

Does Automotive Service Excellence (ASE) Certification Enhance Job
Performance of Automotive Service Technicians?

by

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Career and Technical Education

Department of Teaching and Learning

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March 2006

Blacksburg, Virginia

Key Words: Certification, Job Performance, Automotive Service Industry, ASE

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(ABSTRACT)

The purpose of this study was to determine if Automotive Service Excellence (ASE) certification of automotive service technicians in independent dealerships enhanced job performance. Descriptive survey methodology was used to gather information for 100 automotive technicians (50 ASE-certified and 50 non-certified technicians) located in 50 different work sites. Each site's service manager was asked to complete a questionnaire and a rating scale for two technicians, one ASE certified and one non-certified. The questionnaire was designed using expert opinions of automotive service managers and community college automotive instructors in the Triad area of North Carolina. The 28-item Minnesota Satisfactoriness Scales (MSS) were used to assess job satisfactoriness. Responses to 95 completed questionnaires and accompanying MSS were included in statistical analyses. The role of these variables in predicting ratings of job performance was further examined by including the

regression analyses of only those who had four or less years of on-the-job experience. Among certified technicians, higher scale scores and longer years of experience positively predicted ratings of job performance, as well as decreased numbers of customer complaints. Overall, certified technicians had higher mean job performance ratings than non-certified technicians. Attendance and employee recognition did not significantly predict ratings of job performance in either category of technicians. Results indicated that the number of technicians receiving customer complaints was directly dependent on certification status. Variables such as awards and number of months of perfect attendance had minimal effect on both categories of technician job performance rating.

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ACKNOWLEDGMENTS

When coming to an end of one important life phase, which of course implies the beginning of another, it is appropriate to take a moment to reflect on all those who helped along the way. I would like to do that now.

First, I would like to extend my sincere appreciation and thanks to Dr. Curtis Finch, my research advisor, as well as the other members of my committee: Dr. James Laporte, Dr. Gary Skaggs, Dr. John Burton, Dr. Susan Asselin, and Dr. James Fortune for the expertise they shared throughout the process of pursuing this advanced degree. I also wish to express my special appreciation to Dr. Curtis Finch for his support, encouragement, acceptance, tolerance, and most especially for his patience. I truly know of no other individual who would have been so willing to give as much of themselves and their time to an advisee. (Thank you for putting up with me, Dr. Finch!). Next I would like to thank those who helped with analyzing the numbers: Dr. Li Liang of the Department of Statistics at Virginia Tech, and Mr. John Klaric of the Department of Education Research at the University of North Carolina, Greensboro. I will like to thank my editors Dr. Gayle Lewis and Laurie Good. I would also like to acknowledge the extensive and valuable time of the service managers who completed the questionnaires. In addition, I have greatly appreciated the help of James Ndugu (Atkinson Theory) for his contributions in formulating the theoretical framework for this study.

Special recognition must be given to my late father, to whom I dedicate this degree. Even though he had very few financial resources, he did his best to push me through college. He was a man with a vision, a loving father who believed in me and encouraged me to be the best I could be. I would also like to thank my mother for her steadfast support, patience and understanding over the years. Thanks are also due to my brothers, Amadu and Bala, as well as to my sister,

Tani, for their support and understanding and for keeping the family together during the course of my absence. I am deeply indebted to my two children, Johnson and Peterson Kolo, for their courage, patience and understanding over the years. And although they may not have felt like it at times, this dissertation was never more important to me than they have and continue to be. I will like to give praise to the highest God for being the source of my strength, in spite of all the troubles. To God Be The glory.

Emmanuel Kolo

DEDICATION

I dedicate this dissertation to my late father, who passed away on December 3, 2004. He was a man who valued education early on and dedicated his life to bringing me to this stage. Without his inspiration, guidance and sacrifice none of this would have been possible.

Thank you, Dad. May your soul rest in peace.

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CHAPTER 1:

INTRODUCTION

Evolution of Automobile and Culture

Perhaps more than any other modern invention, the automobile—in tandem with the associated industries that it has spawned beginning over a century ago—has immeasurably impacted economic development both in America and worldwide. Mobility is the cornerstone of progress in all nations (Rea, 1965; Weber, 1988). Hence, it follows that a prerequisite for judiciously comprehending any given society is knowledge of and appreciation for the historical evolution of that society’s major means of transportation. For example, Wakefield (1994) noted that no clear picture could be drawn of early America without including the Conestoga wagon and the flatboat. Similarly, a realistic depiction of the mid-to-late 1800s in America would be incomplete without discussing the railway train and steamboat.

Clearly, the hallmark of 20th century American mobility is the automobile. Most Americans today depend on the economic efficiency and convenient use of the automobile for both personal pleasure and pragmatic pursuits. As Douglas’s (1997) cursory examination of the automobile’s historical growth and development reveals, the car has become an invaluable asset both culturally and economically.

The earliest component in the automobile’s development was Gottlieb Daimler’s 1887 invention of the combustion engine. Daimler also introduced the first gasoline-powered car in Germany. Charles and Frank Duryea built the first successful American model in 1892-93. By the turn of the century, 8,000 horseless buggies traveled the rough, unpaved roads of America. Later, in 1899, Ransom E. Old built in Detroit, Michigan, the first factory devoted exclusively to manufacturing automobiles. Nine years later, Henry Ford launched the first mass-produced

automobile using an innovative assembly line process that transformed the automobile from a luxury vehicle into an affordable necessity (Rea, 1965).

Thus began America's love affair with the automobile—a bold and enduring invention for two reasons. First, mass-production facilities operating in a free market economy produced cars in such abundant quantities that they soon became ubiquitous in America. Second, and more recently, high-tech and state-of-the-art computerized engineering and styling processes have reshaped the auto paradigm with stellar styling designs and landmark performance engineering standards (Knowles, 1997). However, as America's love affair with the automobile continues unabated, so does the need for trained technicians to service and maintain them. Is it unreasonable, therefore, to expect that devotees of mobile freedom will demand the highest standards of maintenance and care for their vehicles?

Statement of the Problem

Americans continue to crave the convenience that today's technically advanced automobiles afford, generally preferring to drive themselves to most destinations over using existing mass transit, which is impractical and costly in many regions of the country and nonexistent in more rural locations. Unless this enduring need for personal mobility wanes, the demand for skilled technicians to service their mechanically complex vehicles of choice will continue to escalate (Naomi, 1996). In fact, the demands for skilled automotive technicians will soon far exceed the supply. Sutphin (1994), an educational consultant to the National Automotive Technician Education Foundation (NATEF), believed that rapid technological changes in the automotive service industry have created a two-pronged problem. First, the automotive service industry must cope with ongoing innovative and technological changes that require it to continually upgrade the existing skills of its technicians. Second, the industry must

find a way to equip and attract new qualified workers to the currently shrinking pool of skilled automotive technicians. According to Sutphin (1994), the automotive service industry will need about 80,000 new technicians every year, especially when factoring in attrition through retirement. In addition, the number of vehicles on the nation's roads climbs by an average of two million a year, or by 1.6 percent annually. Experts, however, believe that the number of qualified mechanics is dropping by as much as 5 percent per year. Marty Keller, chief of the California Department of Consumer Affairs/Bureau of Automotive Repair (CDC/BAR), argued that consumers are finally beginning to feel the effects of the shortage of trained automotive technicians. CDC/BAR, in fact, has been at the forefront of national campaigns to promote technical careers in the automotive industry. Keller believed that unless action is soon taken to reverse this disturbing trend, owning and maintaining a car is going to become a much more expensive and inconvenient proposition (Bott, 1998).

Patricia (2000, p. 143) argued that "most mechanics were self taught or learned on the job. Someone with a mechanical aptitude could take some things apart and figure out how they worked. That discovery approach to learning doesn't work as well today. Every time I've opened one of those black boxes under the hood of my car, all I've found are 0s and 1s that must have fallen out of some computer or worse yet, I found smoke."

The technical complexity of today's automobiles has created both an extensive demand as well as abundant opportunities for those who seek careers in the automotive industry (Patricia, 2000). The term *mechanic* no longer accurately describes the person who repairs an automobile. He or she is now a *technician*, reflecting the higher level of skills and knowledge required by today's automotive industry. Technicians nowadays must have a well-rounded education that will adequately prepare the individual to repair contemporary automobile, as well as adapt to

future changes in the industry. For example, a solid foundation in mathematics is necessary for various problem solving and diagnostic procedures. Basic physical science and physics principles are seen throughout the diagnostics process and in service and repair procedures. Moreover, Patricia also maintained that an electrical/electronics background would be essential for measuring electrical parameters of voltage, current, resistance or power.

Technician Shortage and the Role of Vocational Education

Several important studies have surfaced that have shed light on the nature of the two-pronged dilemma confronting the automotive industry. These studies suggested that vocational-technical education could play a vital role in expanding the pipeline of highly trained automotive technicians. According to Naomi (1996), technicians remain a key component of the United States labor force. As previously discussed, unless Americans abruptly abandon their love affair with technologically advanced cars, the demand for skilled automotive technicians will continue to escalate, vastly exceeding the supply of technicians to fill the demand. In the field of automotive and diesel repair, for example, skilled technicians are in exceptionally high demand. Bob Weber, Director of Career Development for the National Institute for Automotive Service Excellence, observed that, "It is not unusual to see print advertisements for top-of-the-line auto or diesel technicians paying \$50,000" (1996, p.14). Wakefield (1994) indirectly underscored the importance of a skilled automotive workforce when he affirmed the importance of automotive knowledge as a prerequisite for anyone in America to be considered properly educated.

Kealey (2000) noted that there was a crisis in the automotive service industry and that newer franchised vehicle dealers would not be able to service the cars they were selling because of the estimated national shortage of 60,000 technicians. Additionally, technical personnel were becoming too few to match customer demands. Kealey further noted that one Massachusetts

dealer had a 28 bay facility and only two technicians. Thus, as the pool of qualified people continues to become smaller, more shops are likely to be hanging on to inadequately trained technicians despite their poor performance as a matter of necessity.

As a step toward alleviating the chronic technician shortage, the Automotive Youth Educational System (AYES) wanted to expand its contact with students beyond the high school level. A total of 1,162 students, including graduates, have been involved in AYES and there were plans to introduce students as young as 6 years old to automobile dealerships. “When they’re in school, kids often take tours of the local police department or fire department. Why not take them on a tour to the dealerships, let them see what goes on there?” (Woodyard, M. 1999, p.40). Curry (2001) also noted that students who had been involved in the AYES program were particularly eager to do well as professional automotive technicians.

Bill Stanley, service manager at Friendly Jeep Eagle in Warren, Michigan, agreed that there was a chronic shortage of automotive technicians which was affecting many dealerships nationwide. Stanley added that when he interviewed prospective service employees, who were becoming increasingly rare, he looked for a positive attitude and for someone who really wanted to be a mechanic.

According to Curry (2001, p. 26), “Volvo is in the midst of establishing its own technician recruitment and training program for its Canadian subsidiary.” In partnership with Centennial College of Ottawa, Volvo developed a six-month program that provides 32 weeks of classroom learning and four weeks of hands-on experience. After completing the program, students could spend 2 years in an apprenticeship program with a Volvo dealer before becoming full-fledged technicians. “We’re trying to grow our technicians” (Curry, p. 26). Volvo also

planned to bring this program to the U.S. Toward that end, Volvo has had a partnership with a vocational school in Salt Lake City for more than a dozen years.

Despite these innovative educational programs, automotive manufacturers and dealerships remain concerned about the dwindling number of automotive technician programs in the U.S. For example, Curry (2001, p. 26) stated, “Twenty years ago we had 40 diesel technicians programs, today we have just 13. With fewer students, we get fewer technicians.”

Benefits of Automotive Service Excellence Certification

Patricia (2000) was convinced that schools benefit from Automotive Service Excellence (ASE) certification in many ways, the most significant being the overall program improvement. For example, teachers, administrators, and counselors would all know what the automotive industry expected from a training program, as they are clearly delineated in ASE standards manuals. Another benefit of ASE certification is the increased potential for receiving funding or donations from public and private sources. Moreover, Patricia maintained that ASE certification is used as a recruiting tool because it signifies demonstrated program excellence.

Technicians who are ASE accredited know that they have joined the ranks of professionals in the automotive service industries. Individuals who complete an ASE-certified training program have strong academic skills and a desire to improve their skills through continuing education opportunities (Patricia, 2000). Wherever the ASE blue seal is displayed, whether at a school, at a repair facility, or on a uniform, it is a symbol of quality that was earned. According to Patricia, being ASE-certified gives technicians an edge when they are seeking employment. A worker’s confidence, sense of self worth, and ability to get a job almost anywhere are significantly improved once he or she becomes certified. ASE certification shows

employers that these technicians have proven their technical expertise and that they are among the group of the very best technicians.

From its inception in 1972 to November 2003, the non-profit National Institute for Automotive Service Excellence (ASE) certified 419,741 automotive technicians across a wide spectrum of specialties (e.g., engine machinists, collision repair technicians, master truck technicians, etc.) (ASE Website, 2004). This figure represented over 50% of the estimated 750,000 total number automotive technicians practicing in the United States at that time. Of this total, over 101,000 were considered to be “master automotive technicians,” indicating that they were certified in all eight automotive repair specialties, listed below. (ASE certifications are valid for 5 years, after which time technicians must retest in order to keep up with changing technology and to remain in the ASE program.)

1. Engine Repair
2. Engine Performance
3. Automatic Transmission/Transaxle
4. Manual Drive Train and Axles
5. Suspension and Steering
6. Brakes
7. Electrical Systems
8. Heating and Air Conditioning

As of May 2000, there were 1014 certified automobile training programs (720 initial certifications, plus 294 re-certifications), making a grand total of 1223 ASE certified automotive programs (U.S Department of Labor, 2000).

ASE Certification Tests

ASE tests are designed to measure three skills:

1. *Basic technical knowledge:* A basic technical knowledge covering (a) how a system works and what components are used in the system, and (b) what procedures one would use to make repairs and adjustments.
2. *Repair knowledge and skills:* Apply generally accepted procedures and precautions during disassembly, inspections, adjustments, repair, and reassembly. Also, the technician must be adept in using reference materials such as shop manuals and measuring tools as needed.
3. *Diagnosis knowledge and skills:* To what extent can the technician successfully test, measure and diagnose problems, deducing the possible causes of a customer complaint and winnowing them down to the most probable cause? (Molla, 1998).

Linking Credentials with Placement and Performance

If these professionally designed tests could be considered valid measures of the three critical types of knowledge and skills needed by auto technicians, then it follows that technicians thusly certified will likely (a) be heavily recruited for placement in the fast-proliferating number of entry-level automotive technician positions, and (b) demonstrate high levels of on-the-job competence during the ensuing years as a technical employee. Such conclusions, although logical, had yet to be verified through any empirical studies. The literature review thus far had not revealed any studies designed to test the correlation between certification credentials and on-the-job performance. Empirical studies, therefore, were needed to establish this link. Before education policy makers and vocational education experts could begin to enhance and expand present-day automotive-related training programs, they would first have to ascertain if ASE

certification could be empirically shown to be associated with improved on-the-job performance of certified technicians. Once these associations were been empirically established, vocational-technical education professionals could use the proven nexus to justify an enhanced workforce-training curriculum centered on ASE requirements in the automotive technology field. Moreover, the proven certification-placement-performance nexus would legitimize expanding the service area of the education-for-work domain in accordance with its mandate to equip all citizens with skills for productive work and citizenship in the 21st Century. Such expansion would likely encompass, but not be limited to, heretofore poorly served segments of the population—older, laid-off workers, underemployed liberal arts college graduates, high school dropouts with an aptitude for automotive work, and currently employed technicians who needed to upgrade their skills, among others.

ASE Certification Obstacles

As indicated previously, the initial ASE mission was to improve the quality of automotive service and repair through the voluntary testing and certification of automotive technicians. Currently, well over 400,000 technicians are ASE certified in one or more areas and represent every segment of the automotive industry: automobile and truck dealerships, independent repair shops, service operation, parts distribution, engine rebuilding, and technical training (Weber, 1996). Nevertheless, the U.S. Department of Labor has identified several obstacles to certification that must be addressed. These include (a) the high cost of developing and maintaining certification systems, (b) the excessively long time-period required for system acceptance, (c) difficulties in developing industry coalitions and reaching agreement on standards for certifications, and (d) the lack of a structure for promoting certification across employers and among all stakeholders.

Purpose and Research Questions

Despite these certification obstacles, one may argue that empirically showing a strong association between certification requirements and subsequent on-the-job performance success would significantly advance the motivation of all stakeholders to expeditiously navigate around, or methodically remove those obstacles. In order to address these purported relationships, four research questions were developed to investigate the relationship between ASE certification and subsequent job performance, as follows:

1. To what extent does ASE certification relate to on the job performance of both certified and non-certified technicians?
2. To what extent do motive and expectancy (attendance, customer complaints) relate to the job performance of both ASE certified and non-ASE certified technicians?
3. To what extent does incentive (recognition, pay raise) relate to job performance of ASE certified technicians?
4. To what extent do education, training, and experience relate to job performance of both ASE certified and non-ASE certified technicians?

Clearly, if ASE certified technicians would be expected to meet or exceed on-the-job performance standards in consistently higher numbers than their non-ASE certified counterparts, then the need for incentives to assist non-ASE certification shops to seek certification status would become evident.

Design and Limitations

The primary method for gathering needed data to answer the four research questions was through the use of a survey instrument that had been carefully constructed to conform to established requirements for empirical scientific inquiry. Procedures for collecting data with the

survey instrument included the design of an initial cover letter, two follow-up cover letters, cards, reminder post-cards, and follow-up phone calls.

Rationale for Delimiting the Study to the Triad Area in North Carolina

While the need for a nationwide survey establishing a clear link between ASE certification requirements and expected outcome variables was noted in the research questions, the magnitude of such a survey in terms of time and mobility requirements prohibited this investigator from attempting a broad-based study. Nevertheless, if such a study could be undertaken in one selected area of a single state, then it could be easily replicated in other states. For the purpose of this study, however, the focus was limited to only large, independent car dealerships that hire both ASE-certified and non-certified technicians in the Triad Area of North Carolina.

Restriction of Research Subjects

As noted above, this investigation was limited to two population groups: ASE-certified and non-ASE-certified technicians who had completed their probation periods and had been working with a dealership for at least one year. The variable “years of technician experience” was based on numbers of years of experience in the dealership and not the number of years in the automotive field. The certified technicians had to be ASE-certified in general engine performance. The reason for choosing one technician in each category and one certified area was that supervisors of large, independent dealerships tended to stay very busy handling customer complaints. Therefore, they could not be expected to have had the time to furnish the needed information about every technician in all the certified areas. The supervisors were required to complete the survey instruments on each technician used in the study. In addition, they were asked to conduct performance reviews on their subordinates for purposes of (a) assessing the

degree to which the subordinates meet or exceed performance expectations, (b) identifying shortfalls in training that may have been demonstrated by subordinates or that may be anticipated by supervisors' knowledge of new technologies soon to be adopted in their respective workplaces, and (c) recommending salary increases according to performance and work habits.

In conclusion, through the four research questions, supervisors' comparative assessments of ASE-certified and non-ASE-certified technicians were elicited relative to certification and on the job performance. Multiple regression analysis was used to examine the variables. Such variables, if significant, were noted and their implications analyzed and discussed.

Value to Education-for-Work Practitioners

Education-for-work practitioners at the community college level, in schools of continuing education, in high school tech-prep programs, and in trade schools (charter, private, or public) were identified as the individuals/organizations that would most benefit from the findings of this study. The results would be especially valuable if they established that in the limited geographical region of North Carolina, there did indeed appear to be a significant association between certification requirements and increased on-the-job performance assessments. Such findings would help practitioners to identify the most critical aptitudes for potential students to succeed in their certification efforts prior to enrolling in the technician curriculum.

Similarly, such knowledge could guide practitioners in developing curricula with the necessary rigor for enrollees to ensure their ultimate success in certification efforts and in on-the-job performance during the ensuing years. Instructors would no doubt wish to emphasize cognitive skills in the classroom consistent with those required on the ASE examination. Moreover, education-for-work instructors could simultaneously harness their traditional expertise in training students to apply their newly acquired conceptual knowledge to actual

practice on specific automotive problems. Students who understood the theory and could apply it to real-life situations would find themselves improving their analytical, critical thinking, and problem solving skills prior to the certification examination.

On the other hand, if the findings did not demonstrate a compelling association between success on the certification tests and subsequent increased job performance assessments, education-for-work practitioners would need to work with researchers and non-profit foundations to conduct further studies on the nature of the disconnect. Moreover, such information could also be used to construct elements of appropriate certification tests that can be more reliable predictors of future positive performance assessments.

Value to Non-Profit Groups

Whether the nexus investigated in this study was confirmed or not, this study would need to be replicated on a much larger scale in order to obtain sufficiently meaningful results that could then be generalized to a broader population. Therefore, the automotive industry and related non-profit organizations integrally involved with shaping service and delivery practices for maximum consumer satisfaction, safety, and dollar-value costs, would find this limited study an ideal prompt for a broader-scale investigation. Moreover, universities with research centers could simultaneously conduct replications of this smaller study in different areas of the U.S. and perhaps internationally as well. The global economy and the World Wide Web have spurred collaborative efforts among top-notch university think tanks worldwide. Such cooperation—resulting from the intellectual wealth of professional researchers, research fellows, and graduate students—would likely afford unparalleled opportunities for conducting numerous smaller-scale studies, the results of which could then be synthesized through meta-analysis to ascertain which findings were salient and generalizable.

Value to Automotive Service Managers

Service managers are the essential link between the automotive dealers and consumers, who are becoming more discriminating and demanding in their service expectations. In general, car owners expect a reasonably maintenance-free automobile accompanied by top quality service that is conveniently located, prompt, and affordable. Hence, automotive technicians must be knowledgeable, highly skilled, and dependable. To the extent that ASE certification could enhance these attributes and can predict on-the-job success of certified applicants, then the service manager would be more likely to (a) specify certified candidates in employment ads, (b) encourage current technicians to become certified, and (c) encourage the dealer-owners to offer increased compensation for both entry-level and experienced automotive technicians. Finally, automotive service managers would more likely be amenable to serving in advisory capacities to automotive technician training programs sponsored by education-for-work professionals and the automotive industry.

Definitions of Terms

ASE: Automotive Service Excellence.

ASE Certified Technician: A technician that is certified by the National Institute of Automotive Service Excellence in one or more areas of certification.

ASE Master Technician: A technician who successfully passed all eight areas of ASE certification (engine repair, engine performance, automatic transmission/transaxle, manual drive train and axles, suspension and steering, brakes, electrical systems, and heating and air conditioning).

Certification: A process by which an agency or association grants recognition to an individual who met predetermined qualification such as (a) graduation from an approved

program, (b) acceptable performance on a qualifying examination, (c) completion of a given amount of work experience.

Dissonance: A state of psychological discomfort that is aroused when an event occurs which disconfirms any strong expectation.

Expectancy Value: The theory of motivation that proposes that behavior is the result of expectations of achieving goals and the value placed on those goals.

Fear of Failure: A motivational factor that influences a person not to fail in a specific task.

Incentive: An external stimulus that pulls an individual toward some goal.

Job Performance Evaluation: A formal management system that evaluates the quality of an individual's performance in an organization, which is generally prepared by the employee's immediate supervisor.

Motivation: An internal state that arouses, directs, and maintains behavior. It often involves choices, duration, intensity, persistence, and emotional response. It can be seen as traits or stable characteristic of individuals.

Motive: The learned result of pairing cues that affects the condition that produced a desired effect. It is distinguishable primarily in terms of the types of expectations involved, and secondarily in terms of the types of action that could yield either positive or negative effect.

MSS: Minnesota Satisfactoriness Scale.

Need for Achievement: The desire to perform at some high standard of excellence.

Non-Certified Technician: A technician who is not certified by the Institute of Automotive Service Excellence.

Standard of Excellence: A self-imposed requirement of good performance, usually not involving competition with others providers.

Chapter Summary

Chapter 1 outlined the evolution of the automobile in American culture and the impact of its mass production paradigm on the U. S. and world economies. This initial chapter then described contemporary and future problems, which have been driven by a change from the industrial age mass production paradigm to the information technology-based paradigm currently shaping the new global economy. Against this backdrop, the researcher described how the education-for-work profession has been re-examining its role in determining solutions to the two-pronged dilemma that confronts it: (a) how to retrain and retain currently employed skilled automotive workers, and (b) how to meet the increased demand for a much larger pool of newly trained automotive workers, especially highly-skilled technicians. Based on these findings, this investigator then discussed the likely relationship between automotive certification of technicians and their subsequent improved on-the-job performance. Chapter 1 concluded by (a) identifying the four salient research questions, (b) briefly outlining the research design and delimiting parameters to be employed in the proposed study, and (c) reviewing the anticipated significance of the study for three possible user groups. Chapter 2 provides a more comprehensive review of the literature examined for this proposed investigation.

CHAPTER 2:

A REVIEW OF THE LITERATURE--ANTECEDENTS AND OVERVIEW

Certifying the competencies of skilled workers in any field is not a new practice. In fact, the first record of certification, dating back approximately 2000 years ago in ancient Athens, was designed to protect consumers (Gilley, 1985). In the United States, a limited range of worker certification was instituted in the 18th Century, but it was restricted to trades authorized and regulated by guild-like associations similar to those in Europe. Tradesmen in this country during the colonial and early American period were trained in their respective crafts, primarily by being apprenticed to experienced master craftsmen who groomed and trained them one-on-one until they acquired the necessary level of proficiency to become journeymen. After serving a designated amount of time working as in that capacity, they could then achieve master craftsman status. Apprentices to master craftsmen could thereby learn a trade or craft that would provide them with lifelong productive work. Pride in workmanship was a hallmark of skilled master craftsmen and their apprentices. This naturally limited the number pursuing such skilled trades to those with proven aptitudes. Hence, master craftsmen achieved a high level of monetary gain and social status in their respective communities (Gross, 1978).

According to Gross (1978), the industrial revolution that followed the Civil War in America and ushered in the 20th Century also changed the paradigm for worker preparation. Gross identified three trends emanating from the paradigmatic shift. First, licensure or certification began to be used in increasing numbers and by a growing variety of occupations. Second, the nature of such credentialing shifted from being primarily *voluntary* to being predominantly *compulsory*. Third, preparation for licensure/certification credentials shifted from the apprenticeship mode to the classroom instruction method—a change precipitated by mass

production that demanded fewer master craftsmen but more lower-skilled workers. From these limited origins, worker certification programs in the United States expanded immensely in scope and purpose, with exponential growth occurring since World War II.

This literature review examines the history and dynamics of such growth, starting with the impact of World War II and the subsequent distinction between certification and licensure as constructs in worker training—a distinction previously explained in Chapter 1. Next, the postwar proliferation of certification programs and the attendant disputes surrounding them are discussed within the constructs of two broad themes. The first examines the growth of certification in a variety of diverse professions and occupations, while the second focuses on the automotive service industry and the factors surrounding expanded certification practices and demands in that field.

World War II's Impact on Certification Developments

As Lippitt and Nadler (1967) explained, teachers who had been recruited out of the classroom by industry during World War II conducted the earliest vocational training activities. Once the nation transitioned into a peacetime economy, many of these trainers returned to the classroom, while those who remained gradually moved into administrative roles. As a result the industrial sector found itself with “good administrators but weak learning specialists” (Lippitt & Nadler, p.2). Thus, a variety of professional organizations evolved as the need for increasing the ranks of skilled trainers became manifest—the two most prominent being the National Education Association (NEA) and the American Society for Training and Development (ASTD), whose respective roles are discussed later in this chapter.

Concurrent with the expanding number of associations grew the gradual distinction between certification and licensure. Whereas licensure and certification were previously used

interchangeably, the term *license* came to be associated with permission to practice a trade or skill—generally granted by a municipality, state, or larger governmental authority wherein the licensee was requesting permission to practice. Licensure by a municipality or state may or may not require certification in the field before an individual would be allowed to practice in a designated geographic area. *Certification*, on the other hand, came to designate a mark of achievement, usually issued by an association of professionals or practitioners in a specific occupational field. A particular association would develop a consensus for determining the level of knowledge and/or skill an applicant must demonstrate in order to be certified by the association (Bratton, 1984; Penland, 1982; Weiss & Gowans-Young, 1981).

Broad-Based Certification Proliferation

Factors Related to Growth

Weiss and Gowans-Young (1981) supporting the conclusions of Gross (1978), who suggested that two primary factors contributed to the increased number and scope of labor certification. The first was an industry-driven need for more widespread specialization within the mass-production, industrial-based economy. Initially, this led to a further shift from on-the-job training to a heavier reliance on formalized classroom instruction. Internships then followed, affording students the opportunity to apply their classroom learning and to hone special skills in their respective industrial or professional workplace environments. The second factor was a corollary demand for measurement standards against which specialists could assess their proficiencies within their respective fields. Hence, concurrent with, as well as inextricably related to these factors, were the increasing numbers and the advancing strength of a variety of trade associations. The dynamics and dilemmas associated with certification efforts within a variety of organizations will be examined in the following sections.

The American Society for Training and Development (ASTD)

The primary focus of ASTD is to address industrial specialization standards and the critical role of the trainer in developing skilled workers to meet measurable standards of knowledge and designated levels of skills-acquisition. Gilley (1985) noted that when the idea of certification was first conceived, it was deemed a positive step that would provide a framework in which trainers could improve their skills and fitness for their occupation.

According to the ASTD, companies with 50 to 100 employees spend about one third as much on training per employee as firms with more than 500 employees (Ellinger, Watkins, Barnas, 1996, p.14). U.S. employers currently spend approximately 20% or more on training than they did in 1983. According to Curtis E. Plott, president and chief executive officer of the Alexandria, Virginia-based America Society of Training and Development (ASTD), “More than ever business is investing in training. But the investment isn’t growing at the same pace as our workforce.” In 1983, employers provided formal training in the United States that came with a price tag of \$30 billion (which translates to \$47 billion in 1995). In 1995, employers spent \$55.3 billion, \$26.4 billion of which went to direct training costs such as wages, salaries and fringe benefits (Ellinger et al. p.14). Since that 1996 report, companies seem to be relying more on in house *e-learning* opportunities for their employees, making the current training-spending picture somewhat unclear.

In late 1996, ASTD released its predictions for the workplace of the future. ASTD cited global competition and rapid technological advances as the primary catalysts behind the development of the following 10 major trends.

- Skills requirements would continue to increase in response to rapid technological change. Jobs would require workers who can read manuals, technical journals, and financial

reports and who could write business letters, journal articles, and detailed reports.

Unfortunately, workers—especially entry-level workers—would have lower reading and writing skills than ever.

- Although the American workforce overall would be significantly more educated and diverse, jobs would require skills acquisition at a faster pace than employees were currently learning. Moreover, the workforce of the future would be significantly more diverse.
- Corporate restructuring would continue to reshape the business environment. In the past, large firms provided a stable environment for training, whereas small firms offered little training. In the future, it would likely be harder for the workforce to obtain the training it would need if smaller companies would be unable to fund these educational opportunities. Thus, employees themselves would need to take on more responsibility for their own professional development if they were interested in career advancement.
- Corporate training departments would change dramatically in size and composition. Along with downsizing in other departments, training departments would very likely shrink. Moreover, those that were able to survive would employ an increasing number of women.
- Advances in technology would revolutionize the way training services were provided. The combination of downsized training departments and increasing technological innovations would mean that more training would have to be delivered via computers or videoconferences.
- Training departments would have to find new ways to deliver services. As company-based training departments shrunk, the need for trained employees would grow. To meet

that demand, trainers would function more as brokers for training suppliers that could offer a wide variety of customized training options.

- Training professionals would have to focus increasingly on performance improvements. Thus, when training programs were evaluated, more weight would be given to the job-based actions employees take as a result of that learning.
- Integrated high performance work systems would proliferate. Integrating an organization's people, processes, and technology on an ongoing basis--as demanded by high performance systems--remains a difficult challenge. Nonetheless, future training efforts would place greater importance on integrating these factors.
- Companies would become more learning-focused. In an information-based society, tracking and managing knowledge would become increasingly essential. Training would serve to reinforce the establishment of a learning organization mindset.
- Organizational emphasis on human performance management would very likely accelerate. As organizations focus more on boosting the highest level of performance possible from employees, the ability to "manage for performance" would become increasingly important and would include the ability to motivate, compensate, and train for performance (Hatcher & Ward, 1997).

The Ontario Society for Training and Development (OSTD)

In December 1976, the OSTD published *Core Competencies of a Trainer* (Skjervheim, 1977), which identified what they believed to be core competencies. As a result, the organization now offers a certificate in human resource development. Sponsored in cooperation with three major universities, the program was designed for both students and working professionals.

The Association for Educational Communications and Technology (AECT)

In 1969, three years before the American Society for Training and Development (ASTD) soundly voted down certification for its members, the Association for Educational Communications and Technology (AECT) published and disseminated highly acclaimed and broadly used guidelines for certifying workers in the communications and technology areas (Grady & Burnett, 1985). Because of AECT's actions, additional studies were conducted to evaluate the effectiveness of certification programs. In particular, two studies were particularly significant. One was a published study by Nadler (1970) entitled *Developing Human Resources*. A second and singularly seminal one was the *Employee Development Specialist (EDS) Effectiveness Study* by Chalofsky and Cerio (1975). Initiated by the U. S. Civil Service Commission's Bureau of Training after governing officials became cognizant of the need for internal trainers, the study examined and clarified the duties and responsibilities of four civil service positions: (a) development specialists, (b) administrators, (c) consultants, and (d) program managers.

The research teased out and then enumerated the underlying abilities, knowledge, and understanding required for the employees in each of these positions to effectively perform their duties. Moreover, the study laid the groundwork for the highly valued "Employee Development Specialist" (EDS) designation, as well as the criteria required for these specialists to perform their roles as trainers for the four civil service positions. These criteria were embodied in an EDS curriculum that consisted of 29 instructional modules for five positions, the four named above as well as an additional career counselor position (Jorz & Richards, 1977).

Although the postwar certification phenomenon has a well-established history in the U.S., it has been under serious challenge by the two major American training associations, the

International Board of Standards for Training Performance and Instruction (IBSTPI), and the National Society for Performance and Instruction (NSPI). The following sections examine the primary and ancillary purposes of certification, whether certification delivers its intended results, and the potential unanticipated, and possibly negative consequences of certification.

The Multi-Dimensional Purposes of Certification

As professional associations multiplied in numbers and scope, so did the purposes they enunciated as reasons for requiring certification of their practicing members. Accordingly, Venable and Gilley (1984) identified the following seven reasons for certification: (1) to enhance the prestige of the field, (2) to insure professional competence, (3) to improve academic programs, (4) to protect the client/employer, (5) to avoid external regulation, (6) to increase the influence of the certifying society or association, and (7) to stabilize individual job security. These purposes expand upon the salient research findings discussed in Chapter 1, which corroborate the important role of vocational-technical education in transforming the workforce from the industrial, mass-production oriented paradigm to the information, technology-driven paradigm. The literature on certification in all fields also continually alluded to one or more of the purposes enumerated above. Moreover, Venable and Gilley (1984) maintained that each of these seven purposes implied the existence of an ancillary problem for which certification was offered as a solution. For instance, the first purpose—to enhance the prestige of the field—indicates a belief that a given field is not as prestigious as it should be. Therefore, Venable and Gilley believed that the seven problems underlying their list of solutions were sufficiently important to warrant intervention.

Certification proponents then posited certification programs as cost-effective interventions, asserting that the benefits of such programs outweighed the costs of developing,

implementing, and maintaining them. On the other hand, opponents of certification programs, citing the Department of Labor findings discussed in Chapter 1, contended that certification programs were costlier than had been believed. Specifically, they pointed to the added expense of dealing with potentially adverse unintended outcomes of certification requirements, such as the cost of litigation should those programs be legally challenged. Indeed, Venable and Gilley (1984) asserted that those unanticipated costs could easily be greater than the combined costs of developing, implementing and maintaining them.

Additionally, Howard (1992) noted that the stated purposes of certification are a mixture of long- and short-term goals proffered from a variety of motivations and often embedded in an association's occupational-specific mission statement. Thus far, no effort has been made to distinguish between these goals and to tease out the underlying motivations. Within and among concerned stakeholders—employers, clients, associations, and practitioners—the perceived meanings may differ significantly. Howard concluded that certification programs could be viewed from a variety of stances that typically would span a broad array of needs, concerns, and objectives.

Against this enigmatic backdrop, the primary purposes for certification as drawn from the literature are discussed in the ensuing pages of this chapter. Inasmuch as the previously listed seven categories identified by Venable and Gilley (1984) are not mutually exclusive, this literature review combines related categories in order to integrate them into comparable categories uncovered in more recent literature findings. Such integration and category reconfiguration facilitates discussion of the salient literature citations. Hence, the newly reconfigured categories of multi-dimensional purposes are as follows: (1) to enhance the prestige of the field by insuring professional competence and spurring academic achievement via

additional schooling; (2) to protect both clients and employers via the added influence of the certifying society or association, thereby avoiding external regulation and/or advocating for self-enforced, peer-group regulation (not unlike that which the medical practice has enjoyed for many years); and (3) to stabilize individual job security. These are further elucidated below.

Enhancing Prestige, Competence, and Academic Achievement

Prestige. One of the primary purposes of certification often advanced by proponents is that it will enhance the prestige of a given profession or occupation (Grady & Burnett, 1985; Gilley, 1985; Miller, 1986). By legitimizing a given type of work, certification brings societal recognition to the occupation (Bratton & Hildebrand, 1980). In so doing, the enhanced reputation of one occupational group that is certified would serve as a model for others who might be considering a similar recognition standard for their own profession. And indeed, this enhanced status and its permeating influence is of paramount importance in motivating others to strive for such credentials and the attendant enhanced status (Weiss & Gowans-Young, 1981). Coscaretti (1984) observed that individuals thusly motivated to acquire enhanced prestige through certification were also likely to enjoy increased credibility and therefore be better able to exert positive change.

Competence. Clearly, certified competency is becoming increasingly important across the professions. As a result, more and more employers are requiring professionals in many fields to be certified in their specialty when hired or to work toward certification if already employed in a professional or specialty slot. Human Resource (HR) specialists, in particular, are being urged to become certified in order to enhance their professional credibility (Sunoo, 1999). Included in the human resource competency-tested designations awarded through the Human Resource

Certificate Institute are the Human Resource Professional and the Senior Human Resource Professional.

Additionally, Sunoo (1999) noted that other certification designations are offered for sundry human resource specialties by such associations as the International Personnel Management Association and the Positive Employee Relations Council. The latter offers the less well-known designation of Certified Employee Relations Professional, which recognizes competencies in the Internet as well as in employment law. Additional human resource specialty certifications include the Certified Employee Benefits Specialist (CEBS), the Certified Benefits Professional (CBP), and the Certified Compensation Professional (CCP).

HR departments in major industries and commercial establishments are quite often considered the hub of the workforce. As such, it is the unit through which almost all decisions involving employees—other than routine job tasks—must be filtered. Hence, it is understandable that certification in a broad number of human resource specialties has become widespread and even expected. Moreover, with certification expected for HR personnel, does it not also follow that those certified recruiters of management, professional, and technical personnel for other organizational departments, will similarly seek and give preference to those who are certified in their respective fields?

Technical area certification is also on the increase, spurred on by the inherent demands of a high-tech, information-based economy wherein rapid change is pervasive and technical skills must be continually upgraded. William Coscarelli, a Curriculum and Instruction professor at Southern Illinois University in Carbondale, told Sunoo (1999) that both companies and customers are demanding evidence of competence in an increasing number of technical fields. Hence, certification at places like IBM has become the norm, with such credentialing being

required of both outside vendors as well as in-house technical professionals—including technical training instructors (Sunoo, 1999).

Like HR professionals, technical trainers comprise an occupational group whose skills must be transferable across multiple sectors in society—public and private, manufacturing and service, profit and non-profit. Hence, Lee (1998) noted that the Chauncey Group International, Ltd, an arm of the Educational Testing Service, offers two such certifications for technical trainers: the Certified Technical Trainer (CTT) and the Certified Professional Development Trainer (CPDT). The standards they used were derived from prototypes published by the International Board of Standards for Training, Performance, and Instruction (IBSTPI).

Academic achievement. Although certification in a given occupational field may or may not require an undergraduate and/or graduate degree, compelling arguments have been made for their importance in the current business world. Sunoo (1999) posited that both certification and academic degrees in business and related fields were necessary and even critical for those who wanted to advance in the international business milieu. Indeed, the increasingly complex world of commerce in a global and free-market economy has altered the curricula in many institutions of higher education, which have developed courses and programs that specifically address changes in the way the world does business. As an example, Malkin (1997) recommended the establishment of a 2-year curriculum to professionalize current and future employees in the air-cargo industry, given the projected exponential expansion of the global airfreight market in the coming decades.

Protecting Clients and Employers through Association Strength and Influence

Certification has traditionally been hailed by proponents as important for protecting the consumer from the shoddy workmanship of incompetent workers and from greedy exploitation

by corrupt or unreliable businesses. Certification ensures that designated standards of performance and/or ethics can be met by individuals providing goods and services in the designated field (Edwards & Green, 1988). Danish and Symer (1991) argued that mandatory certification protects the consumer from fraud and unethical practices by regulated organizations.

Today's consumers are generally more discerning and demanding in this global, information-based, just-in-time economy than were the consumers of mass-produced products and service in the first half of this century. Quality and value have become paramount considerations among contemporary discriminating consumers. Manufacturers and distributors of consumer products and services are therefore compelled to insure that their products or services are high in quality and reasonably priced. Moreover, companies whose executives and management personnel support certification programs will generally reap direct benefits such as lower training costs, more successful recruitment efforts, and more rapid mastering of learning curves by new employees (Weiss & Gowans-Young, 1981).

In the 1980s, professional and trade associations, which dedicated themselves to assuring that end products were of high quality and affordable, easily augmented their membership to reflect the quality concerns of manufacturers and consumers alike. What were then known as "quality circles" first appeared within various organizational divisions, and this was followed by "total quality" management programs. Central to both movements was the genesis of professional associations that offered their members opportunities to achieve recognition through various levels of certification (Howard, 1992).

More recently, companies operating globally have concluded that their prestige and bottom-line will more likely be enhanced if they undergo the rigorous certification demands of "ISO 9000." The International Organization for Standards (ISO) is comprised of over 100

countries. Its ISO 9000 standards are targeted specifically at industrial consumers by assuring them that suppliers worldwide are uniformly adhering to the same rigorous quality standards (Howard, 1992).

Protecting Employers from External Regulation

Consumer protection undertaken by product and service providers is immeasurably valuable in preventing consumers from seeking product regulation by government or other outside agencies. Hence, Venable and Gilley (1984) contended that embedded in any written purpose or mission statement of certification groups is the underlying intent of avoiding external governmental regulations. Westgaard (1993) explained that advances in technology, lower profit margins, and an increase in the number of unskilled or marginally skilled workers have all significantly increased the need for training. As a result, companies are spending more each year for training, involving the recruitment of thousands of trainers, instructional developers, performance analysts, media specialists, and others.

Increasing the Influence of the Society or Association

As consumers have become better protected, and because higher quality goods and services have no doubt resulted in part from certification efforts (thereby increasing the prestige of the certifying associations), associations too have strengthened their influence on all stakeholders—regulators, providers, workers, and consumers. The Director of Professional Standards and Development for the American Society for Training and Development observed that associations gain income and influence from supervising the certification process (Frazee & Valerie, 1997). Moreover, associations can use the income stream to wield enormous influence on behalf of their members via lobbying efforts and by educating government representatives and regulating agencies at all levels about issues of concern.

Stabilizing Individual Job Security

Certification proponents contend that increased job security is an important derivative of the growing trend toward certification. They argue that if prestigious professional associations representing their member occupations carefully enforce certification, then it will thus assure higher standards of performance. It follows, then, that the maintenance of higher performance standards will augment job security, not to mention to the professional opportunities for individuals who are properly certified.

Increasing technological change and expanding free markets that spurred vigorous global competition largely drove the role of certification in enhancing job security. This necessitated on-going employee training in technical and critical thinking skills in order for global businesses to compete effectively. As employees availed themselves of the increased certification opportunities sponsored by their professional associations—and frequently required by their employers—they often found themselves with vastly improved opportunities for (a) augmented income, and (b) increased opportunities for advancement commensurate with their talent and training.

Research Evidence

Abundant evidence supporting the benefits of certification has surfaced in the recent literature, which spans many fields (Sunoo, 1999; Tannenbaum & Yukl, 1992). Tyler's 1997 article, entitled "Software Certifications Boost Productivity," is one such example. Tyler investigated various high-tech companies (e.g., Microsoft, IBM, Novell, Lotus, and Sun Microsystems) in order to assess the how certification programs influenced their employees' "post-certification" salary increases and career advancement opportunities. She cited the following real-life examples as proof positive of the benefits of certification programs:

- Patricia Harris, a faculty member and network program coordinator at an Arizona community college, noted that her institution's certification program enrolls approximately 1000 students annually. Those who completed the course, she observed, were more likely to be interviewed for jobs than the non-completers or non-enrollees. Moreover, because certified students were better prepared to manage the network, their retention rate was higher compared to non-certified new hires.
- A Microsoft publication surveying 1368 certified professionals reported that certified individuals usually earned higher salaries and advanced more easily in the workplace. Moreover, raises and promotions increased by 58 percent and 46 percent, respectively.
- Elizabeth Fox, also with Microsoft, observed that certification resulted in increased competence and thereby increased self-esteem among certified employees—this is in addition to improved monetary gain and greater career advancement opportunities.

In spite of such compelling evidence, the value of certification for both employers and employees continues to be questioned.

Arguments against Certification

Opponents of certification cite numerous arguments on multiple fronts, the most prevalent being those listed below.

Increased Costs of Preparation to Clients/Employers

For the most part, certification programs are costly, with many fields requiring undergraduate or even graduate degrees prior to being admitted. If a Ph.D. is required, for example, the combined costs of the graduate degree and the subsequent certification program could easily exceed \$40,000 (Westgaard, 1993). Such costs would be prohibitively high for many individuals and would discourage them from pursuing those careers. Moreover, if such

costs had to be born by the employers, their return-on-investment (ROI) might be difficult to justify. Furthermore, if the company's augmented costs were passed on to the consumer in the form of increased costs for goods and services, this could easily reduce a company's competitiveness in the marketplace.

Drain on Association Resources

While certification may provide an additional source of revenue for some professional associations, for others it may drain away valuable resources and staff time. For example, Miller (1986) described the various problems associated with grading certification exams. Exams that featured true/false or multiple-choice questions took less time to administer and grade than exams involving essay or problem solving questions requiring higher-level thinking skills. The latter type, however, were considered to be a better indicator of learned skills or knowledge. Moreover, complex written exams were generally cheaper and less time-consuming than administering real-life workplace simulation tests given by assessment centers that tested knowledge and conceptual thinking skills.

Opponents of certification say that paper and pencil tests are no substitute for demonstrated effectiveness, but nonetheless are often used as such in order to save costs. Also, testing instruments often lack validity and/or reliability, without which the resultant certification credential cannot guarantee an employer that a certified employee is actually capable of the increased expectations.

Interference with Theoretical Underpinning of Free Markets

The most salient argument against certification is that it interferes with the fundamental free market theory of supply and demand. In essence, when the supply of a needed skill decreases below the demand for that skill, the compensation for that skill increases. Conversely,

when the supply increases beyond the demand for that skill, the compensation decreases (Palomba, 1981). Many labor economists decry any artificial interference with the process of supply and demand, maintaining that free markets themselves are the most efficient regulator. They view certification as an artificial barrier that restricts the supply, thereby artificially inflating compensation levels. One such example is a labor union's traditional practice of maintaining artificially high wages by restricting membership and using its group-leverage to prevent companies from hiring non-union workers at lower wages. Professional associations may use certification as a way to exclude competition by restricting the number awarded. This could be done, for example, by raising minimum certification standards (Palomba, 1981; Venable & Gilley, 1984).

Synopsis of Contemporary Debate

Mandatory or optional certification programs continue to increase exponentially across a broad range of occupations in today's global economy. However, the debate about their effectiveness persists, with ample and persuasive evidence supporting both camps. Writing for *Enterprise Careers* in October 1998, Paula Jacobs quoted Harris Miller, the president of a professional association, as noting that passions on both sides were rooted in philosophical as well as competitive reasons. That being understood, Jacobs (1998) summarized the major arguments on both sides of the issue as follows.

Certification proponents maintain that the practice accomplishes the following important goals: (a) provides objective, measurable standards; (b) motivates people to move into new fields where opportunities abound, thereby helping fill the skills gap in some industries; (c) generally leads to higher salaries; (d) helps candidates gain an employment edge; (e) enhances productivity (Jacobs, 1998).

Those who oppose certification maintain that the negatives outweigh the positives. They argue that certification programs (a) are far too time-consuming for employees, (b) are generally too expensive for employers seeking a return on their investments and for individuals who often have insufficient discretionary income to defray those costs, (c) are too vendor-focused and specialized, (d) appear to validate knowledge over experience, and (e) are no guarantee of sufficient conceptual and problem-solving knowledge (Jacobs, 1998).

As indicated earlier, the certification debate continues unabated across all sectors of the global economy. The automotive sector is no exception and is especially noteworthy in the context of this investigation, given the delimited focus on certification for the automotive service industry. Hence, the second part of this literary review examines the dynamics specifically surrounding certification history, the important issues in the automotive industry in general, and in the automotive service industry more specifically.

Automotive Industry Certification Dynamics and Disputes

Societal forces have dictated many of the changes associated with the automotive industry, as reported by Carnevale, Gainer, and Meltzer (1982), and Carnevale and Schulz (1988). These have included rapidly changing technology, changing demographics, and the swift surge of free markets worldwide—all operating in concert to create an extraordinary demand for a new generation of high-tech, people-savvy, market-oriented skilled workers. Such worker skills are far more complex than those that typified the mass-production workers of the domestically-focused, market-restricted, big-three auto giants in the past. As a result, public education and professional trade associations have sponsored numerous initiatives to address the growing need for workers in today's complex and global automotive industry.

Factors Shaping Changes in Automotive Services

Reform Commissions

Educational reform, with its mandate to prepare students for work in a rapidly changing global economy, has greatly influenced the need for certified technicians in the automotive industry. The Commission of the Skills for the American Workforce suggested that public education as configured just over a decade ago would not adequately prepare a workforce prepared to compete successfully in a global economy (What Work Requires, 1990). Moreover, the Commission posited that improving industry-based skill standards and certification measures were important steps to take toward educational reform. Indeed, they deemed it imperative that students should be able to apply the knowledge they acquired in schools into skills they could apply in the workforce. Such a standards/certification-based education reform initiative would facilitate the transition from school to work and ultimately strengthen the country's economic position (U.S. Dept. of Labor, 1991).

The Commission's findings generated a broad array of education reform efforts in the ensuing years—reforms involving changes in curricula and pedagogy that would strengthen the nexus between education and workplace needs in the more complex global economy (Bailey, 1989). Some argued that industry-based skills standards as measured via certification, such as those exemplified by the Automobile Service Excellence (ASE) credentialing process, would be an essential component of any viable educational reform effort. In 1991, the U.S. Department of Labor through the Secretary's Commission on Achieving Necessary Skills (SCANS) urged the educational establishment to expand from its traditional task-oriented approaches to methods that would address the issues of the rapidly changing workplace. SCANS worked with experts experienced in analyzing skills requirements of emerging technologies and innovative work

organizations. These experts identified five competencies and three foundational skills deemed essential for students intending to immediately enter the workforce, as well as for those who would attend college in preparation for a profession or trade.

Commission Findings and Legislations

In their final report, the Commissioners agreed on the following basic/foundation skill components: (a) basic skills (reading, writing, mathematics, speaking, and listening); (b) thinking skills (thinking creatively, solving problems, seeing things in the mind's eye); and (c) personal qualities (individual responsibility, self-esteem, sociability, self-management, and integrity). In addition, the Commissioners broadened the concept of generic workplace competencies, identifying the following five necessary skills: (a) allocating resources (time, money, materials, space, and staff); (b) using interpersonal skills effectively (working in teams, teaching others, serving customers, leading negotiating and working well with people from culturally diverse backgrounds); (c) acquiring and evaluating information and data (including organizing and maintaining files, and using computers to process, interpret, and communicate information); (d) understanding systems—social, organizational, and technological, and monitoring, correcting, designing, or improving them accordingly; and (e) selecting and applying technology and other tools to specific tasks, as well as maintaining and troubleshooting related applications effectively.

Legislation

Proposals to reform the U.S. system of skills certification began to permeate the education agenda. In 1993 the United States Congress enacted the National Skills Standards Act (NSSA) which created under Title V, the "Goals 2000, Educate America" Program. Likewise, the School-to-Work Opportunities Act of 1994 called for educational programs that would award

a "nationally recognized" skills certificate. More importantly, a mandatory system of standards would directly address the inadequacy of training one way for manual labor and another way for mental labor—a duality that separates theory from practice and academic education from education-for-work. The 1990 reauthorization of the Perkins Act set the stage for launching a much heralded reform initiative that would challenge the traditional duality—namely, the integration of vocational and academic education as authorized in the School-to-Work Opportunities Act (Grubb, 1995).

Associations

Not only did the SCANS report become the template for numerous public education reform efforts as indicated above, its findings also spurred professional and trade associations from all sectors of the economy to propose their own reforms. For example the American Society for Training and Development (ASTD) emphasized the importance of “fundamental educational standards that must be taught from the earliest possible time in school and reinforced throughout an individual career and which allow individuals to continuously learn new skills over time [in order to] help their company be competitive” (Leslie, 1992, p. 7). ASTD’s list of standards included (a) knowing how to learn; (b) competence in reading, writing, and computation; (c) listening and oral communication skills; (d) adaptability, which stressed creative thinking and problem-solving; (e) group effectiveness skills requiring interpersonal skills, negotiation, and teamwork; and (f) influence, as defined by organizational effectiveness and leadership abilities (Carnevale et al., 1982).

Similarly, Stasz, McArthur, Lewis, and Ramsey (1990) described a set of universal skills needed in the workplace—skills that interacted with knowledge and personal initiative to determine the degree of success or failure in all occupations and work efforts. Their framework

of generic skills was comprised of two broad categories: (a) basic or enabling skills, and (b) complex or reasoning skills. Their analysis concluded that basic skills (reading, math, and productive living) coupled with reasoning skills (critical thinking, defining, evaluating, and solving problems) would result in cognitively complex skill dimensions. Such, they maintained, was the basis for essentials skills required for adapting to a rapidly changing workplace. Stasz and others (1990) also pointed out that worker disposition (attitude, aptitude, confidence) ultimately became a mediating factor that strengthened or weakened a worker's technical skill performance.

Standards in Automotive Service Industries

Initial Educational Strategies

The establishment of explicit, national standards has been one of the strategies to improve learning and retention among American students. The National Council on Education Standards and Testing (1992) proposed one of the more influential arguments, claiming that standards and assessments that could legitimately measure progress would provide instructors and students with pedagogical targets, as well as contribute to more efficient use of available resources. In 1994, a National Skills Standards Board (NSSB) was created by Title V of the Goals 2000: Educate America Act. The NSSB was charged with developing standards for occupational training programs.

An early study of standards specifically associated with the automotive industry was reported by Wilbin (1982), who indicated that they were first developed by a national committee with representatives from spheres of the automotive industry: manufacturers, equipment and parts suppliers, repair shop owners and technicians, automotive instructors and state and local trade and industrial supervisors. In 1992, the National Automotive Technicians Education

Foundation (NATEF) was awarded a grant by the U. S. Department of Education to revise its standards. NATEF was challenged to examine automotive training programs and evaluate them according to nationally accepted standards of quality, with the goal of either recommending certification or, if found to be inadequate, identifying areas that needed improvement. NATEF relied on areas previously identified by the National Skill Standard Development Programs (1985), including program standards, tools, equipment, curriculum, and goals tasks.

The Center on Education and Training for Employment (ETE), a unit of the College of Education at the Ohio State University, conducted a 1995 study to determine if ASE-certified mechanics possessed better knowledge of automotive repair than students in similar non-certified programs. Both groups were administered a test that measured knowledge in the eight areas of automotive repair that ASE used for certification. Subtests for each of these areas were then developed from test bank items found on the Ohio Vocational Competency Assessment, with subtests containing as many as 15 items each; with the highest possible score being 90 items correct (Morgan & Lawrence, 1995).

The Tests of Cognitive Skills, Second Edition (TCS/2) (CTB-McGraw-Hill, 1984), a primarily nonverbal intelligence test, was used to adjust the dependent variable scores, which controlled for differences in the intelligence of the students. By controlling for individual discrepancies in intelligence, the analysis was able to yield a more precise estimate of the effect of certification.

As in any summative evaluation, the most challenging component of the study was defining and selecting the comparison group that would be used to test if ASE automotive certification indeed had a significant educational impact. The comparison group that was eventually identified was comprised of individuals from automotive repair programs who had

made an initial inquiry to ASE concerning certification, but had not yet returned the self-evaluation forms that constituted the first step in the certification process. It should be noted that this study was limited to automotive repair programs because there were inadequate numbers of auto body and truck programs from which to identify both certified and non-certified programs.

Four automotive repair programs, two secondary, and two postsecondary programs were selected in both Florida and Pennsylvania. One of the programs at each level was an ASE-certified program and the other was not, but had made an initial inquiry about certification. Researchers attempted to select certified and non-certified programs in each state that were as similar as possible. Certified programs in high schools, regional vocational centers, and community colleges were matched with similar non-certified programs, controlling, where possible, for the populations and types of geographic areas the programs served (Morgan & Lawrence, 1995).

Results of Related Studies

As the first step in the analysis, the subtest scores for the eight areas of ASE-certified automotive repair were correlated with the total scores, which, it should be noted, were analyzed according to levels of education and on-the-job experience. Each of the subtests correlated highly with the total scores ($r = .70$ to $.85$). The subtests also significantly correlated with each other, but at a lower level, namely, $r = .42$ to $.66$. Correlations provided evidence for the construct validity of the test. The intercorrelations with the total scores indicated that students tended to perform similarly on each of the subtests. The lower intercorrelations among the subtests was indicative of the different types of knowledge those tests measured.

Tests results from two comparison groups with different levels of education and experience were measured, which verified that those with greater experience scored higher.

Similarly, post-secondary students, as expected, scored significantly higher than secondary students did on the test. The comparisons-by-certification tests that were the focus of the Morgan and Lawrence study (1995) revealed that in three of the four comparisons, the certified programs had higher average scores than the non-certified programs. The higher average score for the non-certified post secondary program in Florida yielded a statistically significant interaction among the variables. Morgan and Lawrence theorized that the rise was likely the result of programmatic improvements. In addition, they surmised that ASE standards could engender added efforts on the part of all involved by setting forth clear objectives for the knowledge and skill students should acquire as described by the National Council of Education Standards and Testing.

Similarly, the Morgan and Lawrence study (1995) found mean ratings for the ten standards in each of eight programs and charted the mean test scores for students in these programs. Because of the way the non-certified programs were selected, they tended to be very similar to the certified programs, and the ratings reflected this similarity. Nevertheless, across the two states the certified programs received higher average ratings than the non-certified programs. On the other hand, the non-certified, post secondary program in Pennsylvania received higher ratings than the certified secondary programs. Moreover, two certified secondary programs received higher ratings than the non-certified, post secondary program in Florida.

The results of this analysis make a strong case that certification improves the learning that takes place in an automotive repair program. To provide a rigorous test of the effects of the standards, the non-certified programs were selected to be as similar to the certified programs as possible. It is likely that if the comparison group had been selected from a more representative population of all non-certified programs, the differences between the certified and non-certified programs would have been larger than those found in this study.

Since this was a summative evaluation instead of a formative one, it did not attempt to identify the ways in which certification enhances learning. However, the results of subsequent site visits provided some substantive clues. The most obvious way that standards can influence learning is by ensuring that facilities, equipment, tools and instruction are relevant to the real needs of the workplace. The ASE standards also set forth clear objectives for the knowledge and skills students should acquire. These objectives delineate instructional goals and thus may motivate students by plainly communicating the expectations for satisfactory performance. Although there is a large body of research that has established that expectations can influence learning both positively and negatively (Rosenthal and Jacobson, 1968; Swann and Snyder, 1980), it seems unlikely that non-certified programs would have the same degree of clarity in their objectives. The goal of achieving ASE-certification may also augment learner motivation. If students in certified programs know that the instruction they are receiving meets national standards, they can be reasonably certain that the curriculum is tailored to successfully mastering the skills needed to become ASE-certified.

Morgan and Lawrence (1995) concluded that ASE standards exert a positive influence on the learning that takes place in automotive repair programs. Students from programs certified by ASE scored significantly higher on a standardized test of knowledge of automotive repair than students from similar non-certified programs. It is likely that if the comparison programs were selected to be more representative of all non-certified programs, the differences between certified and non-certified programs would be larger than those found in this study.

The Office of Vocational Education in Kentucky conducted another study in 1982, headed by Thomas Harris, an industrial education consultant. Harris maintained that improvements in teaching, curriculum, quality of equipment, as well as program prestige and

credibility would all improve because of automotive certification programs. Therefore, 100 percent of Kentucky's secondary and post-secondary auto mechanic preparatory programs were targeted for certification, with 25 percent to complete the process each year for 4 years (Morgan & Lawrence, 1995).

The certifying agency for the ASE is the National Automotive Technical Education Foundation (NATEF). NATEF was to examine the automotive training programs and evaluate them according to nationally accepted standards of quality, after which they would either recommend certification or identify areas needing improvement. The areas that they examined included program standards, tools, equipment, curriculum, goals, and tasks. Although Kentucky did not quite reach its goal of 100 percent certification prior to the project deadline of June 30, 1987, the results were rather impressive. From a total of 83 schools targeted for certification (and several with more than one auto mechanic program), the following accomplishments resulted:

- 36 schools received certification in all or some specialty areas.
- 36 schools were approved and were awaiting a team visit.
- 5 schools completed the team visit and were awaiting the results.
- 6 schools submitted one or more applications.

In the mid-1990s, NATEF named Kentucky as the state leading the ASE certification process in both the number of programs certified and the percentage of programs certified. Kentucky's creditable certification efforts, however, revealed a number of important obstacles that have since become red flags for other states seeking to streamline their own certification efforts. The following list of major obstacles is listed in order of importance, followed by corrective recommendations.

Communication. Key personnel at the local level did not fully comprehend the evaluation

process nor understand exactly what was expected of them. They did not understand how to complete the self-evaluation instrument. For example, Standard 7.8B asked, “Is each student encouraged to purchase a hand tool set (during the period of instruction) which is appropriate to the automotive specialty area(s) in which he/she is being taught?” The typical response to this question was to circle the lowest number, indicating a “no.” Through a misunderstanding, however, this question was mismarked, resulting in erroneous information. In fact, actual classroom practices contradicted what was circled. When questioned, each teacher stated he encouraged students to purchase top-quality tools and even informed students that many companies offered substantial tool discounts to students. Moreover, students were routinely informed that many employers required automotive mechanics to purchase their own basic hand tools.

It is recommended that intensive in-service training be held at the regional or small-group level to train the automotive teacher and school administrator in the certification process, with emphasis upon the self-evaluation document. The single most important recommendation to any state seeking ASE certification is this: Make the auto teacher and the school administrator a team, mutually responsible for the process, and train them in the application and self-evaluation procedures!

Lack of Certified Team Leaders. The second most significant handicap Kentucky experienced, especially in the final year, was a critical shortage of trained and certified Evaluation Team Leaders (ETLs). Kentucky had just a single ETL in January 1987, just as many schools began to seek certification before the June 30 deadline. An additional six ETLs were trained in February, but they were too few and too late to avoid a backlog of schools requesting last-minute team visits. Most, if not all of the 20 schools awaiting team visits could have

received their visits before the self-imposed deadline if more ETLs had been available.

It is recommended that a larger pool of ETL be trained, with the following qualifications:

(a) select ETLs that do not have classroom responsibilities, and (b) provide substitutes for ETLs do teach classes.

Time Limitations. It was suggested that the recommended one-year timeframe for reaching certification was too restrictive. One to three years might be more realistic, depending upon the degree of upgrading an individual program requires. Time limitations should, of course, be predetermined for each stage of the process.

Equipment Limitations. The lack of equipment was a factor in a small number of programs experiencing certification difficulties. For example, if a program had no front-end alignment machine, or if the equipment was obsolete, the program could not be certified in that particular specialty area. Instructors and administrators should ensure that all required equipment is available and in good working order.

Personnel Changes. A change in project directors occurred in 1986, possibly creating some delay.

Budget Limitations. The rather large number of schools seeking certification just prior to the project deadline created a shortfall of travel money for ETLs. This proved to be more of an inconvenience than an obstacle and did not prevent or delay any team visits. This last-minute rush, however, should routinely be anticipated and safeguards put in place to deal with it.

ASE certification is highly valued and respected, and it carries a connotation of quality. Instructors are quick to point out any ASE plaques on their classroom walls, as each one represents an unbiased statement of excellence. According to Paul (1996), automotive teacher and department chairperson for the Elizabeth Town State Vocational Technical School, "People

in the community can relate to the ASE certification. Equipment donations have increased and credibility has been added to our program as a result of the certification. We have a viable program, high-caliber technicians who are much needed by the auto industry” (Paul, 1996, p.2).

Program Content, Structure and Management

ASE provides voluntary certification tests for automotive technicians in the following subject areas:

1. Engine repair (Test A1)
2. Automatic Transmission/Transaxle (Test A2)
3. Manual Drive Train and Axles (Test A3)
4. Suspension and Steering (Test A4)
5. Brakes (Test A5)
6. Electrical/Electronic Systems (Test A6)
7. Heating and Air Conditioning (Test A7)
8. Engine Performance (Test A8)

When an automotive technician successfully passes all eight ASE automobile certification tests, the technician is certified as a master technician. When a technician passes an ASE test in one of the eight areas, he or she receives an ASE automotive technician’s shoulder patch. If a technician passes all eight tests, a Master Technician’s shoulder patch is awarded to that individual. Technicians must document two years experience in automotive service work prior to certification in any ASE test area. Successful completion of an automotive training program at a recognized institution may be substituted for one year of automotive service work.

Re-certification tests are required at five-year intervals to maintain valid ASE certification. Since the subject areas and tasks are updated periodically, the tests may be updated

several times in a five-year period. Therefore, the re-certification exam tests the technician's understanding of current technology. Compared to the regular certification tests, re-certification exams contain approximately one half of the questions in each subject area.

ASE also offers *Specialist* automobile testing with the *Engine Machinist*, *Alternate Fuel* and *Advance Engine Performance* specialist tests. ASE also gives certification tests in medium/heavy truck technology. Test categories in this subject area include (a) Gasoline, (b) Engine, (c) Diesel Engines, (d) Drive Train, (e) Brakes, (f) Suspension and Steering, (g) Electrical Systems, (h) Heating, (i) Ventilation and Air Conditioning, and (j) Preventative Maintenance Inspection (PMI).

ASE also provides certification tests in body repair and painting/refinishing tests. These tests include (a) painting and refinishing, (b) non-structural analysis and damage repair, (c) structural analysis and damage repair, and (d) mechanical and electrical components.

ASE certification also is available in the parts areas, including medium/heavy truck parts specialist, and automobile parts specialist. A technician may choose to complete all eight automobile tests, plus the body repair and painting/refinishing tests, and medium/heavy truck tests. Upon the successful completion of all these tests the technician is certified as a *World Class Technician*.

NATEF certification of automotive training programs involves the completion of self-evaluation forms and a 2-day review by an independent inspection team. To be considered NATEF-certified, training programs must request certification in three of the eight automotive certification areas. Moreover, the instructional materials of the automotive training program must include 80 percent of the high-priority tasks in each certification area to be NATEF-certified. NATEF estimates there are approximately 2,500 secondary and post-secondary automotive

technology-training programs in the United States, and over 675 of these programs are NATEF-certified.

Scope of Test Parameters

ASE tests are written by a committee of experts in the automotive service industry, including automotive instructors, trainers (employed by car manufacturers), and test equipment manufacturers. The questions are pre-tested by technicians selected from across the United States. All test questions that are not confusing or could be easily misinterpreted become part of a series of questions from which the actual ASE test questions are selected. ASE test questions are designed to measure the technician's knowledge of basic theory and diagnostic or repair procedures. Many test questions are based on a specific adjustment, repair, or diagnostic problem with which the technician should be thoroughly familiar. Because ASE has found that hands-on competency testing is too complex and expensive for national administration, it believes that written exams stressing real-world problems can provide a reasonably good assessment of diagnostic and repair capabilities.

Administration and Participation

Each year over 200,000 individuals register for ASE certification exams, with approximately two-thirds of the examinees being approved. The American College Training (ACT) conducts tests twice a year at over 600 locations nationwide. Applicants may take up to four regular or advanced tests on the same day, or as many re-certification tests as they choose. A mechanic must provide proof of 2 years hands-on work experience before being eligible to take the exams. Relevant formal training may be substituted for up to one year of work experience. Completion of a 3-or 4-year bona-fide apprenticeship program may entitle the

applicant to full credit for the 2-year hands-on work requirement. An eligible applicant can become an ASE certified automobile technician upon passing at least one automotive exam.

Program Accrediting Requirements

Accreditation involves a process of self-evaluation by the program and formal evaluation by an external team. The standards are uniform throughout the nation and have been field tested and validated by teams of experts assembled under the auspices of the Automobile Mechanic Training Evaluation Project and directed by the Industry Planning Council of the American Vocational Association.

Some observations and implications for further investigation include the following:

- Although the ASE Technician Certification Program is now fully endorsed by major segments of the automotive industry, it was initiated by only two domestic manufacturers and dealers.
- The ASE Certification Program required many years of industry, committee, and financial support before it became self-supporting.
- Early in the development of the accreditation program, ASE determined that accreditation of individual training programs could not be a self-supporting operation. By establishing NATEF as a not-for-profit foundation, ASE made it possible for industry and others to make tax-deductible contributions in support of the program (Losh, 1995).

Rationale

The increasing use of high technology components in today's vehicles has increased the demand for advanced technical skills (U.S. Department of Labor, 2000). Electronic elements in automobiles—non-existent prior to the 1950s—are expected to rise from a 15% of total content level in 1994 to a 20% level by 2010 (U.S. Department of Labor, 2000). Moreover, while

advanced electronics have made driving a car easier and more comfortable for the buyer, it has made the automotive technician's job far more difficult and complex. For example, 26 years ago a car mechanic needed to understand about 5,000 pages of service manuals to fix any automobile on the road. The only electronic component in most cars at that time was the radio! The contemporary technician, by contrast, must decipher more than 500,000 pages of text—and that number increases with each new model introduced by the manufacturer (Sutphin, 1994). In addition, estimates from the Automotive Service Industries Association (ASIA) indicated that in 1950 there was one mechanic for every 73 cars and trucks. In 1970, there was one mechanic for every 130 vehicles, and in 1980, there was one mechanic for every 250 vehicles. In 2010, experts estimate that there will be one mechanic for approximately every 800 vehicles.

Consumers continue to seek automobiles with a long grocery-list of features: enhanced passenger comfort systems, more rigorous safety measures, better fuel efficiency standards, environmentally sound combustion and roomier interiors, sturdier unibodies, aerodynamically efficient and aesthetically appealing designs, and increased performance, reliability, and longevity (Weber, 1988). Thus, technicians today will need an increasingly complex set of proficiencies including math, logic, and advanced computer skills to repair and maintain them. Moreover, Section 609 of the Clean Act Amendment of 1990 requires that anyone servicing motor vehicle air conditioning systems must use properly approved refrigerant recycling equipments, and must be properly trained and certified. Thus, the skill-level demands for auto service technicians continue to escalate.

The Theoretical Framework of the Study

Atkinson Theory of Achievement Motivation

The foremost goal of this research was to link the study to a theoretical framework,

namely the Atkinson Theory of Achievement and Motivation (1965). A brief summary of the theory is provided, as well as how his theory relates to and influences job performance.

Atkinson (1965) maintained that performance is a joint function of ability, motive and expectancy. If expectancy is aroused, the individual will be motivated to perform to his/her optimal ability. Conversely, if there is no expectancy the individual will be unlikely to perform as well. Atkinson further believed that motivating factors influence workers to higher levels of performance because they cultivate personal satisfaction. He argued that performance could be measured against a standard of excellence, with the end result being either favorable (success) or unfavorable (failure). In the case of automotive certification, a technician with a high need for achievement will be motivated to perform well on the job only when he/she perceives his or her performance on a given task will be evaluated against some standard of excellence (such as taking the ASE test). The gratification an individual receives from successful and satisfying personal achievements can improve his or her sense of self worth and job performance. This, then, could be considered an intrinsically important and worthwhile rationale for certification programs.

Expectancy refers to a person's motivation to achieve something, and is dependent on that individual's estimation of his or her chance of success and the value he or she places on success. According to Atkinson and Feather (1966), behind every expectation there is a motive, which is a simultaneous measure of expectancy. Atkinson (1965) posited that all adults have a number of basic motives or needs that could be thought of as values or outlets, which channel and regulate the flow of potential energy. A strong motive may be thought of as a valve or energy outlet that opens easily and has a larger aperture for energy flow. A weak motive can be thought of as a tight, sticky valve that even when open, allows only limited energy flow (Atkinson, 1965).

Whether or not a motive is actualized—that is, whether energy flows through this outlet into performance and useful work—depends on the specific situation in which the person finds him or her self.

Atkinson (1965) also maintained that certain characteristics of a situation could arouse or trigger different motives, opening different sets of situational characteristics and changing the nature of those characteristics or stimuli. As a result, once various motives are aroused or actualized, distinct patterns of performance could be significantly energized. For example, a technician who is accustomed to working in the company of other fellow technicians might be dependent upon those co-workers to share knowledge and experience, thus optimizing his own job performance. This type of worker is said to possess a need for affiliation. His or her affiliation energy outlet is maximized when allowed to work around other technicians. If the situation changed and the technician had to work alone, there would be little opportunity for social interaction. Thus, his or her affiliation energy would be deleteriously impacted. Other motives might be stimulated by the new work-alone situation, but it is highly likely that this particular technician's overall pattern of motivation and behavior would change.

Atkinson (1965) posited that achievement behavior could be viewed as the result of an emotional conflict between hope for success and fear of failure. According to Atkinson, one's approach to an achievement related goal (T_s) depends on three factors: (a) the need for achievement, also known as the motive for success (M_s); (b) the probability that one will be successful at the task (P_s); and (c) the incentive value of success (I_s). Thus, Atkinson postulated that these three components are multiplicatively related as follows:

$$T_s = M_s \times P_s \times I_s.$$

Moreover, he noted that incentive value for success (I_s) is inversely related to the probability of

success (P_s); that is, the incentive value of success increases as success probability (P_s) decreases.

Atkinson (1965) also contended that the incentive value of an achievement goal could be translated in simpler terms, namely, pride in accomplishment. He argued that an individual would experience greater pride following the successful completion of a difficult task than after having accomplished something less challenging. Conversely, while M_s (motive for success) is conceived as a capacity to experience pride in an accomplishment, the term “ M_{af} ” can be considered the capacity to experience shame given non-attainment of a goal (failure). Atkinson maintained that the determinants for fear of failure or the tendency to avoid achievement tasks were comparable to those related to hope for success. For example, when applying Atkinson’s theory to the automotive repair field, a supervisor should look for those technicians who believe the ASE test is too difficult to pass. Although such individuals may not make the initial effort to take the test for fear of failure, they are likely to become better performers as a result of pride in accomplishment.

Incentive, on the other hand, is a reinforcing tool that people can expect to receive if they perform a specific behavior (Weiner, 1985). For example, some form of extrinsic award, reward, pay raise, or promotion is generally needed to motivate technicians to optimize their performance. Atkinson’s theory of achievement motivation can enable supervisors of automotive dealerships to better understand the achievement needs of the technicians, and as a result plan rational training programs that will enhance their technicians’ skills so that they can provide better service, thus boosting profitability.

Feather (1988) built upon the expectancy theory to include the role of values and their effects on behavior. He defined value as a set of stable, general belief about what is desirable. He

then postulated that these beliefs emerge from both society's norms and an individual's core psychological needs and sense of self. Feather argued that values are one class of motive that can lead individuals to perform an act. As an example, he hypothesized that a student who placed a higher value on mathematics and who possessed a higher self-concept of mathematical ability would be more likely to enroll in science courses than in social science or humanities courses. Likewise, a student who placed higher value on English and had a higher self-concept of ability for English would be more likely to enroll in humanities and social science courses.

Eccles, Wigfield, Harold, & Blumenfeld (1993) studied the relationships between competence beliefs and expectations for success. They found that expectancies for success are positively related. In other words, an individual who believes that he or she is competent at a certain task will believe that mastery of similar tasks in the future is quite possible, while an individual that has reduced beliefs of competence will have lower expectations for success. Eccles et al. (1993) conceptualized task values on four major components: attainment value, intrinsic value or interest, utility value, and cost. The value that a student places on enrolling in mathematics courses, for example, would be a function of how important it is for the person to do well in mathematics, as well as how much enjoyment or pleasure he or she get out of engaging in the activity. Similarly, automotive technicians who value certification will be motivated to strive to become certified.

Theoretical Implications

Atkinson's theory of achievement motivation is designed to help supervisors better understand the achievement needs of their workers so that they can plan rational training programs that will enhance their skills. By identifying and learning to influence particular expectancies and incentives associated with a motive network, it is possible to strengthen and

arouse motivation or behavior tendency. Different motives lead to different behavioral patterns, and it is important that service managers learn to identify various kinds of basic motivations and needs. Automotive service managers must also be able to fit the demands of a job to a pattern of behavior that will result from and provide satisfaction for the arousal of a given motive. The service manager can create this fit by altering the demands of a given job, or by selectively arousing, satisfying, and thereby reinforcing the kind of motivation that will lead to the most appropriate job behavior. Once the service manager obtains what he considers a reasonable fit, he can tailor expectancies and incentives so that they will arouse the desired motivation, thereby ensuring persistent patterns of behavior that can help to provide better service and efficiency as well as boost profitability. In addition, if anxiety concerning failure is deterring technicians from achievement oriented behavior (such as taking the ASE test), then the service manager can help the individual by developing training plans that will decrease the technician's anxiety by bringing other sources of motivation for achievement into play.

This researcher linked this study of achievement motivation as explained above concerning a technician working in a group setting to achievement motivation as theorized by Atkinson (1965). Atkinson believed that when job performance is evaluated in relation to some standard of excellence, individuals tend to work harder. However, what constitutes an achievement challenge for one individual may represent the threat of failure for another. The tendency to avoid failure, according to Atkinson's theory of achievement motivation, is a multiplicative function of a motive, expectancy, and incentive. Logically, the empirical evidence confirming or disconfirming ASE certification as a predictor of better job performance by those certified (when compared to those non-certified) would need to be addressed. Additionally, it is important to be able to assure employers that hiring ASE certified technicians would improve the

quality and productivity of the service provided.

Chapter Summary

Chapter 2 initially built upon research findings mentioned in Chapter 1, which relate to the persistent controversy over the efficacy and utility of certification. Within that debate, the automotive sector is especially noteworthy in its focus on certification for the automotive service industry. Chapter 2 then traced the dynamics surrounding the history of certification in the automotive industry and identified (a) public education, (b) reform commission findings, (c) legislation, and (d) associations as important factors shaping changes in the automotive service industry. Moreover, in spite of the phenomenal growth of ASE-certified programs cited in Chapter 1, the review of the literature revealed that controversy still permeates the question of the efficacy of certification credentialing. This investigator's examination of numerous research studies uncovered evidence attesting to the effectiveness of ASE testing of acquired knowledge and skills in the eight specialty areas.

In addition, the literature showed that while simulation testing was a more accurate measure of a person's ability to apply the acquired knowledge to an actual on-the-job situation, the costs associated with administering simulation testing made it prohibitively expensive for the ASE to adopt. Therefore, how could employers be better assured that hiring ASE certified technicians would likely improve the quality and productivity of the service provided and hence result in more satisfied employers and clients? A logical answer would be to address the paucity of empirical evidence confirming or disconfirming ASE certification as a predictor of better performance by those certified, especially when compared to non-certified technicians. This, then is the subject of the investigation proposed herein, the design and methodology of which are described in Chapter 3.

CHAPTER 3:

METHODOLOGY

This chapter describes the rationale for the limited scope design and the process by which (a) interviewees and survey subjects were selected, (b) the data was collected, and (c) the resulting information was analyzed to answer the following specific research questions:

- 1 To what extent does ASE certification relate to on-the-job performance of both certified and non-certified technicians?
- 2 To what extent do motive and expectancy (attendance, customer complaints) relate to the job performance of both ASE-certified and non-ASE-certified technicians?
- 3 To what extent does incentive (recognition, pay raises) relate to job performance of both certified and non-certified technicians?
- 4 To what extent do education, training and experience relate to job performance of both ASE-certified and non-ASE-certified technicians?

Limited-Scope Survey

Chapter 1 described the need to determine whether a clear nexus existed between ASE certification and a technician's on-the-job performance. Data pertaining to the two outcome variables were generated for two categories of technicians (ASE-certified and non-ASE-certified). Factory-trained technicians were not considered in this study because they were not certified by ASE. Factory trained technician programs are structured around a specific make of automobile, where as the NATEF/ASE training program provides uniform levels of competency and skill among entry-level technicians nationwide.

Because this smaller study in a single region (the Triad area of North Carolina) can be replicated at the state- or even national-levels, the anticipated results could be synthesized and a

meta-analysis undertaken later to ascertain if a definitive nexus exists between the variables.

Hence, this investigator conducted a limited-scope survey in the Triad area of North Carolina consisting of the following counties: Forsyth, Guilford, Randolph, Surry, and Rowan.

Recognizing that no inferences could be drawn about findings beyond the Triad area, the results reported herein will extend the knowledge base about the value of ASE certification only in the Triad area. In so doing, the investigator hopes to impact decisions about the nature and size of future studies designed to yield broader-based results.

Table 1.

Automobile, Bus, and Truck Registrations in Selected Counties of North Carolina from 1970-2000

County	Year			
	1970	1980	1990	2000
Guilford	154,576	222,263	268,068	319,756
Forsyth	115,606	170,251	206,550	231,368
Rowan	47,112	67,124	82,895	104,920
Surry	28,637	42,045	52,221	64,961
Randolph	42,281	65,516	82,943	111,227

Note: Source, U.S. Department of Commerce, Bureau of Census, Statistical Abstract of N.C. Counties, 2000.

According to the U.S. Population Bureau (2000), the population of North Carolina in 2000 was approximately 8,085,484. The total number of automotive registrations in North Carolina—and particularly in those selected counties—had steadily increased since 1970 (U.S.

Population Bureau, 2000). A graphical representation of automobile registrations by county is provided in Figure 1.

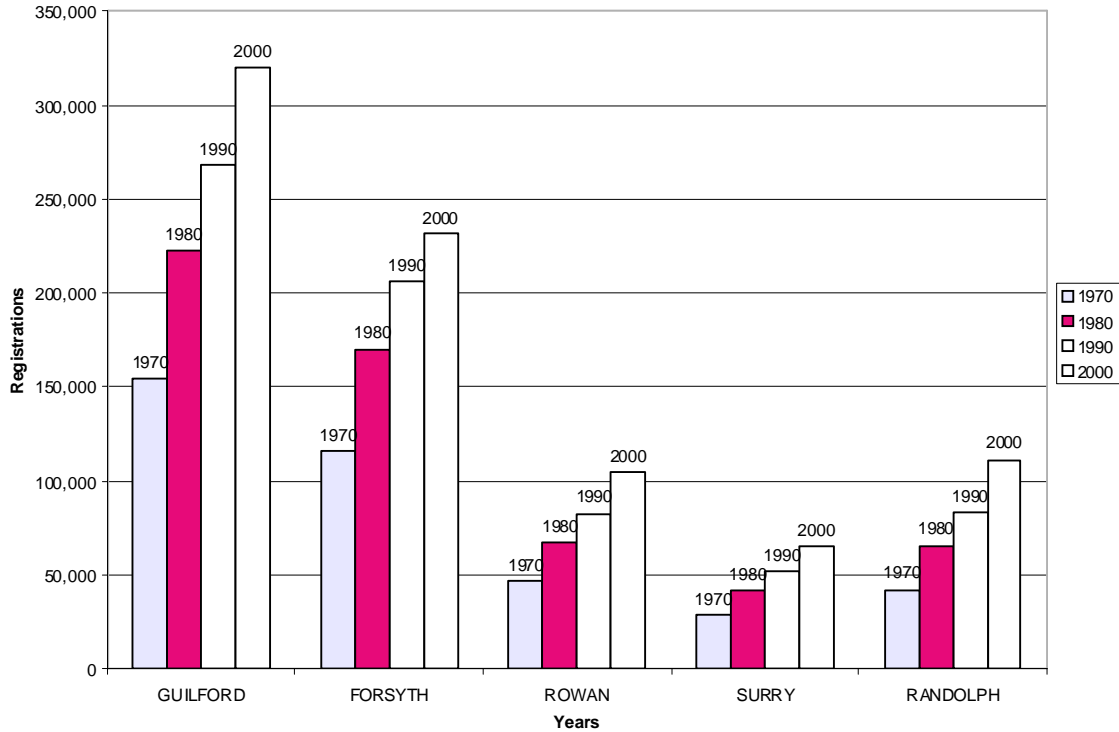


Figure 1. Automobile, Bus, and Truck Registrations in Selected Counties of North Carolina from 1970-2000.

From U.S. Department of Commerce, Bureau of Census, Statistical Abstract of N.C. Counties, 2000.

Survey Subjects and Interviewees

Automotive Technicians

The survey subjects consisted of two main groups of employed technicians: (a) ASE-certified technicians, and (b) non-ASE-certified technicians. The investigator collected information about these subjects from automotive service managers who had hiring authority and who were responsible for evaluating an employee’s on-the-job performance. Moreover, to ensure accurate comparative data between ASE-certified and non ASE-certified technicians, only

automotive service managers who hired and supervised both categories of technicians were solicited for input about an employee's job performance. Dealership managers who employed *only* non-ASE-certified technicians or *only* ASE-certified technicians would be unable to provide any comparative data and thus were excluded from this study.

Automotive Service Managers

The investigator enlisted input from as many automotive service managers as necessary to obtain data for 100 technicians, of which 50 percent were ASE-certified, and 50 percent were non-ASE-certified. First, the investigator contacted the North Carolina Chamber of Commerce and the Triad Automotive Dealership Association to compile the list of large independent dealerships. From that list, every third dealership listing in each alphabetized category was called to ascertain how many technicians worked at the dealership, and if they consisted of ASE-certified, non-ASE-certified, or both types of technicians. If that round of telephoning yielded a sufficient number of managers who hired both ASE-certified and non-ASE-certified technicians and, if combining the numbers from all such dealerships yielded at least 100 technicians (of which 50 were certified), then the investigator would begin data collection. If the response did not yield a sufficient numbers of technicians, the investigator would increase the number of dealerships contacted until at least 100 technicians were identified.

Information Collection Process

Relevant data was collected from service managers who had hiring and supervisory authority over their employees. Included as appendix items are copies of all documents that were used in the data collection process, including telephone scripts, a cover letter, and questionnaire form. They are designated and explained as follows.

Description of Appendices

- Appendix A:* The initial telephone approach that was read by the investigator.
- Appendix B:* The second telephone contact script, which was used with shop managers who employed both certified and non-certified technicians. It was designed to solicit their input and secure their agreement to share demographic and performance information about their technicians. No actual employees were identified, and the information collected was kept confidential.
- Appendix C:* The cover letter that accompanied the mailed questionnaire, thanking the service managers for their input in the study and reaffirming the need for confidentiality and anonymity of all persons involved.
- Appendix D:* The questionnaire instrument that was completed by all participating service managers themselves or by their designated personnel.

The Minnesota Satisfactoriness Scale

This questionnaire was intended to gather two types of information: (a) general dealership information and (b) technician job performance information as provided by service managers. The job performance data was developed using the Minnesota Satisfactoriness Scale (MSS).

The MSS was developed in 1957 to assess employee on-the-job satisfaction levels (Weiss, Davis, England, & Lofquist, 1967). The instrument now consists of long- and short-form questionnaires that are completed by an employee's supervisor who evaluates the employee on 28 performance indices. Weiss et al. suggested that if no occupational group was clearly identified that was similar to the one under investigation, comparisons should be made to a

generic group entitled “employed non-disabled,” which included skilled and unskilled blue collar workers and professional personnel. Weiss et al. recommended assigning a percentile score of .75 or higher to those with a *high* degree of job performance, and a score of .25 or lower to those with a *low* level of job performance. Scores ranging from .26 to .74 were assigned a job performance rating of *moderate*.

Reliability

Data supporting the internal consistency of the MSS were presented by Weiss et al. (1967) of 567 Hoyt reliability coefficients computed on 75 groups with 21 scales each. Eighty-three percent were .80 or higher and only 2.5% were lower than .70. The stability of the instrument was achieved by two-retest procedures. A one-week retest was administered to 75 employed people, and one year later, another retest was performed on 115 employed individuals. The correlation analysis performed on the retest data indicated that the one-week and one-year coefficients (.97 and .89, respectively) were significant beyond the .001 level (Weiss et al.).

In another study, Weiss et al. (1967) evaluated the internal consistency of the short form utilizing a sample of 1,460 males. The Hoyt reliability coefficient ranged from .84 to .91. Weiss et al. maintained that general job performance and satisfaction could more accurately be inferred using the long form. Albright (1972), in reviewing the reliability of the questionnaire, concurred that the data regarding the reliability of the long form appeared reliable, since reliability may vary across groups.

Validity

The Minnesota Satisfactoriness Scale (MSS) manual does not contain direct evidence concerning the validity of the short form. However, Weiss et al. (1967) observed that since the short form was based on a subset of long form items, the validity of the short form could be

inferred from the validity of the long form. Data supporting the construct and content validity of the MSS form is contained in the MSS manual (Weiss et al., 1967). Given the proven effectiveness of the instrument, the MSS has been utilized extensively in job performance studies (Alison, 1984; Cheloha & Farr, 1980; Grady & Burnett, 1985; Plessman, 1986; Rahim, Antonioni, Krumov & Ilieva, 2000).

Advantages

The MSS is believed to have the following advantages:

- a. It is self administering;
- b. It requires only about 10 minutes for the short form to be completed;
- c. It only requires a fifth grade reading level;
- d. It meets acceptable standards for reliability and validity;
- e. It is easy to score.

Rationale for Brevity

For practice, the researcher's native English-speaking proxy contacted by telephone two automotive dealerships from listings in the Yellow Pages. Both service managers said they were too busy to talk as it was at the end of the month. Also, in the process of having her own automobile inspected, the proxy informally interviewed the manager-in-charge, who stated that they hired both certified and non-certified technicians and paid for many to attend automotive training schools and seminars. He added, however, that he had previously hired some skilled technicians who were not able to pass formal tests. Moreover, when asked if he would participate in a survey, he said he did not have time to do so. Hence, the investigator decided that a short questionnaire preceded by telephone contacts would be the most efficacious way to gather the needed data for the proposed study. It should be noted that the questionnaire was also designed

to solicit other relevant observations and ideas from managers who might have the time to discuss them.

Further Preliminary Preparations

Having crafted the questionnaire instrument and written telephone approach scripts for different scenarios, the investigator had them further critiqued and refined by other knowledgeable professionals in the field: namely, automotive services managers and automotive instructors in community and/or technical colleges. One service manager and one automotive instructor were selected from each of the five counties where the study was conducted. In addition to seeking their input on the instrument and other documents to be used in the study, the investigator also solicited their help in persuading other shop managers to participate, since they often interfaced extensively with other automobile service departments and repair programs. Generally, when these interpersonal relationships were already established, the task of persuading the shop managers to participate was enormously facilitated. The data collected was anticipated to be robust and informative since it was in the self-interest of all parties to ensure that the automotive service and repair businesses kept their customers satisfied. A satisfied clientele, of course, facilitates the success of the business and thus provides continued work for qualified and competent automotive technicians.

Pilot Test

The questionnaire was constructed and modified with assistance from the investigator's research advisor. Five independent dealerships were randomly selected from the Greensboro, North Carolina, area. The service managers were contacted in person and briefed about the purpose of the research study and the relevance of the study to their dealerships. A copy of the questionnaires, as shown in Appendix D, was presented to the supervisors, along with a pre-

addressed, stamped envelope. The supervisors were asked to return the completed forms within the date stipulated in the cover letter. They were reminded not to include personal names and they were assured that their responses would be kept confidential. All five questionnaires (one for each category of technicians) were returned and the analysis of the pilot test indicated that (a) the survey instrument successfully measured the technicians' performance, (b) the questions were expressed clearly and unambiguously, and (c) they covered the main areas of concern for the supervisors. The results of the study further indicated that the supervisors understood the questions, indicating the validity of the instrument.

Information Analysis Process

Once the information was collected, the investigator used a standard computer software package (SAS) to analyze the data. According to the variables in this study, if X is a cause of Y, then there should be some covariance or correlation between the two variables. While the covariance between X and Y is something that can be empirically observed or measured, the causal effect that created the covariance cannot be directly observed. In essence, the observed covariance that was created by the effect of X and Y actually may have resulted from an effect of Y and X. It should also be noted that if an increase in some third variable directly caused an increase in X concurrently with an increase in Y, then a positive covariance between X and Y can be said to exist. Moreover, this possibility indicates that correlations do not prove causality, although we cannot infer causality without the existence of covariance. The possibility of the presence of multiple causation requires the causal analysis to account for the other independent variables besides X. Therefore, this study did not focus on just one X variable. Instead, it simultaneously analyzed multiple Xs such as X1, X2, X3, etc. Because the independent variables are usually correlated with one another, the effects of each X by analyzing just one XY pair at a

time cannot be estimated. The inter-correlation of the Xs means that if each pair is analyzed separately, biased estimates will occur. “Multiple regression is an effective technique for conducting the needed simultaneous analysis since it statistically controls for the correlations between independent variables when estimating the effect of each X” (McClendon, 1994).

A multiple regression equation contains a single dependent variable and two or more independent variables. The equation for a causal model with two independent variables is $Y = \nabla + \textcircled{1}X_1 + \textcircled{2}X_2 + \textcircled{\text{II}}$ where Y is caused by two variables X1 and X2. Each $\textcircled{\text{}}$ represents the change in Y produced by a unit increase or decrease in X with the other X held constant. The constant ∇ represents the value of Y when X1, X2, and $\textcircled{\text{II}}$ are equal to zero. The error term $\textcircled{\text{II}}$ represents the cumulative effect of all other causes besides X1 and X2, and is considered to be relatively small. The use of the Greek symbols, ∇ , $\textcircled{\text{}}$ and $\textcircled{\text{II}}$ indicates that the equation is a theoretical model for the true effects that exist in a particular population under investigation (McClendon 1994). Therefore, the multiple regression equation used in the estimation of the theoretical model represented by the equation above is

$$\hat{Y} = a + \textcircled{1}X_1 + \textcircled{2}X_2.$$

Notice that the equation contains only Roman letters, no error term and the Y has a hat. This is an intercept and partial slopes equation. Since under-age technicians are not legally employable, some of the variables investigated in this study, such as age, will not be examined at zero in which case the intercept will not make sense. The multiple regression equation to be used will then be

$$\hat{Y} = \textcircled{1}X_1 + \textcircled{2}X_2 + \dots + \textcircled{n}X_n.$$

Some of the variables that were used in this study are as follows.

X1 = Pay raise

X2= Education

X3 = Training

X4 = Experience

X5 = Attendance

X6 = Customer complaints

In addition, other variables between or among the technicians and/or the managers may have surfaced and their implications were considered. Finally, all other written ideas and observations submitted by the managers were analyzed qualitatively for common themes or factors not previously identified for the study. This enabled the researcher to ascertain if one or more trends were developing, and if so, their potential implications.

Data Collection

Given the traditional problem of non response bias, achieving the highest possible response rate had to be high priority. Therefore before the questionnaire was mailed to the subjects in the study, a phone call was made to every subject to verify the name of the current manager of the automotive dealership, the current address, and to request their cooperation in completing the questionnaire. Of the 85 service managers that were contacted, 18 declined to participate in the study because of lack of time. Their possible replacements were chosen randomly from the master list of automotive dealerships in the Triad area of North Carolina, who were then contacted as before. Each questionnaire was assigned a code number from 1-100. These numbers served as identification code and protected the respondent. Since no name was required on the instrument, the identification number also assured that an appropriate follow up mailing could be sent if necessary. Of the 170 questionnaires that were mailed on October 12, 2004, a total of 70 questionnaires were returned, corresponding to a 41% response rate on the

first mailing. Since the number of returned questionnaires was 30 less than required to meet the target of 100 respondents, a second mailing was conducted. A revised cover letter (Appendix C), and a stamped, self addressed return envelope was mailed to managers who failed to respond the first time. In addition, questionnaires were mailed to new dealerships randomly selected from the master list of automotive dealer in the selected counties of North Carolina. The managers were asked to respond on or before February 3, 2005. Twenty six of the 40 subjects responded by that date. By February 3, 2005, the total number of respondents was ninety six.

Follow up of Non-Respondents

Because the target sample of 100 respondents had not yet been met, the investigator conducted phone calls to find out why the questionnaires have not been returned. Given that the questionnaires contained about 36 items each, the time for completion was considered a potential factor in the response rate. Some managers complained about a lack of time, some were just not interested in the study, and some requested more time. Those managers that requested more time promised to mail the completed questionnaires back to the investigator in couple of weeks. On February 20, 2005 ten more questionnaire were received, which brought the total number of respondents to 106 (50.4% response rate).

Data Analysis

The data collected from the mailed surveys were entered into a computer and then analyzed via multiple regression analysis using a standard SAS statistical program. Given the ordinal nature of the scales, multiple regression analysis was chosen to determine if there were significant differences in job performance between ASE certified technician and non-ASE certified technician using variables such as attendance, pay raises, customer complaints, and educational level.

Description of Data Entry

Dealership Award: Corresponds to a dealership who gave award incentives. “0” was used to designate a dealership that did not give awards.

Award: Corresponds to the number of awards the technician earned.

Years of Employment: Corresponds to the number of years the technician had been employed.

Education: For a certified technician, this variable corresponds to the number of years of community college education.

Non-certified Technician: Corresponds to the number of days of educational training.

Training: For certified technicians, this value is designated by a missing value “.”

Non-certified Technician: Corresponds to the number of training semester hours the technician spent in an automotive program in a community college. Twenty five semester hours equaled to one year.

Award2: “-1” Is another variable in the data manipulation. Where -1 represented that no awards were given in the dealership. “0” Indicated that the technician did not get any award.

Minnesota Satisfactoriness Scale

The Minnesota Satisfactoriness Scale (MSS) is an observer-rating instrument that summarizes an employee’s level of job performance as judge by the employer. Thus, by definition “satisfactoriness” refers to the adequacy of AN employee’s vocational adjustment when viewed from the perspective of the employer.

MSS presumes a work environment comprised of a series of tasks that must be performed and a set of rules that must be followed. The employee’s behavior within this environment is the basis for the evaluation of satisfactoriness. The MSS consist of 28 items that can be completed by an employee’s supervisor in about 5 minutes. It is scored on four statistically derived factors

(subscales), and also generates a total score for general satisfactoriness. The employee is rated on the first 27 items using a three point scale that compares the employee to his or her coworkers (3 = better, 2 = about the same as, and 1 = not as good as). The final item requires a judgment of overall competence that allocates the employee to a quartile category. The four MSS subscales with illustrative items are as follows:

Performance: Concerns how well the employee handles his or her work, reflecting characteristics such as promotability, competence, adaptability and quality and quantity of work output (e.g., transfer of higher level job, give pay raise, accept job responsibility).

Conformance: Concerns the employee's willingness to accept job limitations, as well as how well he or she cooperates with supervisors and coworker (e.g., respects authority of supervisors, works as a team member, follows work rules).

Personal Adjustment: Concerns aspects of the employee's mental health and manner of responding to any personal problems that could interfere with job performance (e.g., becomes easily upset, seems bothered by problems, seems to tire quickly).

Dependability: Concerns the employee's lack of motivation, consistency, and attentiveness that imply disciplinary problems and poor work habits (e.g., absent from work, requires disciplinary action).

The 27 items address specific work behaviors that result in an independent judgment of above average, average, or below average relative to other workers in the organization. The internal consistency reliabilities for the four subscales and general satisfactoriness scale, calculated for a normative sample of workers in general (N = 1000), were .90 for performance, .85 for conformance, .74 for personal adjustment, .85 for dependability and .95 for general satisfactoriness. Test-retest stability coefficients with a two year interval between administrations

for a broadly representative sample of 725 workers were .59 (performance), .50 (conformance), .49 (personal adjustment), .45 (dependability), and .59 (general satisfactoriness), suggesting that satisfactoriness is a reasonably stable characteristic of workers and a valid instrument.

Report on the Minnesota Satisfactoriness Scales

The original sample for this study was comprised of 100 technicians who all completed the Minnesota Satisfactoriness Scales (MSS). After removing 5 subjects due to incomplete or blank questionnaires, the usable sample consisted of 95 subjects, 48 of whom were ASE certified technicians, and 47 of whom were non-ASE certified technicians. The average length of employment was 8.2 years for the certified technicians, and 4.7 years for the non-certified technicians.

Chapter Summary

This study was limited to the Triad Area of North Carolina, which consists of the counties of Forsyth, Guilford, Randolph, Surry, and Rowan. To identify qualified participants, the investigator contacted the North Carolina Chamber of Commerce and the Triad Automotive Dealership Association to compile a list of large independent dealerships. The survey subjects included two main groups of employed automotive specialists: ASE certified and non ASE certified technicians. Dealerships that employed both categories of technicians were solicited for this study. Prior to the data collection process, the investigator developed telephone scripts, a cover letter, and questionnaire form. The questionnaires were structured to gather two type of information: (a) general dealership information and (b) technician job performance information as provided by service managers. The job performance data was developed using the Minnesota Satisfaction Scale (MSS). The 28-item instrument and written telephone scripts were critiqued and refined by knowledgeable professionals in the field, including automotive service managers

and automotive repair educators in selected community colleges. The final questionnaires reflected nearly all the suggested revisions. The research instrument was then pilot tested to verify that supervisors understood the questions, thereby proving the validity of the instrument.

A standard computer software package (SAS) was employed to analyze the data using a multiple regression analysis. Some of the variables that were used in the study included pay raises, education, training, experience, attendance and customer complaints. On October 12, 2004, a total of 170 questionnaires were mailed; 70 questionnaires were returned, corresponding to a 41% return rate. A second mailing was conducted, and on February 20, 2005, the total number of respondent totaled 106, equaling a 106% response rate.

CHAPTER 4:

RESULTS

Introduction

The purpose of this study was to determine if Automotive Service Excellence (ASE) certification of automotive service technicians in independent dealerships enhanced job performance. The data analysis and study findings discussed in this chapter were based on the following four questions: (1) To what extent does ASE certification relate to on the job performance of both certified and non-certified technicians? (2) To what extent do motive and expectancy (attendance, customer complaints) relate to the job performance of both ASE certified and non-ASE certified technicians? (3) To what extent does incentive (recognition, pay raise) relate to job performance of ASE certified technicians? (4) To what extent do education, training, and experience relate to job performance of both ASE certified and non-ASE certified technicians?

Results

An examination of mean scale scores obtained by certified and non-certified technicians on the Minnesota Satisfactoriness Scale indicated that certified technicians scored higher on supervisors' rating scales than non-certified technicians. The number of customer complaints received by supervisors was higher for non-certified technicians than for certified technicians.

Chi-square tests of independence indicated that the number of technicians receiving customer complaints was directly dependent on certification status. The number of months of perfect attendance was not significantly correlated with job performance for both certified and non-certified technicians. However, the amount and frequency of pay raises significantly influenced the job performance of non-certified technicians. In other words, as pay raises were

increased in frequency or amount, the job performance of the non-certified technicians improved. On the other hand, this study indicated that pay increases did not significantly influence the job performance of the certified technicians. Independent variables such as length of experience, years of education, MSS scale score and number of complaints were used in the regression analysis to predict the job performance of both categories of technicians.

Reliability and Validity

A Cronbach's coefficient alpha, a measure of internal consistency reliability for the 27-item scale, was 0.95. This indicated that the reliability of the scale was excellent. Item inter-correlations among the first 27 items were obtained; these were all positive in direction and of at least moderate magnitude. Correlation coefficients ranged from approximately 0.23 to 0.72, indicating that a single factor may have underscored these items. A scree plot (Figure 2) from a principal components analysis showed that most of the variability in item responses was due to one dominant factor, thereby explaining approximately 46% of the variance in survey scores.

Job performance was assessed with a 27-item scale and the results were compared to a scale score in question number 28. The reason for this was that to assess complex behaviors with a single item may be statistically unreliable and prone to different subjective interpretations. The job performance ratings for the study sample are shown descriptively in Table 2. An examination of mean scale scores obtained by certified and non-certified technicians on the MSS indicated that certified technicians scored higher on the service manager rating scale than did non-certified technicians ($t(93) = -2.60, p < 0.101$).

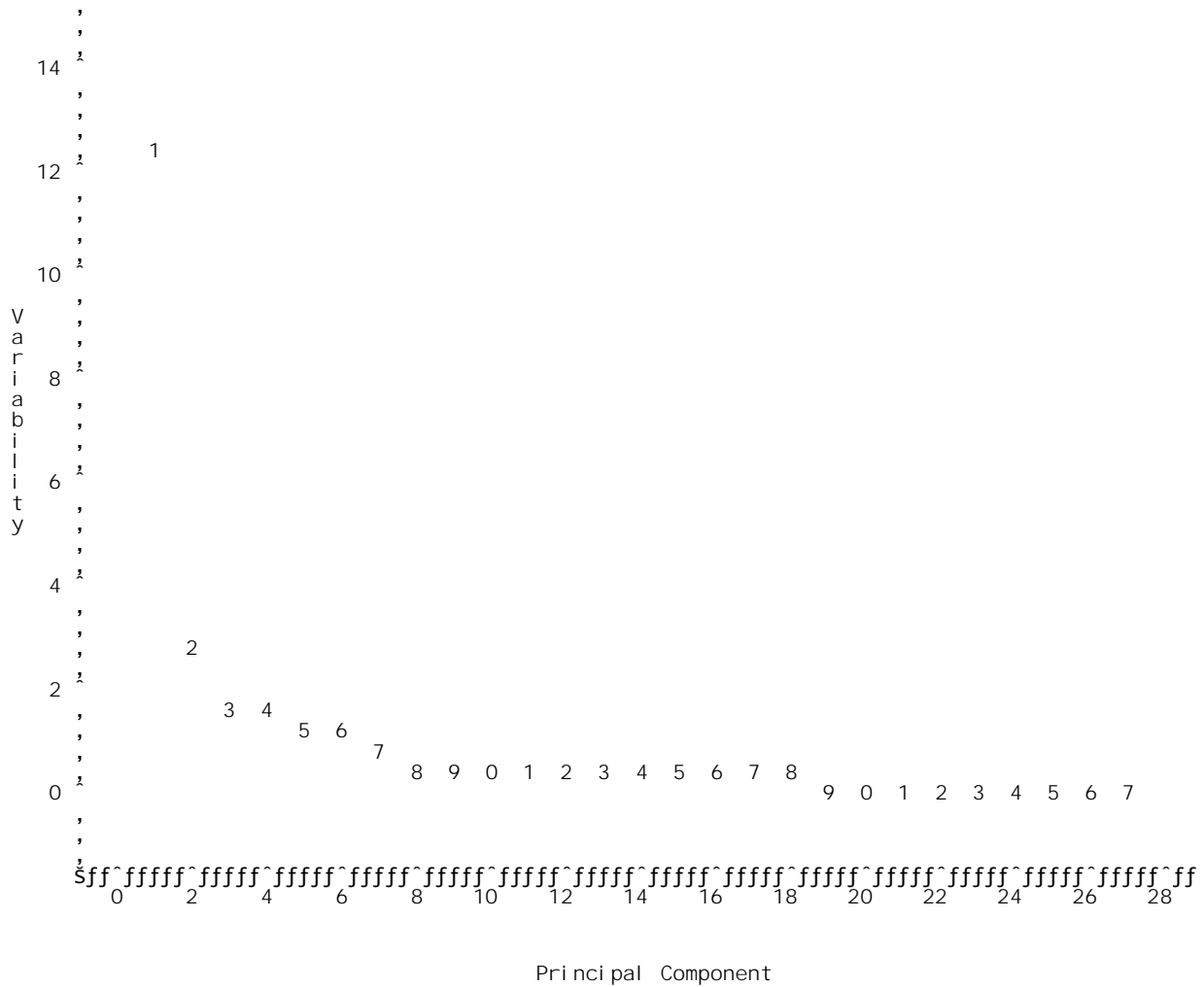


Figure 2. Scree Plot of Variability (as measured by eigenvalues)

Table 2

Mean MSS Scale Scores and Job Performance Scores for ASE-Certified and Non-Certified Automotive Technicians

Group	Number	MSS Scale Score	Job Performance Score
ASE-Certified	48	64.1 (10.7)	3.6 (0.68)
Non-certified	47	58.1 (11.91)	2.8 (1.03)

Notes. Values for scale scores and the MSS score are means, with standard deviations in parentheses. MSS: Minnesota Satisfaction Scales; ASE: Automotive Service Excellence; N: Sample Size.

Table 3

Average Length of Years of Employment

Certification Status	Number of Years at Dealership
ASE Certified	8.2 years
Non Certified	4.2 years

The total scale score correlated well with the performance measure (Item 28). The Pearson product moment correlation for this item was 0.67, which did not differ significantly as a result of certification status (for certified technicians, the correlation was 0.64; for non-certified technicians, the correlation was 0.65). An examination of mean scale scores obtained by certified and non-certified technicians on the Minnesota Satisfactoriness Scales indicated that certified technicians scored higher on the scale than did non-certified technicians ($M = 64.1$ and 58.1 , respectively; $t(93) = -2.60, p < .0109$).

Research Question 1: To what extent does ASE certification relate to on the job performance?

On Item 28, in which supervisors are asked to rate job performance, certified technicians had higher average ratings than did non-certified technicians (3.6 and 2.8, respectively; $t(79.4) = -4.69, p < .0001$). The degrees of freedom in the latter t test were corrected (Satterthwaite corrections) for the presence of unequal variances.

Research Question 2: To what extent do motive and expectancy (attendance, customer complaints) relate to the job performance for both ASE certified and non-ASE certified technicians?

The number of complaints received was significantly and negatively correlated with ratings of job performance for both certified and non-certified technicians. For certified technicians, the Pearson product moment correlation coefficient (r) was -0.35 , which significantly differs from a 0.00 correlation ($p=.0213$). For non-certified technicians, the correlation was -0.39 ($p=.0018$). This negative correlation suggests that the better the job performance, the fewer complaints received. This finding is also shown in Figure 3, indicating that only one certified technician received more than 10 complaints, and 47 certified technicians received fewer than 10 complaints. The same graph reveals, however, that 10 non-certified technicians received more than 10 complaints, and 37 non-certified technicians received fewer than 10 complaints. A chi-square test of independence indicated that the number of technicians receiving customer complaints was directly dependent on certification status ($\chi^2 (df=1) = 8.445$, $p=.0035$).

The number of months of perfect attendance among technicians as it related to job performance over the prior two-year period was also examined. For this study, however, the number of perfect attendance months was not significantly correlated with job performance ratings (for certified technicians, $r = 0.15$; for non-certified technicians, $r = 0.08$; both r s do not differ significantly from $r = 0.00$).

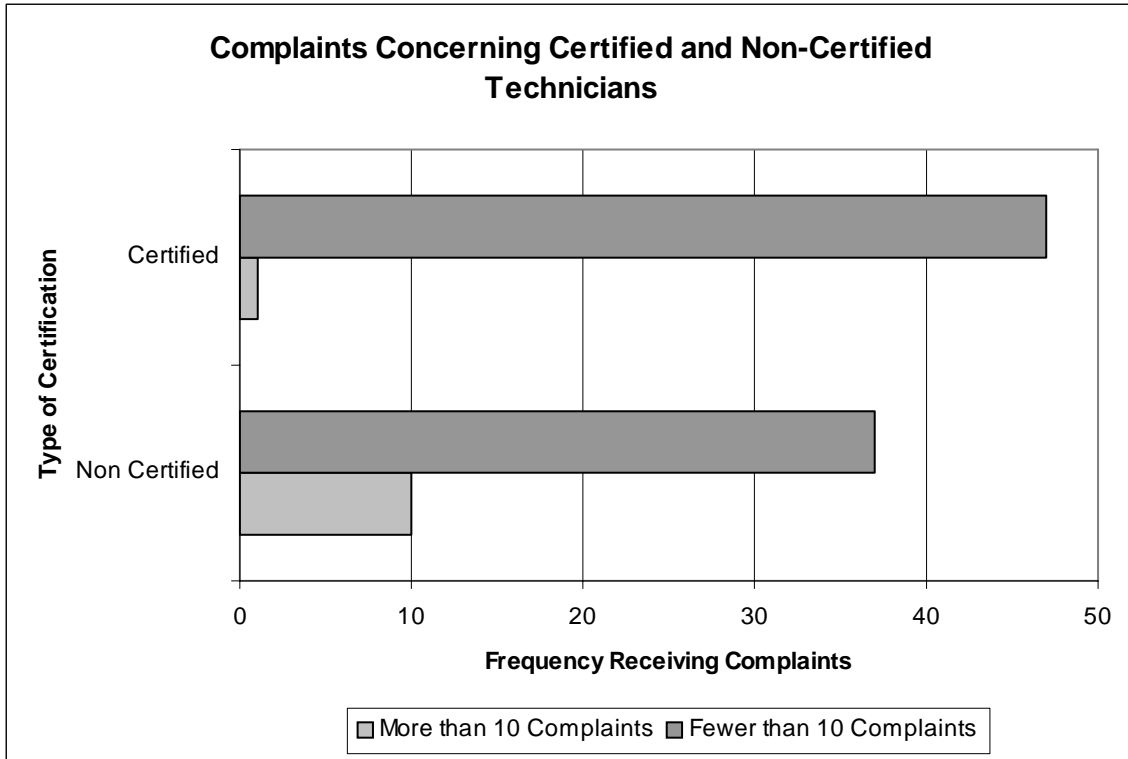


Figure 3. Complaints Concerning Certified and Non-Certified Technicians

Research Question 3: To what extent does incentive relate to job performance of ASE certified technicians?

Ratings of job performance were significantly related to pay raises, but only for the non-certified technicians ($r = 0.29, p=.045$). As ratings improved, the number of pay raises increased among non-certified technicians. On the other hand, ratings of job performance were not significantly correlated to pay raises among certified technicians ($r = 0.15$).

Research Question 4: To what extent do education, training, and experience relate to job performance of both ASE certified and non-ASE certified technicians?

For this study, the length of post employment formal education for certified and non-certified technicians was measured by the number of years of either community college

education or length of time spent in technical training. For the certified technicians, education referred to the number of years of community college education; while for the non-certified technicians, education referred to the number of hours of coursework. Since 25 hours was determined to be equivalent to one year of education, the number of learning hours was divided by 25 to obtain a measure of years of education for the non-certified technicians.

Applying these modifications, a stepwise regression technique utilizing ordinary least squares was used to predict ratings of job performance. The training variable was dropped; the modified education variable was used; attendance, number of complaints received, and MSS scale score were added. All values of experience (measured by the number of years employed) were first used in the regression equation. This regression equation is reported below.

Total Length of Work Experience

Among non-certified technicians, the first regression equation sought to predict ratings of job performance from the total length of experience, education years, the MSS scale score, attendance, and number of customer complaints. Only the MSS scale score significantly predicted ratings of job performance (0.051 , $t=3.72$, $p=.0007$); total length of experience, education years, attendance, and the number of customer complaints did not predict job performance ratings. Higher scale scores positively predicted job performance. The adjusted R^2 equaled 0.3813 , indicating that this model explained about 38% of the variance in job performance ratings. This was adjusted by the number of independent variables used in the model.

Among certified technicians, the same approach was used to predict ratings of job performance: the total length of experience, education years, the MSS scale score, attendance, and number of customer complaints were all used as independent variables in the regression

equation. Among certified technicians, both the MSS scale score (0.044, $t=6.47$, $p<.0001$) and number of customer complaints (-0.06, $t=-3.04$, $p=.0044$), significantly predicted ratings of job performance. Higher scale scores positively predicted performance, as well as decreased numbers of complaints. This model explained about 56% of the variance in job performance ratings (adjusted R^2 equaled 0.5628).

Length of Experience: 4 Years or Less

Among non-certified technicians, the first regression equation attempted to predict ratings of job performance when length of experience was 4 years or less. Independent variables in the regression equation included the length of experience (1 through 4 years), education years, the MSS scale score, attendance, and number of customer complaints. Only the MSS scale score significantly predicted ratings of job performance (0.043, $t=2.36$, $p=.0278$); experience, education years, attendance, and the number of customer complaints did not predict job performance ratings. Higher scale scores positively predicted job performance, but it should be noted that one reason beta estimates were so small is that they reflected one unit increases in the scale score. The adjusted R^2 equaled 0.1904, indicating that this model explained about 19% of the variance in job performance ratings. Again, this was adjusted by the number of independent variables used in the model.

Among certified technicians, the story was quite different even though the same independent variables were used (length of experience, education years, the MSS scale score, attendance, and number of customer complaints). Among certified technicians, MSS scale score (0.054, $t=8.16$, $p<.0001$), experience (0.356, $t=3.29$, $p=.0110$), and number of customer complaints (-0.046, $t=2.89$, $p=.0201$) significantly predicted ratings of job performance. Higher scale scores positively predicted performance, more years of experience (when the regression

was limited to cases where the length of employment was 4 years or less), as well as decreased numbers of complaints. This model explained about 89% of the variance in job satisfaction ratings (adjusted R^2 equaled 0.8896). Although this model was generally a good predictor of job performance, it included independent variables with non-significant beta estimates and was based on just 14 technicians who had been employed at their respective dealerships for 4 years or less.

To obtain an optimal predictive model, independent variables with non significant beta estimates were removed from the regression analysis. This was anticipated to disclose the actual predictive model. Among non-certified technicians, removing the non-significant variables did not aid prediction; as the adjusted R^2 increased very slightly, from 0.1904 to 0.1912. Again, the only significant beta estimate was the one corresponding to the MSS scale score (0.037, $t=2.22$, $p=.0357$). Among certified technicians, removing the variables changed the adjusted R^2 very slightly, from 0.8896 to 0.8618. Therefore, significant predictors of job performance ratings were experience (4 years of employment or less; 0.238, $t=305$, $p=.0122$), MSS scale score (0.050, $t=7.06$, $p<.0001$), and number of customer complaints (-0.045, $t=-2.55$, $p<.0291$).

Equations are (when employment is four years or less):

For non-certified technicians –

^

$$Y \text{ (Predicted ratings of job performance)} = 1.147 + 0.037(\text{MSS Scale Score})$$

For certified technicians –

^

$$Y \text{ (Predicted ratings of job performance)} = -0.353 + 0.238(\text{Experience}) + 0.050(\text{MSS Scale Score}) - 0.045(\text{Number of customer complaints})$$

Chapter Summary

This chapter described the data analysis and the resulting findings regarding the selected sample variables. An examination of mean scale scores obtained for certified and non-certified technicians on the Minnesota Satisfactoriness Scale indicated that certified technicians scored higher on the scale than non-certified technicians. The number of customer complaints received was significantly and negatively correlated with both categories of technicians. For non-certified technicians, the negative correlation suggested that the better their job performance the fewer customer complaints the manager received.

A Chi-square test of independence indicated that the number of technicians receiving customer complaints was directly dependent on certification status. The number of months of perfect attendance was not significantly correlated with job performance for both certified and non-certified technicians. Pay raises significantly influenced the job performance of non-certified technicians, but had little if any effect on the job performance of the certified technicians. Independent variables such as length of experience, years of education, MSS scale score and number of complaints were used in the regression analysis to predict the job performance of both categories of technicians.

CHAPTER 5:

STUDY SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The need for this study grew out of a literature review which revealed that the demand for skilled technicians to service today's complex automobiles will continue to escalate because of rapid changes in the automotive service industry. Sutphins (1994), an education consultant to the National Automotive Technician Foundation (NATEF), argued that rapid technological changes in the automotive service industry have created a two pronged problem. First, the automotive service industry must cope with on going innovative and technological changes that require it to continually upgrade the existing skills of its technicians. Second, the industry must find a way to equip and attract new qualified workers to augment the shrinking pool of skilled automotive technicians. Kealy (2000) argued that a crisis was brewing in the automotive service industry—namely that an increase in the number of franchised new vehicle dealerships would not be able to service the cars they were selling because of a lack of skilled technicians. Moreover, Patricia (2000) argued that most mechanics were self-taught or learned on the job, and that neither method could keep up with the demand for skilled technicians. Thus, technicians today must be property trained, and in sufficient numbers, to maintain a growing number of highly complex automobiles.

Purpose and Research Questions

To reiterate, the purpose of this research was to investigate the relationship between ASE certification and subsequent job performance of certified and non-certified technicians. The research design for this study used qualitative and quantitative research methodologies to facilitate comprehensiveness, data vividness, and statistically measurable results. This study addressed the following research questions:

1. To what extent does ASE certification relate to on the job performance of both certified and non-certified technicians?
2. To what extent do motive and expectancy (attendance, customer complaints) relate to the job performance of both ASE certified and non-ASE certified technicians?
3. To what extent does incentive (recognition, pay raise) relate to job performance of ASE certified technicians?
4. To what extent do education, training, and experience relate to job performance of both ASE certified and non-ASE certified technicians?

Design of the Study

The questionnaire design was based on a review of literature suggesting that certification could enhance job performance. Survey subjects consisted of two main groups of currently employed technicians: (a) ASE-certified technicians, and (b) non-ASE-certified technicians. The investigator collected information about these subjects from automotive service managers who had hiring authority and who were responsible for evaluating employee on-the-job performance. Moreover, to ensure accurate comparative data between ASE-certified and non ASE-certified technicians, only automotive service managers who hired and supervised both categories of technicians were solicited for input about employee job performance. Dealership managers who employed *only* non-ASE-certified technicians or *only* ASE-certified technicians were excluded from the study because they were unable to provide the requisite comparative data.

The investigator enlisted input from as many automotive service managers as necessary to obtain data for 100 technicians, of which 50 percent were ASE-certified, and 50 percent were non-ASE-certified. The investigator contacted the North Carolina Chamber of Commerce and the Triad Automotive Dealership Association and compiled the list of large independent

dealerships. From this list, every third dealership listing in each alphabetized category were called to ascertain how many technicians worked at the dealership, and if they consisted of ASE-certified, non-ASE-certified, or both types of technicians. Given the traditional problem of non-response bias, achieving the highest possible response rate had to be of utmost priority. Therefore, before the questionnaires were mailed to the subjects in the study a phone call was made to each subject to verify the names of current automotive dealership managers, their current addresses, and request their co-operation in completing the questionnaire. Of the 85 service managers that were contacted, 18 declined to participate in the study because of lack of time. Their replacements were randomly chosen from the master list of automotive dealership in the Triad area of North Carolina. These additional service managers were then contacted, enough of whom agreed to take part in the study to meet the target cohort. Each questionnaire was assigned a code number from 1-100. These numbers served as identification codes and protected the respondent. Since no names were required on the instrument, the identification number also assured that an appropriate follow up mailing could be sent if necessary. Of the 170 questionnaires that were mailed on October 12, 2004, a total of 70 questionnaires were returned, corresponding to a 41% response rate during the first mailing. Since the number of returns was 30 questionnaires less than the required number to meet the target of 100 respondents, a second mailing was conducted. A revised cover letter (Appendix C) and a stamped, self addressed return envelope were mailed to managers who failed to respond the first time. In addition, questionnaires were mailed to new dealerships randomly selected from the master list of automotive dealer in the selected counties of North Carolina. The managers were asked to respond on or before February 3, 2005. Twenty six of the 40 subjects responded (65% response rate). The total number of tallied respondents by February 3, 2005, was ninety six, which brought

the total response rate to 96% respondent—but still 4 questionnaires short of the target respondents. The investigator conducted a phone call to find out why the questionnaires have not been mailed. Given the fact that both questionnaires contained 36 items each, the time for completion was considered a potential negative factor in the response rate. Some managers complained of lack of time, some were just not interested in the study, and some requested additional time to complete their responses. Those who requested more time promised to mail the completed questionnaires back to the investigator in several weeks. And indeed, on February 20, 2005, ten additional questionnaires were received, which brought the total number of respondent to 51 (106% response rate). Data collected both from the survey was entered into a computer on SAS statistical program. The data were then analyzed using a multiple regression analysis. A significant level of $p < .05$ was used.

Findings

Research Question One: *To what extent does ASE certification relate to on the job performance?* The first research question used quantitative methodology to examine the data from the research instrument. An ANOVA was conducted with independent variables such as level of education, training, experience, and number of customer complaints. On Item 28 on the MSS questionnaire, in which managers were asked to rate job performance of the technicians, a significant correlation was identified. Post-hoc results indicated that certified technicians had higher average ratings than did non-certified technicians.

Research Question Two: *To what extent do motive and expectancy (attendance, customer complaints) relate to job performance of both ASE certified and non ASE certified technicians?* The second research question investigated the extent to which motive and expectancy related to the job performance of both ASE certified and non-ASE certified

technicians. Again, a positive correlation was identified. The number of customer complaints received was significantly and negatively correlated with ratings of job performance of both categories of technicians. The negative correlation suggested that the better the job performance of the non-certified technicians, the fewer customer complaint the manager received. According to the analysis of this result, only one certified technician received more than 10 customer complaints, while 47 certified technicians received fewer than 10 complaints. 10 non-certified technicians received more than 10 customer complaints and 37 non-certified technicians received fewer than 10 complaints. No significance was found regarding the number of months of perfect attendance for both categories of technicians.

Research Question Three: *To what extent does incentive relate to job performance of ASE certified and non -ASE certified technicians?* Results from the third research question indicated that pay raises were significantly correlated with the job performance of non-certified technicians, but had no effect on the job performance of the certified technicians.

Research Question Four: *To what extent do education, training and experience relate to job performance of both ASE certified and non-ASE-certified technicians?* With regard to results from the fourth research question, it was first necessary to define the concept of education, training, and experience. With respect to the certified technicians, education referred to number of years of community college education. For non-certified technicians, education referred to the number of hours of course work, with 25 hours equivalent to one year of education. The training variable was dropped in the analysis of this question, while all values of experience were used in the regression equation. The result of the data analysis indicated that education and experience significantly affected the job performance of both certified and non-certified technicians. In other

words, the results for this question revealed that the more education and experience technicians had, the better their job performance.

Conclusions and Discussion

Several conclusions are offered regarding the findings of this study on the significance of ASE certification for both certified and non-certified technicians. First, on Item 28 of the MSS questionnaire in which supervisors were asked to rate job performance, certified technicians were found to have higher average ratings than their non-certified equivalents. These results corresponded with the Atkinson Theory of Achievement and Motivation (1965), which argued that performance could be measured against a standard of excellence, with the results being either favorable (success) or unfavorable (failure). In the case of certified ASE technicians who were intrinsically motivated and willing to learn new skills and upgrade their education through dealership-provided training opportunities, they performed well on the job. The gratification they received from successfully completing the ASE tests improved their job performance. This finding is reinforced by Eccles et al. (1993), who found that personal expectations and subsequent success rates could be positively correlated. In other words, an individual who believed that he or she was competent at a specific task would be more likely to believe that mastery of a similar task would be well within reach. Conversely, an individual with a lower level of self-confidence, possibly reinforced by lower training levels, would have lower expectations for success. This premise was shared with the investigator through conversations with service managers who concurred that ASE certified technicians learned new skills better than non-certified technicians employed in the same dealership.

Research Question Two dealt with the extent to which motive and expectancy such as attendance and customer complaints related to the job performance of both categories of

technicians. The results of this study indicated that attendance had no correlation with job performance of both categories of technicians. Customer complaints were found to be positively correlated to job performance for non-certified technicians only, which indicated that the more on-the-job-training the non-certified technicians had, the fewer the customer complaints that were lodged against them. This finding corresponds to studies conducted by Schmidt & Hunter (1986) who found that the amount of experience had a direct causal impact on job performance.

Research Question Three dealt with the extent to which incentives such as recognition and pay raises related to the job performance of both categories of technicians. This study found that pay raises had a significant correlation with the job performance of non-certified technicians, but were not positively correlated with the certified technicians. The greater the increase in pay raises, the better the job performance of the non-certified technicians. These findings agreed with the Atkinson Theory of Motivation which posited that if expectancy is aroused, the individual will be motivated to perform to his/her optimal ability; conversely, if there is no expectancy, the individual will not perform as well.

Not surprisingly, the compensation levels that a dealership established was found to be one of the main engines that drove the success of the business. How much the dealership paid technicians and the factors that they used to establish pay scales and award bonuses and other incentives profoundly affected the quality of the workforce of non-certified technicians. Equally important, it also affected the dealership's ability to attract and retain productive and reliable technicians. According to a study conducted by Motor Service Management (Craig, 2000), few shop owners believed that pay was tied to customer satisfaction. Yet this study indicated that pay increases may lead to a higher level of customer satisfaction among non-certified technicians due to the quality of work they were able to deliver.

Research Question Four dealt with how education and training related to job performance of both categories of technicians. The results of this question indicated that certified technicians who had two or more years of education had higher job performance ratings than those who had less than two years of advanced training. However, non-certified technicians who had some community college education seemed to perform as well on the job than those who had no training at all. This finding reinforced a study by Wise (1975) who argued that there was indirect evidence of causality between the quality of an individual's academic achievement and the individual's eventual job performance. Hambleton (1985) also found that preparation for the Certified Purchasing Manager (CPM) enhanced participants' job performance as well as their exam performance.

The results of this study revealed that technicians who possessed ASE certification performed better on the job and had more positive perceptions of their profession than their non-ASE certified counterparts. Moreover, knowledge and experience gained while obtaining ASE certification enhanced a technician's job knowledge and better understanding of his or her expectations in the dealership. In addition, the lower level of customer complaints directed at certified technicians, in contrast to the higher level of complaints filed against non-certified technicians, may be attributed to increased levels of professional knowledge and experience obtained while completing the requirements for certification.

As noted above, non-certified technicians received more customer complaints than their ASE certified counterparts. This perhaps could be attributed to an overall lack of experience, reduced ability to follow written instructions, and inadequate entry level computational abilities that would have been obtained through science and math classes. It is hypothesized that these inadequacies would impact the technician's job performance, affect the dealership's reputation,

and cut into dealership net profitability through a lack of customer loyalty. This study clearly confirmed and also extended the earlier findings of Hambleton (1986), who suggested that the acquisition of certification enhanced both job performance and job satisfaction. This study's implications for automotive service managers and supervisors are very clear. Regardless of any predisposition for or against ASE certification, managers can minimize their risk and maximize their potential gain by employing technicians who are ASE certified.

Recommendations for Practice

Employers in the automotive service industry should stress the importance of educating technicians and providing them with training opportunities whenever possible and affordable. The automotive industry is rapidly changing and today's technicians require commensurate levels of education and training to keep up with the changing technology. Technician shortage problems will only increase unless educators and other people of influence move to change the perception of the profession, provide technicians with a well-equipped and up-to-date work environment, and develop an industry-wide career path for entry level technicians. Automotive dealerships should also take responsibility for providing continuing education opportunities for their employees, either in-house or in the community college, in order to help their technicians keep abreast of the changing technology.

Another important recommendation that stemmed from this study is that dealerships should provide meaningful incentives that link education and training to pay increases for new technicians. Despite whatever intrinsic satisfaction an employee receives from becoming certified, if sufficient monetary rewards are not waiting at the end of that "certification road," fewer and fewer individuals will opt to enter the profession or seek additional training opportunities—no matter how pressing the need. An established pay scale that links pay to

training, award bonuses, and other incentive can profoundly affect the quality of a technician's output. It can also affect the dealership's ability to attract and retain good technicians.

Another important recommendation for practice is that compensation policies should be aligned among local dealers and should keep pace with the changing nature of today's labor market. Dealerships should also develop service strategies or practices that are customer driven, which can drastically reduce customer complaints, thereby creating a loyal customer base. Customers who are dissatisfied are likely to tell twice as many people about poor service than customers who are happy with the service they are provided.

Toyota Motor Sales U.S.A, Inc., for example, has adopted a formula for customer satisfaction that is reducing customer complaints in a significant way. Doing the job right the first time, coupled with effective complaint management, has been proven to result in maximum customer satisfaction and loyalty. This should be the goal for all dealerships. Not surprisingly, technology is also critical in handling customer complaints. Dealerships should use computers to develop and maintain a database of complaints, use the system to follow any negative trends, and then take immediate steps to remedy any problems. Customer complaint information should be electronically compiled and presented to the technicians, supervisors and the managers. To keep technicians in the loop, weekly shop meetings should be scheduled to track work flow and job performance. These meetings could help dealerships better develop strategies to meet customer expectations.

For the employee, ASE certification offers the opportunity to prove to themselves and others that they are among the top in their professional peer group. Certification reflects achievement and demonstrates a commitment to the automotive service and repair profession. It demonstrates the "can do" attitude of an individual who is secure in his or her ability and is more

than happy to prove it. For the employer, ASE certification can be used to evaluate potential new hires. Additionally, the knowledge gained preparing for exams can be directly applied to the service bay. More productivity and fewer “comebacks” are the result. Finally, certification can be used as part of a marketing program for the shop. As increasing numbers of consumers understand what ASE certification means, they will inevitably seek only certified technicians to service their vehicles.

Recommendations for Future Research

Additional research should be undertaken to investigate why some of the employers that were surveyed for this study did not use ASE certification as a criterion for hiring. Moreover, it would also be worthwhile to ascertain if these particular dealerships had more customer complaints than other dealerships who hired only ASE certified technicians. Additional research should be conducted to investigate and understand the divergent viewpoints between certified automotive technicians and their employers regarding the perceived benefits of ASE certification, including why there were considerable variations in hiring standards.

Further research could be conducted to examine other possible ways of predicting job performance in the automotive service industry. Such studies might include an evaluation of work traits such as aptitude, interests, and temperament, and could also include an investigation of whether certain minimal communication and/or physical skills were required to succeed in this profession.

Third, the level of agreement on the benefits of ASE certification between large independent dealerships and small automotive shops could be investigated. The results of such studies could help determine the need for providing ongoing training opportunities for current employees, as well as setting uniform minimum hiring standards throughout the profession.

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APPENDICES

Appendix A. Initial Telephone Approach Script

[When someone answers the phone], researcher will respond as follows:

Researcher: "Hello, my name is Kolo Emmanuel, a researcher doing an automotive study from Virginia Tech. May I speak with the person who hires and supervises your automotive technicians?"

The response may vary and the investigator will then tailor his further questions to the respective varying responses as follows:

Response 1: "That would be Mr. Downs; may I tell him who is calling?"

Researcher: "Yes, this is Kolo Emmanuel, an automotive researcher from Virginia Tech. I'd like to talk to him about the automotive technician field of employment."

Response 2: "I'm sorry, Mr. Downs is not available. May I take a message?"

Researcher: "Yes, but perhaps you can help me. Do you know how many automotive technicians you employ?" [Most receptionists and office managers will know how many technicians the business employs.]

Researcher: "Thank you, and do you know if you have both certified and non-certified technicians? The investigator will make decisions to talk with Mr. Downs by phone or reschedule an appointment and then, in appropriate, proceed with *Appendix B*."

Appendix B. Second Telephone Contact Script

[This script will be used for only those shop managers who employ both certified and non-certified technicians. The purpose is to solicit their input and secure their commitment to participate in this study. The approach used below may need to be modified to make the exchange as natural as possible, possibly necessitating some "small talk" about a non-controversial subject of interest to most automotive personnel, which could increase the level of comfort and the likelihood of the supervisor agreeing to participate in the survey.]

Example:

Researcher: "Mr. Downing, my name is Kolo Emmanuel. How are you today?"

Mr. Downs: "Fine, what can I do for you? I only have a few minutes. When would be the best time to call? What did you say your name was?"

Researcher: "Kolo Emmanuel. I am an automotive researcher. I understand from your receptionist [name] that you currently employ [x number] number of technicians? Is that correct? [Alternatively, the investigator will ask Mr. Down directly.]

Mr. Downs: "Yes, we are looking for two more. Are you looking for a job?"

Researcher: "Thank you for asking. At the present I am involved in a research project that pertains to technician recruitment, so I cannot apply. But Mr. Downs, your input would be very beneficial to this research project and ultimately to employers like yourself who look for good technicians. How does that sound?"

Mr. Downs: "I really don't have the time."

Researcher: Yes, I know how busy you are; that's why we have designed the study to take no more than 10-15 minutes of your time to answer a few questions about your technicians.

And you do not need to disclose their names. Do you have a secretary or an assistant who you trust with confidential personnel information?"

Mr. Downs: "Yes, but she is busy also."

Researcher: [change tempo] Oh by the way, how many of your automotive technicians are ASE-certified?"

Mr. Downs: "Four are now certified. One is studying to take the test and plans to become certified by next year. The other five have no plans to become certified."

Researcher: "How does your company view certification as a recruitment and evaluation measure?"

Mr. Downs: "It's okay. But the company doesn't pay extra for it, if that's what you mean."

Researcher: "Oh, I see." Well, let me ask you this, Mr. Downs, if you are recruiting a new technician, and you have a choice between hiring one who is ASE-certified and one similarly qualified otherwise, but who is not ASE-certified, would you be more likely to hire the certified one or the non-certified one?" [Whether the response is *yes* or *no* the investigator, ask *why?* and acknowledge through reflecting their answers in different words. This also buys the investigator time to jot down the answers.]

Researcher: (concluding) "Mr. Downs, the more I listen, the more I know how valuable your input would be for this study. The purpose is to find out whether or not ASE-certified technicians are more employable and perform better on-the-job than non-certified technicians. Moreover, if you participate, I will send you a copy of the results of the study, free of charge. This would assist you, would it not, in making recommendations to your manager about whether or not to provide monetary or other incentives for ASE certification?"

Mr. Downs: "Well, perhaps."

Researcher: "Thank you, Mr. Downs. So then, will you please allow me to send you this brief, questionnaire evaluation form? Remember, you *or* your confidential secretary can complete it for each category of technician that you recently hired who have completed their probation period. You'll receive the results of the study, compiled from many other dealerships like yours." [The manager is likely to agree here. If not, the researcher can keep negotiating. When commitment is reached, the researcher will make sure that he gets the proper name, address, zip code and telephone number or the direct phone line to his office if there is one. The researcher may also ask for the best time to consult with him by phone if needed].

Appendix C. Cover Letter (First Mailing)

Kolo Emmanuel
Department of Teaching and Learning
Division of Career and Technical Education
Virginia Polytechnic Institute and State University
Blacksburg, Virginia.

January 30, 2004

Service Manager,

Greensboro, NC

Dear Service Manager:

Attached are the questionnaire and evaluation forms that I promised to send. As I mentioned on the telephone, your input is very important, and I do appreciate your participation in the study.

As soon as I have compiled and summarized the study findings, I will send you a copy. I am confident that the report will be a valuable resource to you as an aid in hiring good technicians and assessing their performance. Please keep in mind the following steps to be followed when the questionnaire and evaluation forms are completed.

- 1 Identify all the auto technicians that have been employed in your automobile service department for at least a year.
- 2 From this group, identify the ASE-certified technicians for whom you most recently completed an annual or periodic employee evaluation. Please note for this study that ASE-certified technician are defined as those technicians who have as a minimum passed the ASE certification test in the general engine repair area, but who could also be certified in other areas.
- 3 Complete one questionnaire and one evaluation form for this ASE-certified technician.
- 4 From group of technicians identified in Item #1 above, identify the non-certified technician for whom you most recently completed an annual or periodic employee evaluation. Note for this study that non –certified technicians are defined as those auto technicians who have not passed any ASE certification tests.
- 5 Complete one questionnaire and one evaluation form for this non-certified technician.
- 6 Review the completed questionnaire and evaluation forms for both technicians to be sure no technician names are included. Return the forms to me in the enclosed stamped, addressed envelope.

Please return the form to me by February 30, 2004. If you have any questions, please do not hesitate to call me at (336) 274-7170. Again, many thanks for your participation in this important study.

Sincerely,

Kolo Emmanuel

Appendix D. Second Mailing Cover Letter

February 3, 2005

Department of Teaching and Learning
Division of Career and Technical Education
Virginia Polytechnic Institute and State University
Blacksburg, Virginia.

The Service Manager,

At the beginning of this month you received a survey questionnaire the purpose of which was to evaluate the job performance of ASE certified technicians and non ASE certified technician as perceived by the service managers. As of today, I have not received a response from you. **It is critical that I have your expert opinion.** I am enclosing another survey questionnaire, self addressed, stamped envelope in case the former questionnaire has been misplaced.

The study will not be conclusive with out your input. Please take 10-15 minute and complete the enclosed questionnaire and return it to me by **February 15, 2005 using the enclosed self addressed stamped enveloped.** If you have any question, call me at (252) 217-9165 or (336) 274-7170. Again your expert opinion is required to make this study credible. If you wish to receive the summary of the finding, please enclose your dealer ship business card.

Thank you in advance for your cooperation and valued contribution.

Sincerely
Emmanuel Kolo
Project Coordinator

Appendix E. Questionnaire Form

Directions: Please provide information for all the items below.

General information

1. Your Name _____ Job Title _____ Phone Number _____
2. Company name _____
3. How many automotive technicians do you currently employ? _____
4. Of those, how many are
 - (a) ASE-certified technicians? _____
 - (b) Non-ASE-certified technicians? _____

The following information applies to one of the two technicians selected.

5. Circle the technician's certification status (do not include the person's name).

ASE-Certified technician

Non-certified technician

6. For ASE-certified technicians only, check below all areas in which this technician is certified.

- 1 Engine repair ____
- 2 Automatic Transaxle ____
- 3 Manual Drive Train and Axle ____
- 4 Suspension and steering ____
- 5 Brakes ____
- 6 Electrical and Electronic System ____
- 7 Heating and Air Conditioning ____
- 8 Engine Performance Testing ____

7. Numbers of months with perfect work attendance during the past 12 months: _____ months.

8. Number of customer complaints during the past 12 months: _____ complaints.
9. Number of pay raises during the past 12 months: _____ pay raises.
10. Number of awards received during the past 12 months (e.g., employee of the month, technician of the month): _____ awards.
1. Number of years employed at this dealership _____.

VITAE

Emmanuel Kolo was born on December 25, 1954, in the town of Beji near Zungeru in Nigeria. He completed his primary education at a Baptist day school. After concluding nearly 5 years of training in automotive mechanics at the Verhoeven Technical School in Minna (Nigeria), he was employed by the Niger State government as a technical instructor. During the following three years he taught automotive repair and drafting at various technical colleges in the Niger State, including Minna, Kontagora, and Bida. He later attended Kaduna Polytechnic in Nigeria, where he earned a national diploma in mechanical engineering in 1982. While pursuing this degree, he also earned certifications as a Motor Vehicle Technician II and III and was awarded a full technological certificate by the City & Guilds of London Institute in 1982. In September 1982 he obtained his National Technical Teacher certification from Kaduna Polytechnic, Nigeria. Upon graduation, Kolo returned to the Ministry of Education and was promoted to Higher Technical Instructor – a position he held until 1985 when he was awarded a scholarship to study at North Carolina A&T University. He obtained his B.S. in Vocational Industrial Education from that institution in 1986. After working at various automotive dealerships and industries in North Carolina, Kolo returned to North Carolina A&T where he earned his M.S. in Industrial Education while teaching technology education at that institution. He then enrolled in North Carolina State University, where he received a Diploma in Energy Management in 1996. Kolo then joined the Department of Vocational & Technical Education at Virginia Tech as a Ph.D. candidate under the supervision of Professor Curtis Finch. Kolo is currently program head of industrial systems technology at Martin Community College in Williamston, North Carolina. He successfully defended his doctoral dissertation in March, 2006.