were also recorded for the purpose of stratifying the results. If supported, results of this study would directly contradict the rationale used by employers to avoid registering an apprenticeship program. It may also lead, however, to the logical follow-up question: Are there other factors related to apprenticeship that affect the relationship between apprenticeship and skilled trade employee turnover?

To answer this question and to further substantiated the results of the study, testing was also done to determine if the nature of the relationship between skilled trade employee turnover and apprenticeship is affected by the size of the employer, wage structure, or union orientation. If these secondary variables are found to have no influence on that relationship, the likelihood of that relationship being accurate is increased. This strengthens the study, supporting the primary purpose of determining what the relationship between apprenticeship and skilled trade employee turnover is.

Another rationale for conducting additional testing of these secondary variables is to demonstrate that the methodology was sensitive and discriminating enough to determine if a relationship between skilled trade employee turnover and any variable could exist. This was accomplished by comparing the secondary variables directly with skilled trade employee turnover. Results that indicate a strong
relationship strengthen the study by providing the possibility of alternative explanations for skilled trade employee turnover other than apprenticeship.

The study focuses on, and inferences are limited to, the skilled trade occupations found common to manufacturing in Michigan. Manufacturing was selected primarily due to the stability of the companies involved, the established skilled trades classifications, and their accessibility for data collection. The skilled trade occupations being studied include any classifications that represent employees whose responsibilities typically include the troubleshooting, maintenance, repair, or fabrication of machinery and/or the physical plant operation of a manufacturing facility. These classifications are recognized by the Department of Labor as apprenticeable occupations.

It simply is not within the scope of this study to include the skilled trades utilized in the construction industry, although logic suggests that conclusions could be inferred with some degree of accuracy to that population. It is also true that even though the study is limited to Michigan, an argument could be made that Michigan is representative of most states that have a large manufacturing economic base, particularly when compared with other states in the industrial belt of the Midwest.

The results of the study may help answer an age-old problem for employers: If they invest money and time training employees, what guarantee do the employers have that the employee will continue to work for them? Answering this question is relevant to employers because if they do not invest in training employees, they will likely decrease their ability to compete in the global marketplace. Apprenticeship programs are particularly susceptible to this “return on investment” issue because of how critical the potentially negative impact a high turnover of skilled trade employees has to a company’s success.
This is particularly true in contemporary manufacturing, which has not only experienced a substantial amount of growth in small and midsized companies over the past decade, but there has been a dramatic increase in the prevalence of sophisticated automation that requires the increased utilization of skilled trade workers (Dole, 1989). The problem is further compounded by the growing shortage of skilled trade workers. This is occurring for two reasons. First, employers are currently struggling to replace an aging skilled trade workforce which is experiencing a dramatic increase in retirements. Most demographic projections indicate this problem will get worse before it gets better (U.S. Department of Labor, 1986). Second, fewer young people are graduating from school with the skills as well as the desire needed to learn a skilled trade.

The government and education communities have a stake in the results of the study as well, because they are both touting apprenticeship as being the premier system for training the workforce of the future. Reasons for this renewed emphasis of apprenticeship include the general recognition that apprenticeship is educationally sound due to the mix of supervised on-the-job training, combined with related trade instruction or applied educational theory. The classroom instruction is usually provided by a local community college, utilizing curriculums that are typically designed by program advisory committees whose membership consists of representation from the employers themselves.

Another significant part of federal and state government rationale includes transferring much of the financial burden of providing occupational education from the general public to the employers (Federal Committee on Apprenticeship, 1992). This benefit occurs in apprenticeship due to the employers' sponsorship of the extremely cost-intensive technical training, often occurring on site, with state-of-the-
art equipment and technology. The cost savings are also magnified because apprentices are paid a wage while learning their trade, enabling them to contribute to the local economy as well as pay taxes.

Finally, another enhancement of apprenticeship is that employers train people only for jobs that really exist, contrasted with education, which has a history of graduating students from programs that may not lead to related employment (Cantor, 1995). Typical occupational curriculums are created based on enrollment trends and job placement projection models, neither of which are recognized as 100% reliable for being accurate predictors of the employment of graduates. This inefficiency in the education system has led to wasted time and resources for all involved.

For these reasons, the Michigan Department of Education—Community College Service Unit, Michigan Educators Apprenticeship and Training Association, Michigan Apprenticeship Steering Committee, Inc., and the United Auto Workers—Skilled Trades Division have each provided financial support for the study. In addition, the U.S. Department of Labor—Bureau of Apprenticeship and Training, Michigan Jobs Commission, and the State Department of Education—Career and Technical Education Division have all provided letters of endorsement for the study. Again, if the results of the study provide enough supportive data to substantiate the conceptual hypothesis, that apprenticeship does not result in an increase of skilled trade employee turnover, then apprenticeship practitioners and proponents will be armed with valuable and convincing information to provide employers. Hopefully, this new information will influence employers to reconsider their choice to resist participating in apprenticeship and ultimately result in an increase of registered apprenticeship programs.
CHAPTER II

REVIEW OF SUPPORTIVE LITERATURE

This chapter presents a review of current literature that supports the rationale for examining the relationship between registered apprenticeship programs and skilled trade employee turnover. The chapter is divided into four sections: (1) apprenticeship, (2) turnover, (3) training and turnover, and (4) federal and state apprenticeship initiatives. A summary of the review is also included at the end of the chapter.

Apprenticeship

Apprenticeship may be defined as a structured relationship between an employer and an employee during which the worker, or apprentice, learns a skilled trade. The apprenticeship process lasts a specific length of time and covers all aspects of the trade, including both on-the-job training and related trade instruction. Most skilled trade apprenticeships last about 4 years or 8,000 hours but range from 1 to 6 years. During this time, apprentices receive their on-the-job training while working under experienced workers called journeymen—the status they will attain after successfully completing their apprenticeship.

In Michigan and primarily in the manufacturing sector, related instruction generally takes place in a classroom or instructional laboratory at a community college. Teachers provide instruction in techniques of the skilled trade as well as the theory behind the techniques. Classes are usually scheduled from 4 to 6 hours a week.
and can take place during the day or evening, on or off shift, and the apprentice must attend a minimum of 144 hours per year for the duration of the apprenticeship. It is not uncommon, however, in present-day apprenticeship programs for the related trade instruction to require upwards of 200 hours per year. This is a direct result of the dramatic increase in the use of technology in virtually all of the skilled trades.

The sponsor of the apprenticeship program plans, administers, and pays for the program. Sponsors can be employers or employer associations and sometimes involve organized labor. Apprentices are considered employees and are generally entitled to all benefits and conditions of employment that regular employees have, with the exception that their pay usually starts out about half that of a journeyman.

When an apprentice is accepted into a program, he or she and the sponsor sign an apprenticeship agreement. The apprentice agrees to perform the work faithfully and complete the related study, and the sponsor agrees to make every effort to keep the apprentice employed and to comply with the standards established for the program. The National Apprenticeship Act of 1937 (the Fitzgerald Act) authorizes the Secretary of Labor to work with the state apprenticeship agencies, the Department of Education, and the representatives of labor and management to protect the welfare of apprentices.

Apprenticeship programs are commonly registered with the federal government or a federally approved state apprenticeship agency. Currently, there are 27 states, the District of Columbia, Puerto Rico, and the Virgin Islands that have State Apprenticeship Committees. These states are commonly referred to as S.A.C. states. In all other states, the U.S. Department of Labor’s Bureau of Apprenticeship and Training, or B.A.T., oversees the apprenticeship functions. Michigan is a B.A.T. state.
Registered apprenticeship programs must comply with standards related to job duties, related instruction, wages, and safety and health conditions. Apprentices who complete a registered program in Michigan receive a certificate of completion from the U.S. Department of Labor—B.A.T. Registered programs offer apprenticeships in over 830 occupations, of which the most common are the skilled trades found in the manufacturing and construction industries.

Apprenticeships have proven to be more than a training tool. They are a mechanism for potentially bringing together, in a planned and cohesive manner, the human and capital resources to solve business and education training needs. They are a cost-effective mechanism for employers, organized labor, and government to provide worker training cooperatively with community colleges (Cantor, 1995).

Industrial education leaders have argued the need for apprenticeship education. Weinrich and Weinrich (1974) believe that all quality technical and vocational education programs should include an on-the-job component. According to them, apprenticeship can be an especially effective method for training persons for highly skilled jobs in manufacturing and construction. Silvus and Curry (1971) recognize apprenticeship education as a form of industrial education “for providing people with manipulative skills and technical or theoretical knowledge needed for competent performance in skilled occupations” (p. 588).

In addition to the obvious necessity for the nation to maintain a large number of technically skilled persons at any given time, there are also many global but important benefits. Sutliff (1995) states that an apprenticeship program that is well planned and implemented may have the benefits of (a) improving employer/employee relations; (b) improving employer/community relations; (c) reducing employee turnover and absenteeism; (d) helping assure the availability of classroom-related
technical instruction; (e) increasing general productivity; (f) helping to attract qualified persons; (g) facilitating compliance of federal and state labor regulations; (h) significantly lowering the cost of training persons for technical jobs; (i) causing skilled workers, through classroom instruction, to be more sensitive to other people's values; (j) causing skilled workers to appreciate and better understand company goals and objectives that relate to the overall operation and organization; and (k) creating a versatile, flexible, and ready workforce that can think critically and be better able to solve problems.

Finally, in a report by *Occupational Outlook Quarterly* ("Apprenticeship," 1991/92), a study was conducted with a population from half a dozen cities across the United States. It concluded that formal apprenticeship trained persons were steadier workers; more likely to be supervisors; better skilled; and more productive, responsible, safe workers. Also, employees trained by formal apprenticeship experienced less unemployment than workers trained by less formal means.

**Turnover**

Mobley (1982) defines employee turnover as "the cessation of membership in an organization by an individual who received monetary compensation from the organization" (p. 4). The cessation or separation from an organization, for the purpose of this paper, is not to be confused with accession due to layoff, termination, internal promotion or transfer, retirement or any other voluntary reason other than to pursue alternative employment in the same occupation. Employee turnover—people leaving organizations—is a major organizational phenomenon. In recognition of this fact, turnover is included in many definitions of organizational effectiveness (Steers & Mowday, 1991).
To study and make comparisons with respect to skilled trade employee turnover, it is necessary to measure it so that it may be quantified. Turnover rates are generally expressed as a percentage over a specific period of time. As with any percentage, turnover rates are a function of the numerator (number of employees that separate over a specific time period), divided by the denominator (total number of employees in the unit being studied). It is imperative that care be taken to exclude employee separations that are not related to the issue being researched, such as retirements, internal transfers, or terminations.

Consequences

Consequences of high turnover are not all negative as one might presume; there are occasions when turnover has positive organizational implications (Staw, 1980). This study, however, is based on the premise that employers that do not register apprenticeship programs partly because of the fear of increasing skilled trade turnover; thus, it is more important that focus be given to the negative consequences of turnover. Table 1 is a modification of a table developed by Mobley (1982) that provides a simple and somewhat graphic picture of the many possible negative consequences of employee turnover.

The local community and even society has the potential for paying the cost of high turnover as well. The general increased costs of production may ultimately lead to higher prices, which in turn can lead to inflation or even recession. Additionally, economic development efforts may not be able to keep or attract industry when attempting to promote a workforce that is characterized as having a history of high turnover.
<table>
<thead>
<tr>
<th>Organization</th>
<th>Individual (Leavers)</th>
<th>Individual (Stayers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (recruiting, hiring, assimilation, training)</td>
<td>Loss of seniority and related prerequisites</td>
<td>Disruption of social and communication patterns</td>
</tr>
<tr>
<td>Replacement costs</td>
<td>Loss of nonvested benefits</td>
<td>Loss of functionally valued coworkers</td>
</tr>
<tr>
<td>Out-processing costs</td>
<td>Disruption of family and social support systems</td>
<td>Decreased satisfaction</td>
</tr>
<tr>
<td>Disruption of social and communication structures</td>
<td>“Grass is greener” phenomenon and subsequent disillusionment</td>
<td>Increased workload during and immediately after search for replacement</td>
</tr>
<tr>
<td>Productivity loss during replacement search and retraining</td>
<td>Inflation related costs (e.g., mortgage costs)</td>
<td>Decreased cohesion</td>
</tr>
<tr>
<td>Loss of high performers</td>
<td>Transition related stress</td>
<td>Decreased commitment</td>
</tr>
<tr>
<td>Decreased satisfaction among stayers</td>
<td>Disruption of spouse’s career path</td>
<td></td>
</tr>
<tr>
<td>Stimulate “undifferentiated turnover control strategies”</td>
<td></td>
<td>Career path regression</td>
</tr>
<tr>
<td>Strategic opportunity costs (postponement of profitable ventures)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Mobley, 1982
It is also important to note for the purpose of this study that the high cost of turnover identified above is magnified for skilled trade employees due to the lengthy training period, high cost of training, and shortage of skilled workers. Another consideration, and perhaps the most costly of all, is the crippling effect that machinery downtime has on production—an imminent consequence of inexperienced skilled trade employees on the job.

Causes

The causes of employee turnover have been studied from many different perspectives. The value of analyzing potential causes of turnover for this study is to demonstrate the large number of possibilities, in addition to apprenticeship, that merit consideration by an employer before determining specific cause. To perhaps oversimplify this very complex issue, causation of turnover can be divided into four basic categories: the external economy, organizational variables, individual work variables, and individual nonwork variables.

March and Simon (1958) suggest that “under nearly all conditions, the most accurate single predictor of labor turnover is the state of the economy” (p. 126) as indexed by the availability of jobs. The U.S. Department of Labor produced a study in 1980 that supported this statement by proving a high negative correlation over a 10-year period between the unemployment rate and the quit rate of employees. Whenever unemployment goes up, the turnover rate goes down. Other factors related to the economy that have been shown to affect turnover are (a) the demographic mix (age) of the labor force—the fewer young employees, the higher the turnover due to competition for their services; and (b) indirectly, inflation, which appears to cause a decrease in turnover.
In a detailed analysis of manufacturing quit rates, Armknecht and Early (1972) found that the most important factor determining inter-industry variations in voluntary separations is the relative level of earnings. Turnover is highest in low-paying industries. Other studies have reached similar conclusions about the aggregate level relationship between pay levels and turnover rates (Blau, 1973, and Fry, 1973, as cited in Price, 1977). Additional organizational factors that have been shown to affect employee turnover to a lesser degree include: (a) occupational categories—higher turnover occurs in blue collar, lower skills, and nonmanagerial jobs; (b) work-unit size—smaller groups experience lower turnover; (c) job content—higher repetitiveness and routine equates to higher turnover; and (d) supervisory style—higher turnover occurs under authoritative and inconsiderate supervision. There have been no conclusive studies that determined a relationship between size of the employer and the type (product) of industry.

To illustrate individual work and nonwork variables that potentially affect turnover, Table 2 may be helpful because of the large number of variables. Again, this table is a modification of the work done by Mobley (1982). The specific issue of the relationship between training and turnover has been omitted for more in-depth discussion in the next section.

To summarize, employee turnover should be an extremely important issue for employers, given the high number of potentially serious consequences to the organization. It is also apparent that there are no simple solutions to employee turnover due to the many possible causes of the phenomenon. In all probability, to blame any one factor would be inaccurate and could certainly lead to misguided and inappropriate solutions.
### Table 2

**Work and Nonwork Variables That Affect Turnover**

<table>
<thead>
<tr>
<th>High Correlation</th>
<th>Moderate Correlation</th>
<th>Inconclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age *</td>
<td>Source of referral (informal) *</td>
<td>Personality</td>
</tr>
<tr>
<td>Tenure *</td>
<td>Family responsibilities *</td>
<td>Sex</td>
</tr>
<tr>
<td>Satisfaction with job *</td>
<td>Vocational interest matches job*</td>
<td>Education</td>
</tr>
<tr>
<td>Overall satisfaction *</td>
<td>Aptitude and ability *</td>
<td>Stress</td>
</tr>
<tr>
<td>Behavioral intentions to quit</td>
<td>Satisfaction—pay, promotions, coworkers, supervisor, conditions of work *</td>
<td>Professionalism</td>
</tr>
<tr>
<td>Organizational commitment *</td>
<td>Expectancy of finding an alternative job</td>
<td>Absenteeism</td>
</tr>
</tbody>
</table>

* Negative correlations

Source: Mobley, 1982

**Training and Employee Turnover**

After extensive research of the literature, it is apparent that there have been no published studies in the past century that have actually produced empirical evidence that supports any relationship between apprenticeship and skilled trade employee turnover. There have, however, been numerous studies that attempt to show a relationship between training and employee turnover. Since a major component of apprenticeship is training, and skilled trade employees certainly fall...
within the broader category of employees, it is logical to reason that there would be
value in examining what the literature has to say about the relationship between
training and turnover. An argument can be made that suggests the relationship
between training and employee turnover would parallel the relationship between
apprenticeship and turnover.

In an article in *Training* magazine (1993), Marc Hequet cites numerous
examples of how companies have attempted to reduce turnover by implementing
some type of training program. In most of the cases, turnover was indeed lowered,
but there were always additional variables that affected the outcome. It was
impossible to isolate training as the only variable; therefore, little evidence was
available to support the training as the primary cause or solution to high turnover.
Elias and Peter (1994) produced a study that looked at training and turnover in the
United Kingdom and concluded that training does not help to reduce turnover.
Contradicting research, however, has also been produced. Studies by Schettkat
(1993) and King (1991) each suggest that formalized training programs do have a
positive effect on reducing turnover.

In consideration of the seemingly overwhelming supply of conflicting
evidence with respect to the relationship between training and turnover, perhaps
Mobley (1982) summarized it best by stating that "No single policy, practice, or
procedure will be sufficient. Effective management of turnover requires examination
of the entire human resource management process, including recruitment, selection,
early socialization, job design, compensation, supervision, career planning, working
conditions and schedules" (p. 185).

His statement is particularly germane to the rationale for this study as
apprenticeship incorporates virtually all of the processes described above. If his
assumptions are accurate, then it stands to reason that apprenticeship programs should in fact have a positive effect on skilled trade employee turnover.

Federal and State Apprenticeship Initiatives

In the first chapter, one of the reasons cited as important for conducting this study was that the federal government was interested in promoting apprenticeship as a preferred delivery system for occupational education. In this section, two of the major initiatives will be defined to further illustrate the importance of the results by emphasizing the potential benefits of increasing employer participation in registered apprenticeship programs.

School-to-Work

School-to-Work programs assist students in making the transition from school to a good first job or a high-skill, high-wage career and increase their opportunities for further education. The coordination, expansion, and refinement of these programs result in a School-to-Work system. This initiative builds on the work of several landmark studies on school reform and youth employment, such as Workforce 2000, The Forgotten Half: Pathways to Success for America's Youth and Young Families, and America's Choice: High Skills or Low Wages. A desired attribute of a School-to-Work program is that a local partnership is developed and fostered between secondary and postsecondary educators, employers, workers, parents, organized labor, trade associations, and elected officials. The federal government has provided more than just moral support for this initiative, providing major funding for states to implement funding. The School-to-Work Opportunities Act of 1994 approved federal funding up to $14 billion for states that were approved.
to implement programs. For 1995–96, which was the second year of a 5-year appropriation, Michigan received $49 million to implement a School-to-Work system.

Specific requisites for School-to-Work programs ("Definitions: School-to-Work," 1993) include the following three major components:

1. *Work-based Learning* includes paid and unpaid work experience, a planned program of job training with progressively higher skills, workplace mentoring and instruction in general workplace skills, and instruction in how to work with new technologies.

2. *School-based Learning* includes career exploration and counseling, along with providing students with periodic evaluations to identify their academic strengths and weaknesses. This will allow counselors to plan learning opportunities and strategies to help them master core academic skills.

3. *Connecting Activities* involve bridging the gap between educators, students, and employers to appropriately match employers' work-based learning opportunities with students. This can include teaching employability skills as well as utilizing the "connections" created in the partnership to their fullest potential.

Since apprenticeship programs have all three of these major components already incorporated into a system, they have been identified as one of the preferred vehicles for bringing students into the workforce. The governor's office in the state of Michigan has already gone so far as to introduce legislation to provide a tax credit for employers that participate in a youth apprenticeship. The intent is to encourage employers' participation in registered apprenticeship programs, facilitating the whole School-to-Work effort.
Tech Prep

Tech Prep actually fits under the umbrella of School-to-Work with the major focus being the application of academics as the preferred method of learning (Pedrotti, 1992). The concept is centered around providing an alternative to the "general education track" that as many as 50% of this nation's youth currently follow (Parnell, 1985). With the other 40% either preparing for a college, university, or vocational/technical career, this forgotten half of students ends up with a general high school diploma that essentially prepares them for unemployment.

Tech Prep is a sequence of study beginning in high school and continuing through at least 2 years of postsecondary occupational education. It prepares students for high-skill technical occupations and allows either direct entry into the workplace after high school or continuation of study which leads to an associates degree in a 2-year college (Center for Occupational Research, 1992). If students were able to take an applied academic or Tech Prep program instead of the general track, it is believed that the strategy of teaching skills through application will make learning easier and more relevant, resulting in a higher completion rate, and will prepare students much more adequately for the workforce.

Again, apprenticeship has been recognized as the ultimate method of applying theory because of the immediate transfer of knowledge to the work site and the direct connection to permanent high skill/wage employment (Michigan Department of Education, 1994). For this reason, Tech Prep has provided additional rationale for the government to continue encouraging industry to create more apprenticeship opportunities for young people. Funding has also been provided to support this

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
effort. In 1995–96, Michigan has received $20 million in federal dollars to support Tech Prep programs.

School to Registered Apprenticeship

In February of 1997, the Michigan State Legislature passed legislation that offered a $2,000 tax credit for companies that employed youth as apprentices in a registered apprenticeship program. For the subsequent 3 years, employers can claim 50% of wages and any tuition incurred from related trade instruction for apprentices who are under the age of 19 and have not graduated high school. The intent of this program is to encourage employers to register apprenticeship programs as well as provide youth with meaningful employment that leads to a high-wage career.

To facilitate this program, the Bureau of Apprenticeship and Training, the Michigan Department of Education—Division of Career and Technical Education, and representation from the Michigan community colleges have created a consortium. The purpose of the consortium is to provide information and assistance to employers who wish to participate in the program and also to provide training for secondary level personnel who are given the responsibility of coordinating the first year of the apprenticeship program. If successful, the results of this study will be included as part of the training package as an additional tool used to recruit employers to register an apprenticeship program.

Summary of Supportive Literature

In review of the literature that relates to the rationale for the study, there are four major points that may be highlighted:
1. Registered apprenticeship programs offer a viable and effective means for training skilled trade workers and feature many benefits for employers, workers, and society as well.

2. High employee turnover has the potential for many negative consequences for employers and solutions to this issue are very complex due to the high number of possible causes.

3. Very little research substantiates a relationship between apprenticeship and turnover, and related research conducted on the effects of training and turnover is often contradictory and inconclusive.

4. Both federal and state government have recognized the value of apprenticeship in their current education initiatives and are interested in arguments to help influence more employers to participate in a registered apprenticeship program.
CHAPTER III

METHODOLOGY

This chapter presents the design and methodology used to examine the relationship between registered apprenticeship programs and skilled trade employee turnover. The chapter is divided into four sections: (1) the population and sample to be studied, (2) the instrumentation used to collect the data, (3) the method for collecting data, and (4) the hypotheses and how the results were analyzed.

Population

Data for the study were collected from a representative sampling of manufacturing firms in Michigan. The sample population was limited to companies that have implemented some form of training program for their skilled trade employees and demonstrate diversity with respect to size, product, union orientation, and geographic location. An attempt was also made to ensure that approximately 50% of the companies sampled have a registered apprenticeship program in place. A sample population of 10% of all manufacturing firms in Michigan that match the above criteria were surveyed; this was estimated to result in a total sample of approximately 300 to 350 companies.

The sample population was selected from the company mailing lists of 25 of the 28 community colleges in Michigan. Two of the three community colleges that did not participate do not have active apprenticeship programs and the third reported too low of a volume to be significant in the study. These mailing lists were checked
for the unlikely occurrence of duplicate companies and any such duplications were eliminated from the selection pool. The mailing lists were estimated to generate a total population of approximately 3,000 companies.

Community colleges are an appropriate resource for the mailing lists because they are the primary source for providing the related trade instruction as well as assisting the Federal Bureau of Apprenticeship and Training with the coordination of apprenticeship programs in Michigan. The B.A.T. state director reports that over 12,000 of 14,000 total apprentices in Michigan were enrolled at community colleges in 1996. They also provide instruction and coordination of skilled trade training programs for companies that choose not to register apprenticeship programs. Another advantage of enlisting the cooperation and support of the community colleges is that their company mailing lists are diverse with respect to both demographic as well as geographic representation.

The specific skilled trade classifications that are represented in the survey data include: Industrial Electricians, Instrument Repair Technicians, Machinists, Machine Repairmen, Maintenance Mechanics, Millwrights, Tool and Die Makers, Mold Makers, Pipefitters, Heating/Refrigeration/Air Conditioning Mechanics, Sheet Metal Mechanics, Steamfitters, and Welders.

Instrumentation

A relatively simple, researcher designed, 10-question survey instrument was used (Appendix A). The questions were constructed to request information that is necessary to calculate and record skilled trade employee turnover, company size, product, wage structure, union orientation, and whether they have a registered apprenticeship program. The age of the company and, if applicable, the length of time
their apprenticeship program has been registered was requested for the purpose of possibly delimiting results from employers that do not have enough history to provide meaningful turnover data.

Most questions offered multiple-choice answers, with ranges given as options as opposed to requiring exact data. The few questions requesting short answers were concerned with specific information that should have been readily available to the participant. This format was designed for the convenience of the person filling out the survey, in addition to maximizing the probability that data will have a high degree of internal validity. The survey questions were also validated for appropriateness, prior to the actual pilot of the instrument, by review of the executive board of the Michigan Educators Apprenticeship and Training Association and the Michigan Apprenticeship Steering Committee.

In order to provide consistent interval data for skilled trade employee turnover (the primary dependent variable), a turnover ratio was used. The following standard formula was developed by the researcher because turnover ratios are calculated in a wide variety of methods, which could have resulted in data that were not interval. Care was also taken to avoid asking participants to make any calculations in order to minimize the possibility of error and to ensure that all figures were consistent and could be compared in a meaningful way:

\[
\text{TURNOVER RATIO} = \frac{\text{Total # of skilled trade employees who voluntarily terminated their employment in the past 5 years*}}{\text{Mean of skilled trade positions over past 5 years}}
\]

* excluding retirements, internal transfers, or promotions.
The instrument was piloted with six companies in Battle Creek, Michigan, three of which were part of the final sample population. The purpose of the pilot was to confirm clarity of directions and questions, receptiveness of survey participants, difficulty of providing answers, and usability of responses. It was concluded that no adjustments or modifications were necessary.

Data Collection

An appropriate contact person from each of the community colleges was identified and recruited to assist with the selection of companies to be surveyed as well as the collection of the data itself. It was presumed that their personal relationships with the individual employers would be a valuable asset to the data collection effort, adding credibility and a level of comfort for the participating employers. Once the contact persons were identified, they were sent a letter that requested a mailing list and outlined their specific responsibilities for assisting with the study (Appendix B). Each community college contact person was paid a nominal stipend for his or her effort to facilitate prompt and complete return of the highest percentage of surveys possible.

After the list of potential employer participants was identified, 10% or 10 of the companies from each community college mailing list were randomly selected. The surveys were mailed to the community college contact people with instructions (Appendix C) to co-sign a survey cover letter, then mail it to the Human Resource Manager or the most appropriate representative identified by the community college contact person for each of the selected companies. The brief cover letter that was included with each survey instrument explained the purpose of the survey, who was sponsoring it, and a promise that the results would be shared with them.
(Appendix D). The cover letter also explained that care would be taken so that it would not be possible for any company or individual participant responding to the survey to be identified by anyone other than the researcher. All data, including results, were calculated and are being reported as aggregate information only. This was necessary to protect the respondents from any ensuing scrutiny during or after the survey, as well as to encourage honest and accurate data on the survey instrument. This process was given approval by the Human Subjects Institutional Review Board on October 10, 1996, prior to the mailing of the surveys (Appendix E).

The cover letters and surveys were mailed to the respective community college contact people by November 21, 1996, for their signature and instructions were given to mail the individual surveys out in their college envelopes. Due to the brevity of the survey, a relatively short turnaround time of approximately 3 weeks (December 21) was targeted for return of the survey instrument. Each community college contact person was directed to follow up the mailing with a phone call, and/or a personal visit if necessary, to ensure that the employer received the survey and could have any questions answered.

It soon became apparent that results were not going to pour in; there was a return of only 26% on the original target date, so regular progress updates of survey returns were sent to the community college contact persons. These updates offered encouragement to persist with follow-up efforts as well as an updated list of who had returned surveys. An example of these progress reports is given in Appendix F. It was important to recognize that during this process the community college contact people had to be sensitive to protecting and preserving their working relationship with employers selected for the survey. Human resource managers are extremely
busy people and often do not give high priority to surveys. It was simply not appropriate to badger these important customers for responses.

Hypotheses and Analysis of Results

Once the data were collected, results were coded and input into SPSS (Norusis & SPSS, 1990), a statistical analysis software. The data were organized in the manner presented in Figure 1:

<table>
<thead>
<tr>
<th>Company</th>
<th>Product</th>
<th>Size</th>
<th>Age</th>
<th>Apprent. Status</th>
<th>Age of Apprent.</th>
<th>Mean Wage</th>
<th>Union Status</th>
<th>Mean Seniority</th>
<th>Turnover Ratio</th>
</tr>
</thead>
</table>

Figure 1. Data Collection Chart.

To determine the nature of the relationship between apprenticeship (primary independent variable) and skilled trade employee turnover (dependent variable), the following operational hypothesis was tested.

1. Apprenticeship and Turnover: The mean turnover ratio of skilled trade employees for employers that have registered apprenticeship programs is less than employers who do not have registered apprenticeship programs.

For the purpose of further substantiating the relationship found between apprenticeship and skilled trade employee turnover, tests were conducted to determine whether the nature of the relationship between apprenticeship and skilled trade employee turnover is affected by the size of the employer, union orientation, or wage structure (secondary variables). The following operational hypothesis was used.

2. Secondary Variables Versus Apprenticeship and Turnover: There is an interaction between the size of the employer, union orientation, or wage structure
and the relationship between apprenticeship and the mean turnover ratio of skilled trade employees.

For the purpose of determining whether or not the methodology was sensitive or discriminating enough to detect a relationship between skilled trade employee turnover and any variable, as well as to provide possible alternative explanations for skilled trade employee turnover, the size of the employer, union orientation, and wage structure were compared with skilled trade employee turnover. The nature of their respective relationships was tested by the following operational hypothesis.

3. **Secondary Variables and Turnover:** (a) There is a difference in the mean turnover ratio of skilled trade employees between large, medium, and small employers; (b) There is a difference in the mean turnover ratio of skilled trade employees between employers that have a labor union and those that do not; and (c) There is a negative correlation between the wage structure of an employer and the turnover ratio of its skilled trade employees.

The results of Hypothesis 1 define the nature of the relationship between registering an apprenticeship program and skilled trade employee turnover. This relationship is reinforced or weakened by the results of Hypothesis 2, and Hypothesis 3 is being tested as much for its descriptive value as substantiating the overall effectiveness of the methodology.

The following corresponding null hypotheses and testing procedures were used to determine support for the operational hypotheses.

1. **Registration and Turnover:** The mean turnover ratio of skilled trade employees for companies that have registered apprenticeship programs is equal to the mean turnover ratio of skilled trade employees for companies that do not have
registered apprenticeship programs. A one-way analysis of variance was used to compare the data, and an alpha of .05 was used to determine significance.

2. Secondary Variables Versus Apprenticeship and Turnover: There is no interaction between the size of a company, or union orientation, or wage structure and the relationship between apprenticeship and the mean turnover ratio of skilled trade employees. A two-way analysis of variance was used to test for an interaction, and an alpha of .05 was used to determine significance.

3. Secondary Variables and Turnover: (a) the mean turnover ratio of skilled trade employees for large companies is equal to the mean retention ratio of skilled trade employees for medium and small companies; (b) the mean turnover ratio of skilled trade employees for companies that have a labor union is equal to the mean retention ratio of skilled trade employees for companies that do not have a labor union; for both (a) and (b), a one-way analysis of variance was used to compare the data, and an alpha of .05 was used to determine significance; and (c) the Pearson product-moment coefficient, when comparing the relationship between wage structure used by an employer and the turnover ratio of its skilled trade employees, will be equal to 0. A Pearson product-moment correlation was used to calculate the correlation, and an alpha of .05 was used to determine significance.

Conclusions were drawn from the results of these tests, and a determination was made as to whether there was enough evidence to support the conceptual hypothesis for the study: Companies that have registered apprenticeship programs have less turnover of skilled trade employees compared to companies that do not have registered apprenticeship programs.
CHAPTER IV

ANALYSIS OF RESULTS

Population

Contact persons were identified at 25 of the 28 community colleges in Michigan. Of the three that did not participate in the study, two do not provide coordination for apprenticeship programs and one reported the volume too low to be significant in the study. Each of the contact persons submitted a mailing list of the employers for whom they provide training. These lists included employers that do not have registered apprenticeship programs as well as those that do. The lists combined to generate a total population of 2,934 employers.

A random sample of 10% or 10 businesses, whichever number was greater, was drawn separately from each of the mailing lists. This was done in order to stratify the sample, ensuring that the sample would be representative of all areas of the state. The procedure used for random selection included numbering each of the employers, then selecting numbers using a random number chart (McClave & Dietrich, 1988). This process resulted in a total sample of 346 employers or 11.8% of the total population. A table that identifies each community college, contact person, number of employers on mailing list, number of surveys sent, and number of surveys returned is attached as Appendix G.

There were 188 surveys returned and 6 employers were reported as no longer in business, which, when deducted from the total sample, reduced it to 340. This
resulted in a net return of 55.3% from the total sample. All of the responses were entered into a data base where they were analyzed using SPSS software.

It is important to the validity of the study to show that the distribution of employers selected for the study is consistent with demographic data currently accepted by authorities who collect such data. In other words, does the sample have the same demographic distribution as the total population? Tables 3 and 4 provide specific background data with respect to the employers who participated in the survey. The results were found to be consistent with similar data provided by the Michigan Employment Security Commission (1996) and the U.S. Department of Labor—Bureau of Apprenticeship and Training, Michigan State Directors Office (1996).

Table 5 reflects the number of employers, mean number of skilled trade positions, turnover ratio by employer, and mean wage in $ per/hr, each sorted by registration status, size, and union orientation.

**Table 3**

<table>
<thead>
<tr>
<th></th>
<th>Registered 53.2% (100)</th>
<th>Not Registered 46.8% (88)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union</td>
<td>24% (24)</td>
<td>33% (29)</td>
</tr>
<tr>
<td>Nonunion</td>
<td>76% (76)</td>
<td>67% (59)</td>
</tr>
</tbody>
</table>

*percentages are calculated from the number of returned surveys*
Table 4

Distribution of Sample With Respect to Employer Size and Registration Status

<table>
<thead>
<tr>
<th>Size</th>
<th>Registered</th>
<th>Not Registered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small &lt; 100</td>
<td>54.0% (54)</td>
<td>50.0% (44)</td>
</tr>
<tr>
<td>Medium</td>
<td>30.0% (30)</td>
<td>36.4% (32)</td>
</tr>
<tr>
<td>Large &gt; 500</td>
<td>16.0% (16)</td>
<td>13.6% (12)</td>
</tr>
</tbody>
</table>

* percentages are calculated from the number of returned surveys

Table 5

Composite Statistics Sorted by Registration Status, Union Orientation, and Size of Employer

<table>
<thead>
<tr>
<th>Category</th>
<th># of Employers</th>
<th>Mean # of Skilled Trade Positions</th>
<th>Mean Turnover Ratio x Employer</th>
<th>Mean Wage $ per/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Employers</td>
<td>Mean # of Skilled Trade Positions</td>
<td>Mean Turnover Ratio x Employer</td>
<td>Mean Wage $ per/hr</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>188</td>
<td>46.44</td>
<td>.298</td>
</tr>
<tr>
<td>Registered</td>
<td>100</td>
<td>52.65</td>
<td>.295</td>
<td>16.45</td>
</tr>
<tr>
<td>Not Registered</td>
<td>88</td>
<td>39.38</td>
<td>.301</td>
<td>14.88</td>
</tr>
<tr>
<td>Small &lt;100</td>
<td>98</td>
<td>14.73</td>
<td>.390</td>
<td>15.12</td>
</tr>
<tr>
<td>Medium</td>
<td>62</td>
<td>31.27</td>
<td>.230</td>
<td>15.48</td>
</tr>
<tr>
<td>Large &gt;500</td>
<td>28</td>
<td>191.00</td>
<td>.122</td>
<td>18.25</td>
</tr>
<tr>
<td>Union</td>
<td>53</td>
<td>106.25</td>
<td>.153</td>
<td>17.03</td>
</tr>
<tr>
<td>Nonunion</td>
<td>135</td>
<td>22.85</td>
<td>.356</td>
<td>15.19</td>
</tr>
</tbody>
</table>
Hypothesis Testing

**Hypothesis 1: Apprenticeship and Turnover Ratio**

The conceptual hypothesis is that employers with registered apprenticeship programs have less skilled trade employee turnover than employers who do not; therefore, the corresponding null hypothesis is the mean turnover ratio of skilled trade employees for employers that have registered apprenticeship programs is equal to the mean turnover ratio of skilled trade employees for employers who do not have registered apprenticeship programs.

This hypothesis was tested by comparing means, using a one-way ANOVA, and an alpha of .05 was used to test significance. The probability ($p$) was calculated at .910; therefore, the null hypothesis could not be rejected (see Table 6). This result does not support the conceptual hypothesis that skilled trade employee turnover is less for employers that have registered apprenticeship programs than those who do not have a registered apprenticeship program.

**Table 6**

<table>
<thead>
<tr>
<th>Turnover Ratio $\times$ Registration Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Registered</td>
</tr>
<tr>
<td>Not Registered</td>
</tr>
</tbody>
</table>

alpha = .05
Hypothesis 2: Secondary Variables Versus Apprenticeship and Turnover Ratio

The conceptual hypothesis is that the size of the employer, union orientation, or wage structure affects the nature of the relationship between apprenticeship and skilled trade employee turnover.

The test procedure used was a comparison of means using a two-way ANOVA, and an alpha of .05 was used to test significance. The probability (p) of interaction was calculated at .128 for the employer size, .869 for union orientation, and .079 for wage structure; therefore, the null hypothesis in each case could not be rejected (see Tables 7, 8, and 9). This result could not support the conceptual hypothesis that the size of the employer, union orientation, or wage structure affects the nature of the relationship between skilled trade employee turnover and apprenticeship.

Hypothesis 3: Secondary Variables and Turnover Ratio

The conceptual hypothesis is that (a) there is a difference in the mean turnover ratio of skilled trade employees between large, medium, and small employers; (b) there is a difference in the mean turnover ratio of skilled trade employees between employers that have a labor union and those that do not; and (c) there is a negative correlation between the wage structure of an employer and the turnover ratio of its skilled trade employees.

The test procedure used for Hypothesis 3a was a comparison of means using a one-way ANOVA, and an alpha of .05 was used to test significance. The probability (p) was calculated at .001; therefore, the null hypothesis could be
Table 7

Turnover Ratio × Registration Status and Employer Size

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean Turnover Ratio for Small Employers</th>
<th>SD</th>
<th>n</th>
<th>Mean Turnover Ratio for Medium Employers</th>
<th>SD</th>
<th>n</th>
<th>Mean Turnover Ratio for Large Employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered</td>
<td>54</td>
<td>.34</td>
<td>.35</td>
<td>29</td>
<td>.29</td>
<td>.30</td>
<td>16</td>
<td>.14</td>
</tr>
<tr>
<td>Not Registered</td>
<td>43</td>
<td>.44</td>
<td>.51</td>
<td>31</td>
<td>.17</td>
<td>.25</td>
<td>12</td>
<td>.10</td>
</tr>
</tbody>
</table>

alpha = .05
interaction probability = .128
main effect probability for turnover ratio and registration status = .831

Table 8

Turnover Ratio × Registration Status and Union Orientation

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean Turnover Ratio for Union Employers</th>
<th>SD</th>
<th>n</th>
<th>Mean Turnover Ratio for Nonunion Employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered</td>
<td>24</td>
<td>.15</td>
<td>.19</td>
<td>75</td>
<td>.34</td>
</tr>
<tr>
<td>Not Registered</td>
<td>29</td>
<td>.16</td>
<td>.22</td>
<td>57</td>
<td>.37</td>
</tr>
</tbody>
</table>

alpha = .05
interaction probability = .869
main effect probability for turnover ratio and registration status = .629

reached. This result supports the conceptual hypothesis that there is a difference between the mean skilled trade employee turnover with respect to employer size.

The test procedure for Hypothesis 3b was also a comparison of means, using a one-way ANOVA, and an alpha of .05 was used to test significance. The probability (p) was calculated at .001; therefore, the null hypothesis could be rejected.
<table>
<thead>
<tr>
<th></th>
<th>Mean Turnover Ratio for $9.00 to $12.99</th>
<th>Mean Turnover Ratio for $13.00 to $15.99</th>
<th>Mean Turnover Ratio for $16.00 to $18.99</th>
<th>Mean Turnover Ratio for $19.00 to $22.99</th>
<th>Mean Turnover Ratio for $23.00+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
<td>n</td>
<td>Mean</td>
</tr>
<tr>
<td>Registered</td>
<td>10</td>
<td>.41</td>
<td>.50</td>
<td>27</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Registered</td>
<td>21</td>
<td>.27</td>
<td>.31</td>
<td>29</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

alpha = .05  
correlation coefficient for turnover ratio and wage structure = -.136  
interaction probability = .079  
main effect probability for turnover ratio and registration status = .824
This result supports the conceptual hypothesis that employers who have a labor union have less skilled trade employee turnover compared to employers who do not have a labor union.

Table 10

<table>
<thead>
<tr>
<th>Category</th>
<th># of Employers</th>
<th>Mean Turnover Ratio</th>
<th>Standard Deviation</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a. Small &lt; 100</td>
<td>97</td>
<td>.390</td>
<td>.430</td>
<td>.001*</td>
</tr>
<tr>
<td>Medium 101–499</td>
<td>60</td>
<td>.230</td>
<td>.277</td>
<td></td>
</tr>
<tr>
<td>Large &gt; 500</td>
<td>28</td>
<td>.122</td>
<td>.150</td>
<td></td>
</tr>
<tr>
<td>3b. Union</td>
<td>53</td>
<td>.153</td>
<td>.205</td>
<td>.001*</td>
</tr>
<tr>
<td>Nonunion</td>
<td>132</td>
<td>.356</td>
<td>.401</td>
<td></td>
</tr>
</tbody>
</table>

*alpha = .05

The conceptual hypothesis for Hypothesis 3c is that there is a negative correlation between the wage structure of an employer and skilled trade employee turnover; therefore, the corresponding null hypothesis is that when comparing the relationship between wage structure and the turnover ratio of skilled trade employees, the Pearson product-moment correlation is equal to 0.

This hypothesis was tested by comparing data utilizing a Pearson product-moment correlation, and an alpha of .05 was used to test significance. The correlation coefficient was calculated at −.136 with a probability of .078; therefore, the null hypothesis could not be rejected. This result cannot support the conceptual hypothesis that there is a negative correlation between wage structure of an employer
and the turnover ratio of its skilled trade employees. Table 9 gives a graphic representation of how turnover ratios correlated with wage structure.

Finally, in order to determine if the results for the primary hypothesis of the study vary with respect to geographic location of an employer, responses were grouped into four separate regions within the state. The following is a breakdown of regions by community college district: (a) North—Bay de Noc, Kirtland, Mid-Michigan, North Central, Northwestern, West Shore; (b) Southwest—Glen Oaks, Grand Rapids, Kalamazoo Valley, Lake Michigan, Muskegon, Southwestern; (c) South Central—delta, Jackson, Kellogg, Lansing, Montcalm, Mott; and (d) Southeast—Henry Ford, Macomb, Monroe, Oakland, Schoolcraft, St. Clair, Washtenaw.

A one-way ANOVA was used to test the relationship between apprenticeship and turnover and the results are reflected in Table 11. Although the mean turnover ratios varied slightly from region to region, the probability that the mean turnover ratios were different due to chance exceeded the alpha in each region. Therefore, the results were consistent with the statewide study, again confirming that the primary hypothesis—the mean turnover ratio of skilled trade employees is less for employers that have a registered apprenticeship programs compared to employers that do not—may not be supported.

Nonrespondents

A random sample of 16 (10.5%) from the 152 employers that did not respond from the survey was selected for a follow-up call to determine why they chose not to respond. The purpose of this effort was to demonstrate that their reasons for not
Table 11
Comparison of Turnover Ratio by Registration Status and Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Category</th>
<th># of Employers</th>
<th>Mean Turnover Ratio</th>
<th>Standard Deviation</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>South East</td>
<td>Reg.</td>
<td>28</td>
<td>.415</td>
<td>.394</td>
<td>.510</td>
</tr>
<tr>
<td></td>
<td>Not Reg.</td>
<td>32</td>
<td>.353</td>
<td>.329</td>
<td></td>
</tr>
<tr>
<td>South Central</td>
<td>Reg.</td>
<td>32</td>
<td>.270</td>
<td>.367</td>
<td>.676</td>
</tr>
<tr>
<td></td>
<td>Not Reg.</td>
<td>10</td>
<td>.321</td>
<td>.317</td>
<td></td>
</tr>
<tr>
<td>South West</td>
<td>Reg.</td>
<td>31</td>
<td>.228</td>
<td>.200</td>
<td>.208</td>
</tr>
<tr>
<td></td>
<td>Not Reg.</td>
<td>15</td>
<td>.415</td>
<td>.768</td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>Reg.</td>
<td>8</td>
<td>.231</td>
<td>.233</td>
<td>.588</td>
</tr>
<tr>
<td></td>
<td>Not Reg.</td>
<td>29</td>
<td>.178</td>
<td>.245</td>
<td></td>
</tr>
</tbody>
</table>

alpha = .05

responding were not related to issues that may raise concern that their responses would have been substantially different from the responders.

The responses to Question #1 were categorized into the following reasons as reported in Table 12.

None of these responses caused the researcher any reason to believe that the nonresponders would have provided data any different from the responding population. A response that would have caused concern would have been, “Turnover isn’t a problem here, so we don’t need the results of the survey.”

A case could also be made to consider that the nonresponders were no different demographically from the responders because:
Table 12
Nonrespondents’ Responses to Question #1

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not have the time or did not prioritize the time to answer the survey.</td>
<td>9</td>
</tr>
<tr>
<td>We’re not interested in the results of the survey.</td>
<td>2</td>
</tr>
<tr>
<td>The survey must not have reached the appropriate person.</td>
<td>2</td>
</tr>
<tr>
<td>Preferred that the information requested on the survey be kept confidential.</td>
<td>2</td>
</tr>
<tr>
<td>Did not wish to participate in a U.A.W. sponsored survey.</td>
<td>1</td>
</tr>
</tbody>
</table>

1. The responders were demographically consistent with the total population, which translates into a high probability that the nonresponders would be consistent as well.

2. Statistical results from testing the data provided by responders have not changed substantially enough to alter conclusions of the study since 50 responses were recorded.

3. Slight differences in the percentage of returned surveys from each community college appeared to be more a reflection of the effort the contact person put into survey follow up, or perhaps his or her relationship with that specific employer, than employer resistance to completing the survey.
CHAPTER V

CONCLUSIONS

Hypothesis Testing

The primary hypothesis of the study—that skilled trade employee turnover is less for companies that have a registered apprenticeship program compared to companies that do not have a registered apprenticeship program—could not be supported by the results of the hypothesis testing. In fact, the actual mean turnover ratio for each population within the sample was so close to equal, .295 for registered companies and .301 for companies that are not registered, the probability that any difference in means occurred due to chance was calculated to be a remarkable .910. Consequently, since it is virtually impossible to prove means to be equal, the primary hypothesis testing should be considered as inconclusive. Another way to state it is that this study provided no evidence that registering an apprenticeship program has any influence on the turnover of skilled trade employees. This conclusion can be considered useful, however, when consideration is given to the primary purpose of the study, which is to give apprenticeship practitioners meaningful data that counter arguments employers use to resist registering apprenticeship programs.

The logic behind this conclusion is valid because the results of the primary hypothesis testing will allow apprenticeship practitioners to state that there is no evidence that employers who have a registered apprenticeship program are not likely
to experience higher skilled trade employee turnover than employers who do not have a registered apprenticeship program.

The results of the secondary hypothesis testing are useful as well. This is true because the interaction hypothesis, which stated that the size of the employer, union orientation, or wage structure of the employer influences the relationship between apprenticeship and skilled trade employee turnover, could not be supported. This lack of support can also be construed as positive, because the less evidence that can be provided to show a relationship between apprenticeship and skilled trade employee turnover, the more confidence there is in the result of the primary hypothesis. In other words, the nature of the relationship between skilled trade employee turnover and whether a company has a registered apprenticeship program is not affected by the size of the employer, union status, or wage structure of a company. Consequently, regardless of whether the company is large, small, union, nonunion, high-wage, or low-wage, there is evidence in this study that registering an apprenticeship program is not likely to have an effect on the turnover of skilled trade employees. This conclusion is magnified to an even greater extent when consideration is given to the fact that when two of the secondary variables were tested without the influence of apprenticeship, they were found to have a major influence on skilled trade employee turnover. This result is also consistent with the supportive literature, which suggests that it is unlikely that training alone can be isolated as a major factor in influencing turnover (Elias & Peter, 1994).

The last of the conceptual hypotheses (3a–c) states that each of three secondary variables—employer size, union orientation, and wage structure—have an effect on skilled trade employee turnover. The results did indeed provide statistical support for two of the three. First, the size of the employer was shown to have
influence over the turnover of skilled trade employees (3a). Companies that have over 500 employees had approximately one third the turnover ratio (.122) of skilled trade employees compared to companies that have fewer than 100 employees (.390). The probability that the difference in means occurred due to chance was .001.

Equally as significant were the results that dealt with union orientation, comparing skilled trade employee turnover between companies that have a labor union with companies that do not have a labor union. This was supported convincingly by the test results. Companies that do not have a labor union had approximately twice the turnover ratio (.356), compared to companies that do have a labor union (.153). The probability that a difference in means occurred due to chance was only .001.

Both of these factors are important because they increase the validity of the study, countering arguments that the study was not discriminating enough to detect any difference in skilled trade employee turnover regardless of the variable selected. These findings are also validating because they are consistent with the supportive literature on employee turnover in that it has been proven that older employees with high seniority are less likely to quit their jobs. Both of these factors are common characteristics of the larger union companies. In addition, larger union employers generally provide higher pay and benefits as well as higher job security—again, factors that are known to have a positive influence on reducing employee turnover (Mobley, 1982).

Finally, the third conceptual hypothesis (3c), stating that the wage structure of a company has a negative correlation with skilled trade employee turnover, could not be supported by the hypothesis test results. The most notable redeeming factor produced by both of the wage-related test results was with respect to the primary purpose of the study. They both increase the validity of the study by producing
results that are consistent with modern management theory. It is accepted by many contemporary authorities on management that wage structure is a poor motivator of employee performance and has little to do with employee turnover in general. So even though the supportive literature did suggest that turnover is greatest among lower-paying employers (Price, 1977), it also qualifies those findings by stating that the correlation is often relatively weak.

Recommendations for Further Study

The next logical step in the study of the effect apprenticeship has on skilled trade employee turnover would be to investigate the reasons why registration of an apprenticeship program appears to have little or no effect on skilled trade employee turnover. To accomplish this, a survey instrument would be distributed to a random sample of skilled trade employees from companies that have an apprenticeship program as well as from companies that do not. These companies should also have varying degrees of skilled trade employee turnover. The survey would be designed to measure perception and opinion as opposed to factual information. Questions would focus on how individuals feel about issues like job security, compensation, employee benefits, loyalty to their current employer, relationship with their supervisors, and their overall work environment.

The results from this approach may allow the researcher to create an accurate management profile of companies that have varying degrees of skilled trade employee turnover. The next step would then be to investigate as to whether there was a relationship between management profiles and companies that have or do not have registered apprenticeship programs. These results could then be compared to the
conclusions from this study and potentially validate or perhaps contradict the results. In either case, it would provide valuable insight for employers.

A second approach might be to repeat the process used in this study, collecting the same demographic information, only with the focus being on turnover of all employees instead of limiting it to skilled trade employees. If the results of this second approach indicated that the turnover ratios for all employees were consistent with the turnover ratios for skilled trade employees, then it would definitely suggest that registering an apprenticeship program indeed has little to do with skilled trade employee turnover, the logic being that overall company demographics or management practices would appear to supersede any effect apprenticeship may have on skilled trade employee turnover. Again, the results of this second approach, like the first alternative, could potentially validate or contradict the conclusions of this study.

Summary

The study was successful in many ways. First, the conclusions drawn from the hypothesis testing will provide apprenticeship practitioners with factual data to support a long-held contention of the apprenticeship community, that registering an apprenticeship program does not increase turnover of skilled trade employees. This will be a valuable tool for apprenticeship practitioners when attempting to influence employers to register their training programs as Department of Labor approved apprenticeship programs.

Second, the demographic data and results from the secondary hypothesis testing not only helped to validate the study in general, but will also begin to provide employers with some insight as to what does influence employee turnover. When
consideration is given to the dramatic influence that company size and union orientation have on skilled trade employee turnover, it appears that job security may certainly be a major issue that affects skilled trade employee turnover.

Finally, the world of apprenticeship practitioners has benefited immensely from the collaborative effort utilized in the data collection process. It was personally and professionally satisfying and intrinsically valuable for all parties involved to have worked together towards completion of a useful and significant project. The professionalism and courtesy extended between peers, combined with the cooperation of such a large number of employers, was impressive. It truly can be held up as an exemplary model of how educators can partner with one another to work with industry toward understanding and hopefully discovering solutions to the issues that affect training our skilled workforce.
Appendix A

Apprenticeship/Turnover Survey
APPRENTICESHIP/TURNOVER SURVEY

Company Name: ____________________________________________________________

Person Completing Survey: ________________________________________________

Phone Number: ___________________________ Date: ____________________________

Please answer the following questions by circling the best response or by filling in the blank.

I. What is the primary product manufactured at your organization?
   
   A. Automotive Parts/Assembly
   B. Durable Goods
   C. Packaging Products
   D. Food Products
   E. Raw Materials
   F. Other ________________

II. How many people are currently employed at your company, excluding temporary employees?
   
   A. Small—Less than 100.
   B. Medium—101 to 500.
   C. Large—Over 500.

III. How long has your company been in business?
   
   A. Less than five years.
   B. Five years or more.

IV. Over the past 5 years, what has been the average number of skilled trade positions at your company? i.e., Electricians, Machine Repairmen, Maintenance Mechanics, Tool & Die Makers, Pipefitters, Welders, etc.

   ________________

V. What is the average length of service (seniority) for skilled trade workers currently employed at your company?

   ________________

VI. How many Skilled Trade Employees have voluntarily terminated their employment in the past 5 years, excluding retirements and internal transfers or promotions?

   ________________

   Over please!
VII. Does your company currently have a Department of Labor Registered Apprenticeship program?

A. Yes  
B. No  

VIII. If yes, how long has your Apprenticeship program been registered?

A. Less than five years.  
B. Five years or more.  

IX. What is the current average hourly wage paid to employees in the skilled trades classification at your company? Please use the average rate used for someone who has journeyman or equivalent status.

_______

X. Are the skilled trade employees represented by a union at your company?

A. Yes  
B. No  

XI. Please check any additional types of work-based education programs that your company provides opportunities for in addition to apprenticeship. Indicate the extent of participation to the right (number of participants per year).

<table>
<thead>
<tr>
<th></th>
<th>A. Co-op</th>
<th>B. Internships</th>
<th>C. Mentoring</th>
<th>D. Job Shadowing</th>
<th>E. Other (Describe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Participants Per Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

XII. Please provide a brief definition for each of the work-based education activities that you have checked above.

________________________________________________________

________________________________________________________

________________________________________________________
Appendix B

Letter to Community College Contact
November 1, 1996

Doug Schulze
Gogebic Community College
E-49938 Jackson Rd.
Ironwood MI 49938

Dear Doug:

Thank you for agreeing to be the community college contact person in the M.E.A.T.A study on the effect of apprenticeship on skilled trade employee turnover. In addition to M.E.A.T.A., this study has been sponsored by the State Department of Education, the United Auto Workers, and the Michigan Apprenticeship Steering Committee. The Bureau of Apprenticeship and Training and the Michigan Jobs Commission have endorsed the study as well.

All of the parties involved believe the study has the potential to provide important documentation that supports the value of apprenticeship, and may provide each of us with a new tool to encourage employers to register apprenticeship programs.

The first step in this study is to determine which employers to survey. Our intent is to survey 10% of all of the manufacturers in Michigan. To do that, we need you to provide us with your current mailing list of all the manufacturers which you provide training for. From your total list, we will be surveying a random sample of 10%. It’s important that you include companies that do not have registered apprenticeship programs as well as companies that do. This may mean that you need to obtain the part of the mailing list from your customized or corporate training department. If possible, please include a contact person that would be the most qualified to complete the survey (see attached survey).

It would also be appreciated if you could provide this list in the form of mailing labels, but a print out would be acceptable. It’s absolutely critical that we receive the list no later than November 22nd, 1996 so we can get the survey out by the end of November. The only additional responsibility you will have as the designated contact person will be to co-sign a cover letter for the survey and then to collect the completed surveys. Nothing less than a 90% return will be acceptable, so we understand that this may take considerable effort.

Fortunately, thanks to the generous sponsors of this study, you will be paid a stipend of $100 for your assistance. It’s less than what your time is worth, but it’s more than our usual return on “extra curricular” activities. Of course you will also receive copies of the survey results, which will be printed professionally in a promotional format.

If you need further details about the survey or have any questions or concerns, please contact Dennis Bona at (616) 965-4137 ext. 2800. Again, your M.E.A.T.A. executive committee sincerely appreciates your willingness to help with this project.

Sincerely,

Dennis Bona
Chairperson—M.E.A.T.A.
Appendix C

Directions for CC Contact
MEMORANDUM

DATE: October 21, 1996

TO: M.E.A.T.A. Survey Contact Person

FROM: Dennis Bona

RE: Survey Distribution

Thank you for providing the mailing list from which the survey participants could be selected. Each of the employers on the list were numbered, then 10% or 10, whichever number was greater, were randomly selected for the survey.

I have prepared a cover letter for each of the companies that you are responsible for and have enclosed them for your signature. Please perform the following next steps:

1. Sign each of the cover letters over your name at the bottom of the page.

2. Place the cover letter, one copy of the survey instrument, and a postage paid return envelope in a large envelope that preferably has your school logo/return address on it.

3. Feel free to use the labels that have been provided.

4. Please check the accuracy of the names and addresses of the companies that have been selected.

5. If there is an error or you feel certain that we have selected an employer that will not complete the survey, please contact me as soon as possible so I can send you a replacement. Do not replace a company without notifying me first.

6. As stated in the cover letter, a follow up phone call from you to the company has been promised within the first two weeks. This will hopefully facilitate a prompt return.

7. I will be faxing you a progress update of returned surveys on a regular basis so you know who to follow up with. There is no definite deadline for survey return, we will keep at it until a 90% return is achieved.

Thanks again for cooperating with the survey. As expected, the total number of companies surveyed will be around 350. Good Luck!
Appendix D

Survey Cover Letter
December 1, 1996

Mr. John Doe
XYZ Company
0000 Maple St.
Somewhere, MI 40000

Dear Mr. Doe:

The U.S. Department of Labor—Bureau of Apprenticeship and Training, Michigan Department of Education, United Auto Workers—Skilled Trades, and the Michigan Apprenticeship Steering Committee Inc., have commissioned the Michigan Educators Apprenticeship and Training Association to conduct a study that they believe will be of interest to you. The purpose of the study is to determine the effect registered apprenticeship programs have on skilled trade employee turnover. By participating in the study, your company will be entitled to a copy of the complete results, which we believe you will find extremely valuable in making decisions with respect to the training of your skilled trade workforce.

The company that you represent has been randomly selected from the records of the local community college which currently services your training needs. Results from the study will be reported as aggregate data only. Care has been taken so that it will not be possible for anyone other than the researcher to identify the individual who is completing the survey nor the company that is being represented. The survey itself is brief and straightforward, and only requests information that should be accessible from routine company records. However, if you have any questions that need clarification or have concerns with respect to the study itself, please don't hesitate to contact myself or the appropriate contact person at the community college who is identified below.

Your community college representative will be contacting you within 14 days of receiving this study to check on the status of your response or answer any questions you may have. It is imperative for us to get a 100% response from the selected companies for the results to be statistically accurate and provide meaningful information back to you. Our intent is to collect all of the data by December 20, 1996. A postage paid envelope has been provided for your convenience. Your cooperation with this study is greatly appreciated.

Sincerely,

Dennis Bona
Chair, M.E.A.T.A.
(616) 965-4137 ext. 2800

Jane Doe
Michigan C.C.
(616) 111-1111

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Appendix E

Human Subjects Institutional Review Board Approval
Date: 14 November 1996
To: Uldis Smidchens
From: Richard Wright, Chair
Re: HSIRB Project Number 96-11-18

This letter will serve as confirmation that your research project entitled "The Effect of Apprenticeship on Skilled Trade Employee Turnover" has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you must seek specific approval for any changes in this design. You must also seek reapproval if the project extends beyond the termination date. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 13 November 1997

xc: Dennis Bona
Appendix F

Progress Update to CC Contact
Final update! I'll still accept any outstanding surveys, so please don't quit, every response helps. Your check will be presented to you along with the results at our conference on the Feb. 27 & 28th. Again, invite employers to fax the survey directly to me at (616) 962-7370. If you need another copy of the survey call me at (616) 965-4137 ext. 2800.

<table>
<thead>
<tr>
<th>EMPLOYER</th>
<th>SURVEY SENT</th>
<th>SURVEY RECEIVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE ELECTRICAL</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>ACTION TOOL &amp; DIE</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>ALTO PRECISION</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>AMERICAN SEATING</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>ARBOR MOLD &amp; TOOLING</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>DIE SAND</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>GENERAL DIE &amp; ENGINEERING</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>HAMILTON MACHINE &amp; MOLD</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>HORIZON TOOL &amp; DIE CORP.</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>JEDCO INC.</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>KENTWATER TOOL &amp; MFG.</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>KNAPE &amp; VOGT MFG. CO</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>KOLENDA TOOL &amp; DIE</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>LEXOR MOLD</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>PARKWAY ELECTRIC</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>PELAK ELECTRIC</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>PROTO CAM INC</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>WAMAR PRODUCTS</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL** 18 9
Appendix G

Results of Survey Returns
<table>
<thead>
<tr>
<th>COLLEGE</th>
<th>ADDRESS</th>
<th>CONTACT</th>
<th>PHONE / FAX</th>
<th>LIST</th>
<th>SENT</th>
<th>RETURN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bay de Noc CC</td>
<td>2001 North Lincoln Rd. Escanaba, MI 49829</td>
<td>Brady Nelson</td>
<td>(906) 786-5802 (906) 786-6555</td>
<td>80</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2. Delta College</td>
<td>University Center, MI 48710</td>
<td>Brian McNerny</td>
<td>(517) 686-9530 (517) 686-8736</td>
<td>154</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>3. Glen Oaks CC</td>
<td>62249 Shimmel Rd. Centreville, MI 49032</td>
<td>Dave Smith ext. 215</td>
<td>(616) 467-9945 (616) 467-4114</td>
<td>104</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>4. Grand Rapids CC</td>
<td>151 Fountain St. Grand Rapids, MI 49503</td>
<td>Ross Kladder</td>
<td>(616) 771-3660 (616) 771-3665</td>
<td>180</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>5. Henry Ford CC</td>
<td>5101 Evergreen Dearborn, MI 48128</td>
<td>Ed Allard</td>
<td>(313) 845-6436 (313) 845-9872</td>
<td>241</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>8. Kellogg CC</td>
<td>405 Hill Brady Rd. Battle Creek, MI 49015</td>
<td>Dennis Bona</td>
<td>(616) 965-4137 (616) 962-7370</td>
<td>140</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>10. Lake Michigan College</td>
<td>2755 East Napier Ave. Benton Harbor, MI 49022</td>
<td>Larry Burman</td>
<td>(616) 927-8114 (616) 927-6715</td>
<td>103</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>11. Lansing CC</td>
<td>P.O. Box 40010 Lansing, MI 48901</td>
<td>Bill Eggleston</td>
<td>(517) 483-1658 (517) 483-9619</td>
<td>67</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>13. Mid-Michigan CC</td>
<td>1375 South Clare Ave Harrison, MI 48625</td>
<td>Larry Miller</td>
<td>(517) 386-6676 (517) 386-2411</td>
<td>24</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
### Appendix G—Continued

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Montcalm CC</td>
<td>2800 College Dr. Sidney, MI 48885</td>
<td>Dan Herman</td>
<td>(517) 328-1234 (517) 328-2950</td>
<td>34</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>16. Mott CC</td>
<td>1401 East Court St. Flint, MI 48502</td>
<td>Dan Spencer</td>
<td>(810) 762-0383 (810) 232-2676</td>
<td>81</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>17. Muskegon CC</td>
<td>221 South Quarterline Rd. Muskegon, MI 49442</td>
<td>William Ross</td>
<td>(616) 777-0367 (616) 777-0255</td>
<td>52</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>18. North Central Michigan Coll.</td>
<td>1515 Howard St. Petosky, MI 49770</td>
<td>Barbara Kurtz</td>
<td>(616) 348-6600 (616) 348-6628</td>
<td>82</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>19. Northwestern Michigan Coll.</td>
<td>1701 East Front St. Traverse City, MI 49684</td>
<td>Joan Berg</td>
<td>(616) 922-1167 (616) 922-1546</td>
<td>86</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>20. Oakland CC</td>
<td>2900 Featherstone Rd. Auburn Hills, MI 48326</td>
<td>Don Tremper</td>
<td>(810) 340-6619 (810) 340-6507</td>
<td>80</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>21. Schoolcraft College</td>
<td>18600 Haggerty Rd. Livonia, MI 48152</td>
<td>Gerald Cavanaugh</td>
<td>(313) 462-4457 (313) 462-4500</td>
<td>364</td>
<td>36</td>
<td>8</td>
</tr>
<tr>
<td>22. Southwestern Michigan Coll.</td>
<td>58900 Cherry Grove Rd. Dowagiac, MI 49047</td>
<td>Kathy Peterson</td>
<td>(616) 782-1328 (616) 782-1467</td>
<td>53</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>23. St. Clair County CC</td>
<td>323 Erie Street, Box 5015 Port Huron, MI 48061</td>
<td>Ronald Ackles</td>
<td>(810) 989-5743 (810) 984-2852</td>
<td>106</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>24. Washtenaw CC</td>
<td>4800 E Huron River Dr. Box D-1 Ann Arbor, MI 48106</td>
<td>Les Pierce</td>
<td>(313) 973-3533 (313) 677-5437</td>
<td>214</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>25. West Shore CC</td>
<td>3000 North Stiles Rd. Box 277 Scottville, MI 49454</td>
<td>Ross Kissel</td>
<td>(616) 845-6211 (616) 845-0207</td>
<td>54</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

**TOTALS** 2934 340 188
BIBLIOGRAPHY


