AN ANALYSIS ON WHETHER WISCONSIN HIGH SCHOOL EDUCATORS, OBTAINING CISCO TRAINING OR CERTIFICATION, ARE ENCOUNTERING BARRIERS

By

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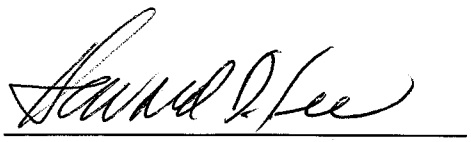

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Abstract

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An analysis on whether Wisconsin high school educators, obtaining Cisco training or certification, are encountering barriers

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As a result of Cisco certification requirement in order to instruct Cisco at the high school, there seems to be a lack of research to determine if Wisconsin educators who are Cisco Instructors at the high school level, are having difficulty in keeping up with Cisco certifications.

Purpose of the Study

The purpose of the study is to determine how Wisconsin Cisco instructors at the high school level, are keeping up with Cisco certifications. A survey will be developed and administered to Cisco high school instructors in Wisconsin.

Review of Literature

The review of the literature presents information pertaining to professions requiring certification including some professions encountering problems while certifying and/or maintaining certifications required for employment. The review of literature

discovered professions are requiring certifications for numerous reasons. Other professions previously not requiring certifications have decided to start and require certifications to raise public image and the public's view of the services they are offering. Jobs in the health care industry and teaching have required certifications as a requirement of employment for many years. The literature demonstrates technical jobs arising as a result of information technology are requiring certifications. Networking is one of these areas. The economy, and jobs offered with in it have caused an increase in a need and demand for technical certifications. Both the need and demand grow as employers desire technically trained employees. As the need and demand for a certified technical workforce grew, so did the need and demand for training and institutions offering training and certification. Providing training and certification was trickling into the high school where it once was the responsibility of corporations seeking technically skilled workers, and two and four year degree institutions. Secondary instructors must maintain a state certification to teach in a content area. With this "trickle down" that certification may not be the only certification required as an instructor teaching technology. An instructor teaching Cisco Networking curriculum at the secondary level must also obtain certification by Cisco.

As the workforce meets the requirements by becoming certified, remaining certified to maintain employment, in addition with remaining current with changing technology and skills, some professions were encountering barriers. The Kentucky Auto Technicians are a prime example. According to a study done on a certification program for auto technicians of Kentucky the mechanics were experiencing barriers such as, lack of certified leaders, time and equipment limitations, turnover in project directors,

and budget limitations, hampered the certification process (Kentucky State Department of Education, 1989). An article discussing the results of a survey conducted in Texas, health professionals ranging from communication disorders, clinical laboratory science, health information management, physical therapy and respiratory care supported the idea of certification/licensure, however "45.3% had difficulty finding accessible, relevant continuing education programs; cost and distance were primary barriers" (Hagus, 2000). If this is occurring in the professions mentioned above, the question remains, do Wisconsin high school Cisco instructors encounter barriers while obtaining and/or maintaining their certification. The certification is required in order to teach the Cisco curriculum at the secondary level as well as other levels.

The decision to obtain quantitative information by utilizing a descriptive research method in determining whether or not Wisconsin high school instructors teaching the Cisco curriculum, are encountering barriers while obtaining and/or maintaining the required Cisco certification. The descriptive research method would best be conducted in the form of a survey. Perhaps Wisconsin secondary educators teaching Cisco Networking curriculum were encountering barriers while obtaining and/or maintaining certification in order to teach the curriculum. Hence, the purpose of the paper is to determine whether or not, Wisconsin secondary educators certified to teach Cisco networking were possibly encountering barriers while maintaining or obtaining their instructor certification to teach the curriculum.

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CHAPTER ONE

Introduction

Background of the Problem

From agriculture, the industrial revolution, and now the information technology revolution, jobs have been changing. Farmers, ranchers, immigrants, and thousands of other individuals, holding different titles, worked the soils of America leaving blood, sweat, and tears to produce corn, oats, grains, and beef, as a means of work, while providing food and a way of life for a growing nation.

Did these workers need proof in establishing they were qualified for what they did? Indirectly they did. Outside the fact that weather influenced the success or failure of crops or a predator helped itself to livestock, their product was proof. Skills, such as, working the land and caring for livestock were the norm and obtained early in childhood, modeled through parents, grandparents and siblings. War inspired changes in the country, and the economy started expanding. Agriculture was anchored as the way of life, however, the war and mass production gave birth to the industrial revolution, developing competition with the aggregate environment. People started pursuing jobs in industry.

Before long the industrial revolution had established roots in society. Soon mass-production, steel mills, the auto industry, a plethora of factories, and manufacturing in large quantities became predominant. As the economy and country changed, so did jobs and the workforce's skills and the demand for skilled workers. The nation and economy began to support a larger population. As the population grew, the need for more healthcare workers and teachers began to increase. Society needed the doctors, dentists, nurses and teachers to provide their services to the growing cities. These

individuals required higher education and training to obtain certificates by the state to provide proof of their skills in performing their jobs. Their training and certification came from universities and teacher colleges.

The skills and training obtained by them were different from shoeing a horse or plowing a field. New jobs demanded skills ranging from mechanical knowledge and training to medical and educational knowledge. Society needed workers with specialized skills to meet society's demands as well as industry's demands. Industry desperately needed laborers capable of running new machinery, fixing the machines, and building them. They were trained on-site the majority of the time, and proof of their knowledge was shown through daily productivity.

While the industrial revolution and the growth of the nation continued, the evolution of new technical inventions sparked another sector in the economy and the job market. This sector was technology. Technology expanded the development of new jobs as well as technical training and skills. As time progressed, machines, inventions, and manufacturing became highly technical and started requiring specialized technical training, education, and experience. On the job training still existed, yet training gravitated towards institutional education and instructional training in preparation for providing a new workforce.

Technical inventions transformed the industrial revolution into the technology revolution. This revolution spawned the growth of many new companies, corporations, and jobs. It is common knowledge that computers are one technology, which became the cash cow of the economy, as well as, a focus of technology. Society started realizing the ramifications of technology and its affect on the availability and access to

information. The internet was finally made public after the government "perfected" it and decided it was time to profit from it. It was a new technology and fast becoming increasingly popular and offering immediate access to information at incredible speeds. As a result, a new field developed called Information Technology, or abbreviated as IT. Information Technology, as defined by Richard Greenberg, "is the study, design, development, implementation, support of management of computer-based information systems, particularly software applications and computer hardware" (Greenberg, 2000).

As technology grew, so did the demand for technically adept skilled workers. Hence, the skilled worker, once again, had to change hats. Training established from previous occupational experiences, depending on the area, had little impact in most cases. In many instances, the individual needed additional technical training to develop the skill(s) necessary to obtain, or maintain the job in the IT field. Companies began looking for evidence of employee qualifications in paper credentials regarding technical knowledge.

This concept was not new. Other professions mentioned above, have required credentials for years. Teachers, dentists, doctors and nurses all required specialized credentials or certifications and this concept began to take hold in the IT industry quickly. Companies desiring quality Information Technology employees began establishing the criteria that workers obtaining new technical skills should provide proof by providing documentation in the form of a certification. The certificate provided an indication that the individual had obtained the technical skills and competencies to be productive. The job market in IT began to grow and so did the requirement of possessing certification.

"As the demand for Information Technology jobs increases, so does the growth for vendor certifications (Murray & Williams, 1999). In an article written by Wilde (2000), she states, "The strong demand for IT professionals worldwide—and the opportunities that demand presents for those looking for jobs—is perhaps the biggest catalyst in the rise in certification" (p. 214).

Each time the economy changed, the job market changed. As the job market changed, the skills changed to meet the demand. The demand for technically skilled workers out weighed the supply, job opportunity became widespread and wages remained excellent. A high demand for the technically skilled workers remains high. Thousands of jobs presently go unfilled in the IT industry. In an article by Greenberg, there are, "a projected 840,000 IT positions going unfilled this year alone,..." (Greenberg, 2000).

The demand for network and IT specialists remains high. What is amazing is that presently, many major companies and corporations are laying off these same people by the thousands. Skilled workers in the Information Technology field are, in some cases, seeking employment. Is there a need for them (Joachim, 2001).

Boutwell (1997) questions whether there really is a need for these skilled workers. He believes it is a conspiracy plan to promote a labor shortage in these areas to develop a surplus of certified, skilled workers. This will saturate the demand market, and lower costs involved in hiring and compensating theses workers. Perhaps there are two sides to this "need" issue. Maybe it is the process of restructuring for America's new technical economy. Boutwell believes this is due to the fact that we have not survived

competitively in manufacturing. We are loosing jobs to foreign lands that have access to lower cost labor.

According to Boutwell (1997), this society has been going crazy issuing degrees from colleges. The educational institution is over educating our workforce, handing out diplomas left and right, without heeding the fact, there is a lack of opportunity regarding many jobs. There was a huge outcry for educators to encourage students into taking more math and science. Enrollment did increase, yet, the availability of those jobs did not. The push to educate and train workers is intense.

The training may not be needed. Not needed? Even though the insane, savagely, persistent, outcry for skilled IT workers still persists, Boutwell (1997) believes there is a lack of quality jobs waiting for individuals pursuing higher education for employment. Boutwell maintains that it is all a part of the fore-mentioned plan for economic change. Reduce the demand by providing a plethora of skilled workers thus reducing the costs by allowing downsizing (Boutwell, 1997).

Yet, the need for technical workers is growing at such a tremendous rate that companies like Cisco (a data networking company, which produces internet hardware and software products that are utilized by, literally, thousands of companies, world wide, handling internet and data transfer needs) are dispersing their training via special training workshops, universities, two-year technical or community colleges, and now even high schools (Wilde, 2000).

Look in the newspapers and compare them to technical journal articles. Newspapers are projecting devastating layoffs, while many journals are highlighting the need for more IT professionals with certifications

> "There still is a need for skilled workers. That's not to say that the labor market hasn't eased. Some 600,000 IT jobs remain unfilled, compared with over 1 million jobs a year ago, said Meta Group analyst Maria Schafer, who's about to issue a report based on a survey of IT and compensation managers at 500 North American companies" (Joachim, 2001).

No matter which side is viewed, the need for technical workers is still present and will become more prevalent as society increases its progression and utilization of technology. Society is trying to address the issue of training and certifying our workers at four year and two-year institutions and now is looking into high schools nationally (Vannierop, 2001).

As mentioned above, individual companies such as Cisco, are also taking this matter into their own hands. Cisco is a company based out of California which manufactures hardware components for Ethernet networks which the internet utilizes. The company is so large that it has created its own demand for technically trained skilled workers. In order to meet its demand, the company has developed their own curriculum from their very own training, offered it to universities, two-year community colleges and technical colleges and then eased it into many high schools.

The instructors teaching Cisco One, Two, Three, and Four must obtain, and maintain, the Cisco Certified Network Associate certification as a requirement to teach all four courses. High school teachers from many different backgrounds have 'stepped up to the plate', and have taken the training, obtained the certification, and now teach Cisco networking curriculum. After receiving this certification, the instructor must retake

the course as a refresher and re-certify once every three years. The instructor must keep up with Cisco's requirements as well as maintain a Wisconsin teaching license. Wisconsin requires six credits every five years in order for an educator to maintain their licensure.

Without a doubt, information technology education is growing. Many districts, and their computer/technology educators, are pursuing Cisco certification in order to provide networking courses to their youth. This is an attempt to meet new state standards implemented in the area of information technology, which will present students with greater opportunities in today's technical job market. Students need the option to build basic technological skills, vital for their future occupations and success.

Educators responsible for teaching their subject matter and perhaps technology such as networking, must not only keep up with the Wisconsin State teaching license, but also with other technical certification. In this case, the license is Cisco's Certified Network Associate. The question is, while trying to obtain training or maintain certification, are educators experiencing barriers during the process? More specifically: are Wisconsin high school educators who are teaching Cisco encountering barriers in obtaining and maintaining Cisco's training and certification?

Information from this question is valuable for companies like Cisco and school districts implementing computer-network training curriculum at the high school level. Data from research may enlighten such entities of possible problems or barriers educators are having in obtaining and maintaining Cisco training and certification. This data would be very pertinent to many school districts which have committed to Cisco

and are dedicating limited monetary resources in order to support this growing information technology area.

Any information gathered may also help instructors pursing Cisco training and certification in planning and preparing to do so. School districts and high school Cisco instructors need to work with Cisco in identifying problematic areas or barriers in obtaining and maintaining the training and certification to assist in proficiency and efficiency of the certification process. Perhaps the research can assist Cisco, the school districts, and the high school instructors by establishing a need to develop alternative strategies in providing training to obtain and maintain Cisco certification.

Statement of the Problem

Obtaining and maintaining Cisco training and certification for Wisconsin instructors at the high school level may be a serious problem. The barriers Wisconsin high school educators are encountering while keeping up with maintaining Cisco training and certification requirements is not known.

Purpose of the Study

The purpose of the study is to identify barriers Wisconsin instructors at the high school level are encountering, as measured by a survey, with regards to obtaining and maintaining Cisco training and certifications.

Research Objectives

The following research objectives will be addressed by this study:

1. Determine the barriers in obtaining and maintaining the CCNA training and/or certification.

2. Identify the affect that an assistance plan had on obtaining or maintaining the Cisco CCNA certification.
3. Identify any district or school requirements in obtaining the Cisco training or CCNA certification.
4. Determine if there is any difference in barriers based on demographics.

Significance of the Study

1. The importance of the study is to identify the types of barriers, if any, Wisconsin instructors at the high school level encounter when obtaining and maintaining Cisco training and certification. The data can aid Wisconsin instructors, school districts, and Cisco in developing strategies to alleviate barriers by improving the process of obtaining and maintaining Cisco training and certification.
2. To identify if the 24 months required by Cisco to obtain Cisco CCNA certification, after completing the instructor's academies to teach the curriculum, is enough time. This will help determine if the time provided should remain the same or be modified.
3. The study may add to the present state of knowledge or may advance the knowledge in the areas of processes and availability of obtaining and maintaining Cisco training and certification concerning all educators seeking Cisco CCNA.
4. Cisco may desire the data to evaluate standards, policies, and other issues highlighted concerning the possession and maintenance of a Cisco

certification to become an instructor. This can assist in the success of the implementation of new Cisco programs within the state.

Limitations

1. The group of Cisco instructors surveyed will be high school Cisco instructors, instructing only in Wisconsin. This demographically narrows the amount of data and information specifically to the state of Wisconsin. The data gathered will not provide information reflecting all high school Cisco instructors nationwide.
2. The group of high school Cisco instructors surveyed came from lists of email addresses limited to a combination of sources, the Department of Public Instruction and a list of Cisco Instructor email addresses from other instructors. There may be other instructors not contacted due to the fact they are not on the list or the wrong email address is listed.
3. Only high school Cisco instructors were surveyed. University professors, community and technical colleges and private institution instructors, instructing Cisco, will not be sampled. The data will not determine if similar barriers are being experienced in post-secondary levels and, perhaps, some private industry training companies.
4. The survey was conducted via email during the summer months. Not all instructors on the list may be reachable; instructors may not utilize school email during this time. The return rate may be low because of other factors uncontrollable by the researcher.

5. The time to conduct the survey, collect the data, and analyze the data was limited to the later part of the summer months based upon the researcher's courses and professional job responsibilities. This offered a very limited amount of time to complete everything in an attempt to graduate by August.

Definition of Terms

A+ Certification: Is an industry recognized credential that certifies the competency of PC Service Specialists (Network Learning Center, no date).

Brazer: Welder of pipes.

Certification: 2: confirmation that some fact or statement is true [syn: documentation, corroboration] 3: a document attesting to the truth of certain stated facts [syn: certificate, credential, credentials] 4: validating the authenticity of something or someone [syn: authentication]. Source: WordNet @ 1.6, c 1997 Princeton University (High Tech Dictionary, no date).

Cisco: Cisco Systems is the worldwide leader in networking for the Internet. Cisco's networking solutions connect people, computing devices and computer networks, allowing people to access or transfer information without regard to differences in time, place or type of computer system (Cisco Systems, no date). Cisco: A San Jose, California company which manufactures hardware for Ethernets, and other products (High Tech Dictionary, no date).

Cisco Certified Internetwork Expert (CCIE): Certification designed to ensure that individuals have expert level of internetwork knowledge (High Tech Dictionary, no date).

Cisco Certified Network Associate (CCNA): The Cisco Certified Network Associate has demonstrated mastery of a wide range of networking knowledge (High Tech Dictionary, no date).

Cisco Instructor: A person responsible for the instruction of a Networking Academy program at the CATC, Regional, or Local levels), themselves obtain the certification and keep up with the technology (Cisco Systems, no date).

Computer Hardware: The hardware is the physical part of a computer system; the machinery and equipment. Software means the programs that tell the computer what to do (High Tech Dictionary, no date).

Computer Software: Software is the program that directs a computer on what to do. Hardware is the physical part of a computer system; the machinery and equipment (High Tech Dictionary, no date).

Database: A large collection of data organized for rapid search and retrieval. 2.A program that manages data, and can be used to store, retrieve, and sort information.Examples are Lotus Approach, Microsoft Access, Filemaker (High Tech Dictionary, no date).

Data Communication: The transfer of data from one computer to another (High Tech Dictionary, no date).

Ethernet: The most popular type of local area network, which sends its communications through radio frequency signals carried by a coaxial cable. Each computer checks to see if another computer is transmitting and waits its turn to transmit. If two computers accidentally transmit at the same time and their messages collide, they wait and send again in turn (High Tech Dictionary, no date).

Information Systems (Management Information Systems): The study of effective systems for the development and use of information in an organization (High Tech Dictionary, no date).

Information Technology (IT): The technology of data processing/information management (High Tech Dictionary, no date). Defined in an article written by Richard Greenberg: "IT is the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware" (Greenberg, 2000, p. 26).

Interoperability: The ability of software and hardware on different machines to communicate with each other (High Tech Dictionary, no date).

Internet: Largest global internetwork, connecting tens of thousands of networks worldwide and having a "culture" that focuses on research and standardization based on real-life use. Many leading-edge network technologies come from the Internet community (Cisco Systems, no date).

Internetwork: Collection of networks interconnected by routers and other devices that functions (generally) as a single network. Sometimes called an internet, which is not to be confused with the Internet (Cisco Systems, no date).

Internetworking: General term used to refer to the industry devoted to connecting networks together. The term can refer to products, procedures, and technologies (Cisco Systems, no date).

Local Area Network (LAN): A network that connects computers that are close to each other, usually in the same building, linked by a cable (High Tech Dictionary, no date).

Microsoft (Corporation): A Redmond, Washington company founded in 1975 by Bill Gates and Paul Allen (High Tech Dictionary, no date).

Microsoft Certified System Engineer (MCSE): Certification level from Microsoft for technical specialists in Windows_NT and other Microsoft software (High Tech Dictionary, no date).

Microsoft Certified Trainer (MCT): Microsoft says Microsoft Certified Trainers are qualified instructionally and certified technically to deliver Microsoft Official Curriculum instructor-led courses at Microsoft Certified Technical Education Centers (Microsoft Cytec's) and Authorized Academic Training Program (AATP) institutions, or independently (Computing & Technology, no date).

Net + Certification: Network+ is a CompTIA vendor neutral certification that measures the technical knowledge of networking professionals with 18 - 24 months experience in the IT industry. The test is administered by NCS/VUE and Prometric (Computing & Technology, no date).

Network: Collection of computers, printers, routers, switches, and other devices that are able to communicate with each other over some transmission medium (Cisco Systems, no date).

Network Administrator: The person who is responsible for setting up and maintaining a network. Duties of the administrator include installing software, assigning passwords, making backups, and finding a way to restore the network when it goes down (High Tech Dictionary, no date).

Network Specialists: Person who specializes in working with networks.

Network Server: A central computer that stores files for a network (High Tech Dictionary, no date).

NetWare: From Novell, the most widely used software for local area networks, available for DOS, Macintosh, OS/2, VAX, and UNIX.Ethernet, Token Ring, and other configurations can be used with NetWare (High Tech Dictionary, no date).

Novell: Novell(Inc): A software company in Provo, Utah, known mainly for Novell NetWare and other networking products (High Tech Dictionary, no date).

Vendor Neutral: Not specific to any company or training.

Ophthalmology: The branch of medicine that deals with the anatomy, functions, pathology, and treatment of the eye (High Tech Dictionary, no date).

Server: The computer in a client/server architecture that supplies files or services. The computer that requests services is called the client. The client may request file transfer, remote logins, printing, or other available services. See Network Server (High Tech Dictionary, no date).

System Administrator: The person in charge of a multi-user computer system, also called sys admin. The system administrator designs the system and manages its use (High Tech Dictionary, no date).

System Analyst: Also called Systems Analyst. A person who designs or modifies an information system to meet the requirements of its end user. System analysis includes investigating the program's feasibility and cost, producing documentation, and testing a prototype of the system at several stages of its design (High Tech Dictionary, no date).

CHAPTER TWO

Review of Literature

Brief History of Technological Change

The purpose of the study was to identify barriers Wisconsin high school instructors are encountering while obtaining and/or maintaining training and certification to teach Cisco networking. The following paragraphs describe a brief history of the technological changes that evolved as America changed its' economies throughout time. Looking back though history anyone can see the nation evolved from an agricultural economy through the industrial revolution and into the technology revolution. This obviously affected jobs and workforce skills over time. During the transformation into the industrial revolution, one could conclude the changes in the economy enabled society to support a larger population and as the population grew it spurred growth in healthcare occupations, education, and skilled laborers to support that population and meet the needs and demands of the economy and workforce.

Occupations such as nurses and teachers have employed individuals possessing credentials and certification in order to perform their duties for quite some time. As the economy changed and technology progressed anyone could safely assume the workforce needed to possess technical skills and training in order to meet the demands of the companies and corporations arising within the technical economy. Technical jobs eventually determined a need for certification to provide some type of evidence qualifying skills for the job just as nurses and teachers did. For instance, in an article written by P.J. Connolly and Tom Yager about information technology certificates for the technology magazine InfoWorld the title asks: Do certificates matter? Connolly and

Yager debate the issue, however, Connolly makes a statement that supports the paragraph above, "From an employer's perspective, certificates can provide an easy way to identify qualified candidates" (Connolly, 2001).

Further supporting technical certifications as a means of providing evidence of an technical professional's competency, an article written by Deborah Murray and Robert Williams called: "Certification Comes of Age" some of the several listed advantages the certification provides to the professional and employer are as follows: ensures a consistent level of competency, assures expertise and a defined skill set, improves quality and support, verifies knowledge mastery and objectively measures skills. The article goes on to state: "Certification is a proven test of competence and an effective way to augment the lifelong path of learning." It is, "why corporations are beginning to mandate certification due to monetary and time allocation commitments. They want to be assured of reliable sources and a guarantee for their investments in technology and staff" (Murray & Williams, 1999).

As technology grew, so did demand for a certified skilled workforce. Companies and corporations started to see the necessity to provide training and education for people to obtain the skills and meet the needs and demands of the new jobs they were trying to fill. As time went on, those companies and corporations, in turn, pressured the educational system to provide the training and education. Cisco is one of those companies. As mentioned in Chapter one, Cisco is a data networking company, which produces internet hardware and software products that are utilized by literally thousands of companies world wide, handling internet and data transfer needs. Responsibility

shifted from Cisco providing the training, to four year and two year institutions and community/technical colleges (Greenberg, 2000).

The review of literature will explore occupations that have required certification and still do. Certification in the workforce arose in order to provide proof of a worker's qualifications and abilities to perform the job and establish professionalism within the profession. Literature pertaining to the types of technical certifications and the information technology sector's need and demand for a certified and qualified workforce will also be revealed. This demand sparked a transition in training and certification with two and four year degree institutions and even the high schools taking on the task of this training to meet the demands. The review of literature will also cover other occupations that require certifications encountering barriers related to obtaining and maintaining certifications.

Occupations with Certifications

As mentioned above, the nation progressed through economic changes from agriculture into industry and then manufacturing. The country expanded and the population grew. With a larger population and new economies, old and new jobs began evolving, changing requirements of the workforce to meet the labor demands of industry and society. A greater need for health care workers, teachers, and skilled laborers developed. Occupations having established competency, accountability, professionalism, and quality assurance by requiring certifications are physicians, nurses, teachers, electricians, and welders (brazers). They require certification as part of the profession to provide a good public image, stay current on techniques and

technology, protect themselves from liability, and also to prove competency and add value to the profession.

Support for the above statement can be established through the following articles. Physicians need certification in order to practice medicine, however, they also are certifying. Dr. Abbott, a professor of Ophthalmology at the University of California in San Francisco and member of the Board of Directors of the American Board of Ophthalmology (ABO) seems to supports this by stating, "The public wants to make sure that doctors are safe. They and their organizations have been pushing the process of certification", "Certification can assure the public and the medical profession that physicians are capable of delivering patient care in a particular specialty" (Scerra, 2001).

Other professions, such as, welders and electricians are ensuring competencies. They are discovering that by requiring certifications, these skilled workers are not only keeping up-to-date with standards, codes, and new technology, they are also setting precedence. Not any welder or electrician can walk off the street with a general certificate and can do the work. The requirement is the individual must be a certified in specific areas. A title from, Air Conditioning Heating & Refrigeration News, 2001 reads, "New Certifications Required in Washington, Oregon". The article mentions how the state of Washington is requiring new certifications in the brazing and electrical professions. Brazers (welders) had until July 2001 to pass their test. It is now mandatory that they posses a certification in order to provide proof of competency in their area. Electricians are following suit. Washington legislation states electricians must be certified by March 1, 2002 (Siegel, 2001). The professions mentioned are requiring

general or specific certifications other than the health care industry. One profession seems to be encountering a few obstacles pertaining to maintaining/obtaining certification for the profession. However, a new sector growing with society's technical demands is information technology.

Information technology has been evolving and it has fast become one of society's newest occupations requiring certification. Information Technology (IT), is defined in an article written by Richard Greenberg, which states that: "IT is the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware" (Greenberg, 2000). Certifications relating to technology and information technology are highly specialized, and are becoming an expectation and requirement in the IT industry. Workers need to pursue the certifications to meet employment criteria to acquire the job.

IT Certifications

Certification is not a new concept and is important to the previously mentioned occupations for they provide the proof to the public that the individual is qualified to perform his/her job. Companies and corporations dealing with technological equipment and technology are in need of qualified IT professionals. It is for this reason they are following suit. Companies demand certifications as proof of skills and utilize this in determining hiring. The demand by the companies forces IT workers to obtain the certification in order to obtain the job. Some IT industry certifications are: Microsoft Certified System Engineer (MCSE), Microsoft Certified Trainer (MCT), Cisco's Cisco Certified Network Associate (CCNA), and Cisco Certified Internetwork Expert (CCIE).

There are presently 300 types of certifications in the IT industry. Following are some explanations as to what some of the above certifications entail. The MCSE is defined on the Microsoft web page as, "The Microsoft Certified Systems Engineer credential is the premier certification for professionals who analyze the business requirements and design and implement the infrastructure for business solutions based on the Microsoft Windows 2000 platform and Microsoft server software. Implementation responsibilities include installing, configuring, and troubleshooting network systems." The MCT is the certification to become a Microsoft Trainer, training others in using software offered by Microsoft (*Microsoft Certified* Trainer, no date).

What is Cisco CCNA? "The CCNA (Cisco Certified Network Associate) certification indicates a foundation in and apprentice knowledge of networking for the small office/home office (SOHO) market. CCNA certified professionals can install, configure, and operate LAN, WAN, and dial access services for small networks (100 nodes or fewer..." Next would be the CCIE. "CCIE status certifies an individual's networking skills at the expert level" (*About the program,* no date).

Once a certification is obtained, the IT industry jobs range widely, depending upon what responsibilities accompany the certification. There are many jobs with many certifications. Here are a few: Network specialists are trained in knowing: how to design, setup, and run the wires, program special hardware which handle the data from the internet, and run a lab so users can obtain the necessary data for a company. Systems Analysts are responsible for solving problems related to the hardware and software of a company so that technology meets the company's needs and works efficiently (Greenberg, 2000).

Computer and Information Systems Managers manage the personnel mentioned above plus many others. Computer Servicing and Repair Specialists are responsible for repairing hardware and software troubles on an individual computer or a server (Greenberg, 2000). All of these jobs require some type of certification and perhaps multiple certifications. A common fact is that technology will continue to advance. Hence, the conclusion that technical jobs will continue to develop along with certifications could be made. As the need for technically skilled IT workers continues to grow, demand for certifications will follow in its' path.

Need/Demand for IT Certification

Is there a need for certification? There is a need for certifications and professionals are obtaining them. Information technology professionals are obtaining them because the possession of a certification(s) is beneficial in the job search. The certification can also establish one's competence in specific talents and areas setting the perspective candidate above the rest in the search for employment. The diploma and the certification are distinguishing professionals from one another by placing them at different levels of competency. The National Organization for Competency Assurance, in Washington, D.C. states, "With a business climate that demands heightened specialization and demonstrated skills, it's no wonder that more and more professions are promoting certification as a way of differentiating profession leaders from less-qualified colleagues" (Cottrell, 2001). Debra Cohen answers the question of the title of her article, "Is Certification In Your Future?" by stating, "Not only is certification here to stay, it is likely to increase in importance and stature with each

passing year." This is in regards to the Human Resource profession in establishing certifications are not just in the technology fields (Cohen, 2001).

Are IT professionals getting technically certified? According to Deborah Murray and Robert Williams, the information provided in Table 1 of their article, "Certification Comes of Age", there was a 55% increase in IT professionals seeking multiple certifications, and a 12% increase in IT professionals seeking certification for career development. They also stated, "The value of Information Technology (IT) industry certification is at an all-time high in the minds of corporate managers and IT professionals alike" (Murray & Williams, 1999). According to the Murray and Williams, it appears professionals are getting certified.

The following excerpt helps establish, further, the notion that IT professionals are getting certified. "IT certification is on the rise, according to vendors and analysts. Clifford Adelman, a senior research analyst with the United States Department of Education, estimates that as of last year, IT vendors had issued 2.4 million certifications to almost 1.6 million people. Microsoft had awarded just 35,000 Microsoft Certified Systems Engineer certificates by the fall of 1997, but that number soared to 231,000 by February 2000. For the more rarified Microsoft Certified Solutions Developer, the numbers rose from 3,000 to nearly 24,000 in the same period" (Wilde, 2000).

Is there a need for certifications in the IT industry? The information technology job market is steadily experiencing severe growing pains. The expectation of possessing technical certification is a serious issue evolving, growing, and increasing yearly. As services, business, e-business, networking, and the IT industry grow, they also continue to expand the technology they utilize. So does the demand for highly

skilled technology workers. Companies need to employ workers empowered via training, to allow them to utilize the technology to remain competitive.

Information technology businesses and the industry are involved in a fast-paced market that is changing rapidly due to technology and competition. One way companies competitively keep up with other companies in the IT industry is by establishing requirements and policies that workers must possess specialized certifications verifying and documenting their skills and competencies. Business and industry presently are insisting that these workers can "deliver skills immediately" and are able to "hit the ground running" (Murray & Williams, 1999).

Companies and corporations require the individual to possess the prior training and skills and tender proof of that training, competency, and skills. This competent individual must be able to utilize skills immediately and require minimal initial training. The skilled employee, with a high degree of competency (verified by ownership of a certification), is essential in providing a business the assistance it needs for growth. It is vital for companies to stay a step ahead in highly competitive markets (Murray & Williams, 1999).

Information Technology is the area of industry and business that deals with, yet is not limited to, the analysis and integration of business systems. IT also deals with database administration, computer network administration and design, as well as, programming and software engineering, and technical help to provide troubleshooting (help desks), website development and administration, digital media manipulation, technical writing and editing (Greenberg, 2000).

The IT industry seems to have had a great impact with regards to creating the need and demand for certification. The IT industry was perhaps the pioneer in requiring certification. Novell, Microsoft, and Cisco, are the Information Technology companies that started and continue to fuel the certification process within this industry to deal with the need for highly technical skills required to work on software and hardware. These certifications have, "evolved from the pioneering efforts of Novell to the industry premier programs offered by companies like Microsoft and Cisco" (Murray & Williams, 1999).

The concept becomes common sense. When companies utilize more technology, the demand for these trained, certified workers grows. As the demand for the certified worker grows, so does the need to obtain certification. It becomes simple economic supply and demand. Technology certification is having an enormous impact on our job market, and employees.

According to authors, Murray and Williams (1999), their title says it all. Certification Comes of Age. It indeed is coming of age. The need for IT professionals possessing the proper training, experience, and certification in order to satisfy the specialized careers in today's job-market, is here to stay. So is certification itself. The need for certification is prevailing and is on the increase in the Information Technology industry (Murray & Williams, 1999).

If the command for IT certification is in such high regard, as stated in the Murray Williams article, do companies like Microsoft, Cisco, and Novell need to know if and how many professionals are getting certified? The information listed below would seem to be very pertinent information.

Is there a growing need for technically skilled workers with certifications? IT professionals are those technically skilled workers. The demand for IT workers is alarming. There are thousands, tens of thousands, even hundreds of thousands of jobs in the IT field that go unfilled. In an article by Greenberg, there are, "a projected 840,000 IT positions going unfilled this year alone..." (Greenberg, 2000).

The demand for computer technicians and specialized workers in this area is on the increase (Smith, 1998). Take, for instance, Tulsa-based, Williams Communications, which employs 3,000 people locally, yet needs to hire 435 more skilled workers just to monitor a network. City wide 54,000 high tech workers "illustrate the city's transformation from 'Oil Capital of the World' into and emerging high tech hub in 15 years" (Boyd, 2000). They want to keep the jobs at home! With the high demand for technicians and certifications a question must be asked. Which institutions are providing education and training to allow the workforce the opportunity to obtain certifications? The answer to this question has been changing.

Institutional Transition of Training

Many companies started offering training sessions themselves by contracting other companies to take care of their training needs. That was an alternative to aid in dispersing training nationally to meet those needs.

Demand forced companies to offer technical training workshops and training camps. Companies like Enterprise Certified Corporation, and the Institute for Technology Training and Excellence (ITTE), took on the task of providing the training. Enterprise Certified Corporation is a "vendor neutral organization offering an assortment of services to ensure certified enterprise interoperability of products, organizations and

IT engineering professionals." The Institute for Technology Training and Excellence, "ITTE is a provider of emerging technical training with a reputation for producing top-quality, leading-edge workshops presented by some of the most knowledgeable and experienced practitioners in the industry" (Murray & Williams, 1999).

Hiring other companies to provide this training did not seem to be sufficient. Cisco involved Community and Technical colleges. Partnerships with these colleges became a viable way to address the training needs. Examples of this situation are demonstrated by Cisco and Macon Technical Institute in Georgia who teamed up to provide CCNA certificate programs (Wilde, 2000). Cisco also teamed up with Pima Community College in Tucson, Arizona, to offer CCNA.

Still, the community colleges did not seem to be enough. Unique partnerships between Cisco, community colleges, and high schools began to evolve. Cisco and Pima College started to offer the curriculum to high school students. Cisco offered training to high schools through Macon Technical Institute as well (Vannierop, 2001). The demand for certified technical professionals perhaps created a necessity for secondary education to get involved.

Technical training and curriculum seems to be trickling into high schools shifting the responsibility to secondary educators. Yet, there are teachers who are not yet comfortable with technology in their classrooms (Greenberg, 2000). The teachers who are comfortable may be having difficulty with the fast paced changes concerning the technology. Are teachers involved with technology having difficulties? "Two out of three university professors surveyed, said that trying to keep up with technology is stressful" (McKenna, Avery, & Schuchardt, 2000). Perhaps as technology grows and certifications

grow professions, including IT, are encountering problems and obstacles while obtaining or maintaining training or certifications.

Professions Encountering Barriers While Obtaining Training and/or Certification

Some professions are encountering barriers in obtaining training or certifications. Auto technicians in Kentucky have been subjected to requirements in obtaining certification. The state developed minimum standards auto technicians needed to meet. Upon completion of an established program implemented in 1987, technicians should posses a certification in specific or broad areas of automotive repair. The report states barriers such as, lack of certified leaders, time and equipment limitations, turnover in project directors, and budget limitations, hampered the certification process. This was information gathered from a study done by the state of Kentucky (Kentucky State Department of Education, 1989).

The Journal of Public Health Dentistry (2001) establishes another profession that entails training, certification and barriers. Instructors in Dental Public Health are encountering barriers relating to 193 students surveyed with an 11 item questionnaire are noted. Barriers noted were: "Not enough time at work to pursue these activities", "Other professional interests have priority", "Not enough personal time to pursue these activities, or family obligations", "Little or no perceived professional benefit", "Expenses associated with training costs", and "Too much work to become certified" (Kaste & Sadler, 2001).

It does not stop there. Some states are experiencing severe teacher shortages. Some employees within the schools that perform jobs such as, instructional assistants, aides, and other support personnel, have been recognized as excellent sources to

assist in the shortage. According to information from and abstract on Eubanks and Segun, these individuals are in for a treat. In their transition, they are experiencing barriers similar to other occupations, some are similar to those stated above. It seems that finances, family, time, and institutions themselves pose to be troublesome (Eubanks & Segun, 2001).

However, some occupations that require certification can have barriers in obtaining training or certification however, as other professions encounter difficulties concerning obtaining or maintaining certification, are educators in the IT area encountering similar barriers? Cisco networking certification CCNA is required by Cisco instructors for them to teach Cisco One, Two, Three, and Four. An Instructor is: A person responsible for the instruction of a Networking Academy program at the CATC, Regional, or Local levels (retrieved June 21, 2001 from the World Wide Web: http: //Cisco. netacad.net).

In summary, the evolution of jobs and the workforce has lead to many changes through out the years. Depending upon the profession, some of the changes include the establishment of a certification. The jobs mentioned above vary in regards to their relationship with certifications. Physicians and education have required certifications in the past and evolved along with the new economies. Other occupations joined the certification crusade as increased public demand for proof of skill and ability grew along with a need to project a professional image. The evolution of technology concerning information technology and technical competency spread so fast new jobs required certification as a way to assist in determining candidates and skill. As the hunger for

technically skilled workers propagated so did the need and demand for a certified workforce.

Information Technology professional training needs to become highly accessible. Two-year degree technical schools, community colleges, universities and high schools became providers. The transition placed the responsibility of training in institutional hands. The certification "infection" spread and certain occupations seemed to have difficulty with maintaining training and certification.

CHAPTER THREE

Methodology

Methods and Procedures

The methods and procedures used to analyze whether Wisconsin high school educators, obtaining or maintaining Cisco certification, are encountering barriers, are explained within this chapter under the headings of (1) method of study, (2) sample selection, (3) instrumentation, (4) pilot study (5) procedures followed, and (6) limitations (7) data collection and recording (8) data analysis.

Method of Study

The study of whether Wisconsin high school instructors teaching Cisco Networking are encountering barriers while obtaining/maintaining training and/or certification evolved while researching literature pertaining to occupations which have credentials and certifications, new jobs in the Information Technology industry that require certification, and occupations that encounter barriers while obtaining/maintaining training for certification.

This study makes an effort to obtain quantitative information utilizing a descriptive research method attempting to establish whether or not Wisconsin high school instructors teaching the Cisco curriculum are encountering barriers while obtaining and/or maintaining the certification required by Cisco. The descriptive research method would be conducted in the form of an email survey. Prior to developing this survey, specific objectives were established assisting in the development of the survey.

The objectives are as follows: 1) Determine the barriers, if any, educators encounter while obtaining or maintaining Cisco training and/or certification. 2) Identify any affect an assistance plan had on obtaining or maintaining the Cisco training and/or

certification. 3) Identify district or school requirements in obtaining or maintaining Cisco training and/or certification. 4) Determine if there are any differences in barriers based on demographics.

After these objectives were established, specific questions relating to each objective became the foundation of a survey instrument. The survey was designed by utilizing objectives, the questions written to gather information relating to the objectives, and a matrix constructed to establish a balance between the numbers of questions relating to each objective. The email survey consisted of 17 mostly yes/no questions. It was developed, reviewed, piloted and sent out to 60 Wisconsin high school instructors teaching Cisco. The majority of the population sample of instructors teaching Cisco at the high school level was gathered from a list of Cisco instructors attending a meeting held by the Wisconsin Department of Public Instruction.

The survey qualified the subject as an instructor, sought to identify whether or not he/she was certified, establish if the respondent has encountered any barriers while obtaining/maintaining, training and/or certification, and gather demographic data to utilize in comparing variables.

Population Selection

Population selection consisted of Wisconsin high school teachers presently certified to teach Cisco networking or training to certify in order to teach Cisco networking. The selection of subjects was based upon the criteria instructors were obtaining or maintaining the Cisco Networking certification for teaching Cisco networking at the high school level in Wisconsin, grades 9 through 12. The subjects that met the above criteria were selected, yet not limited to, a list of email addresses

obtained while the researcher attended a meeting of Wisconsin high school Cisco instructors held by Wisconsin's Department of Public Instruction in Stevens Point, Wisconsin in April of 2000.

The list of email addresses obtained and utilized for this survey contained 60 high school Cisco instructors from all over the state. The 60 instructors were asked to complete the survey developed by the researcher for the purpose of providing information and data specifically for Wisconsin high school Cisco instructors and their districts in identifying whether or not barriers are being encountered while in the process of obtaining or maintaining Cisco training and certification. The population and size was limited to those in attendance of the meeting and by the availability of instructor email addresses on the list.

Instrumentation

Instrumentation utilized to collect data for the research was a matrix and an email survey. The matrix offered a visual alignment and balance between the number of questions and each objective. The survey was believed to be a convenient, cost effective procedure to quickly ascertain teacher input (Dillman, 2000). The email survey offered the opportunity to ask specific questions and seek specific responses while attempting to compile data proving or disproving the statement of the problem. The email survey developed by the researcher sought to obtain simple data in an attempt to identify whether or not Cisco instructors in Wisconsin high schools are encountering barriers while obtaining and/or maintaining Cisco certification.

Presumed advantages an email survey would provide were: time efficiency, encourages quick responses, and reduce response procrastination. A much higher

response rate was desired based upon the expectation respondents would be more likely to respond electronically. Additional advantages an email survey possesses are: respondents did not have to write anything down, place it into an envelope, and mail it. Using email eliminates the need for postage, paper, or envelopes, hence, the cost savings was significant. An email would more likely be read than that of a letter in the mail (Dillman, 2000).

The survey was developed by first establishing the objectives allowing the researcher to develop specific questions relating to each objective. Questions relating to the objectives were formulated while reviewing articles pertaining to professions relating to certifications. The review of literature allowed the hypothesis that perhaps Wisconsin Cisco instructors at the secondary level were experiencing the same situations. A matrix below was designed to relate questions to objectives and create equity between the questions and objectives. This became the foundation of the survey instrument.

Table 1

Survey matrix

Objectives

1. Determine the barriers in obtaining and maintaining the CCNA certification.
2. Identify the affect that an assistance plan had on obtaining or maintaining the Cisco CCNA certification.
3. Identify any district or school requirements to obtain the Cisco CCNA certification.
4. Determine if there is any difference in barriers based on demographics.

Survey Question	Objective			
	1	2	3	4
1.			X	
2.	X			
3.	X			
4.	X			
5.	X			
6.			X	
7.			X	
8.			X	
9.		X		
10.		X		
11.		X		
12.		X		
13.				X
14.				X
15.				X
16.				X
17.	X			

Objective 1 = 5 questions
Objective 2 = 4 questions
Objective 3 = 4 questions
Objective 4 = 4 questions

The survey instrument had two parts and introductions. The first part was the actual email with an introduction soliciting the need for the subjects help by he/she offering data towards assisting another Cisco instructor complete research that may benefit other instructors obtaining and/or maintaining Cisco certification. This part of the survey also asked respondents to look into the attachment sent with the email. It notified the respondent that enclosed was a brief survey of "yes/no" and "multiple-choice" answers. The second part of the email was the survey written in Microsoft Word and placed as an attachment to the email. It stated any information given would be completely anonymous and confidential. The introduction also stated that the respondent understand that any information given was done so freely and voluntary.

The email addresses of the researcher and the investigation advisor were provided in the event that there may be a complaint or concern pertaining to the survey. Another contact from the University of Wisconsin-Stout's Institutional Review Board for the Protection of Human Subjects in Research was also provided in case any questions or concerns to the participant arose. See Appendix B for a copy of the survey.

The email survey would allow Wisconsin high school Cisco instructors teaching the curriculum, the opportunity to respond to specific questions by answering yes/no, choosing a multiple choice answer, or briefly state his/her own answer. The survey provided the subject with directions to complete it and return it via email. It consisted of questions requesting responses of yes/no to questions that would qualify or establish the respondent as an instructor or to obtain information guiding the respondent to other questions requiring multiple choice answers the subject could choose from. The yes/no answers were created to keep the survey simple, yet obtain specific information and

guide the respondent to questions gathering data for research and provide direction to the respondent as to the next question he/she should respond to.

Multiple choice questions were chosen to allow the respondent a selection of possible choices regarding potential barriers an instructor may have encountered while obtaining or maintaining Cisco certification or training. Leaving open-ended questions may have encouraged respondents to get off the subject and become misdirected as to the purpose of the survey and the information and data desired for the research.

Question 1 established if the subject was even a Cisco instructor. If the subject was not a Cisco instructor the survey was to be disregarded. Question 2 asked if the subject was certified. Question 2 included a Part A and B. If the respondent was certified he/she was instructed to move to question 3. If the respondent was not certified, he/she was directed to part A of question 2. Question 3 requested data from instructors who were certified asking if they had encountered barriers while obtaining certification. If the respondent was not certified they were directed to Part A of question 2 where the respondent was asked to answer yes/no to whether or not they encountered barriers while taking Cisco instructor training. Part B of question 2 related to Part A. If the respondent answered "yes" to Part A, he/she was directed to Part B to select a barrier(s). If the respondent answered "no" to Part A, respondents were to read through the questions and answer the next question pertaining to them. This question was question 5. Questions 1 through 4 sought to identify if the respondent was certified or was obtaining or maintaining that certification and if he/she was encountering barriers. These questions determined if barriers were present while obtaining certification, maintaining certification, or training.

Questions: 2 (part b), 3 and 4, offered the subject multiple-choice selections ranging from A through G. The barriers selected as choices A through G were the result of reviewing articles relating to other professions obtaining and maintaining certifications that were encountering barriers, the researcher's personal experience, and suggestions from the investigation advisor. The barriers offered to the subject are as follows: A: Time, B: Personal Money, C: District Funding, D: Difficulty in learning the material, E: Difficulty in taking the courses, F: Difficulty with passing the exam, and G: Other, offering the respondent a chance to add any other possibilities. These offered the respondent barriers possibly encountered while obtaining or maintaining certification. The purpose of the questions were to distinguish if barriers were encountered at all and/or if instructors encounter barriers more frequently while obtaining or maintaining Cisco certification.

Question 5 asked respondents if they felt the 24-month requirement to obtain the Cisco certification after taking training, was enough time. This was an attempt to identify whether this requirement was causing any difficulties in obtaining or maintaining the Cisco certification. Perhaps the 24 month requirement was a barrier. Questions 6 and 7 of the instrument attempt to identify whether or not the respondent's school or district imposed any requirements while obtaining CCNA or refresher courses. A "yes" answer offered a space for a brief explanation attempting to identify what those requirements may have been. These questions sought to identify any relationship between the possibility of barriers deriving from imposed requirements by the school or the school district. Question 8 sought to establish whether or not it was necessary for the high school instructor to obtain the CCNA certification in order to teach the curriculum.

Question 8 sought to identify whether or not Wisconsin Cisco instructors teaching Cisco curriculum at the secondary level felt it was necessary to obtain the certification in order to teach the curriculum. Questions 9 through 12 sought to establish whether or not an assistance plan was in place for instructors while obtaining or maintaining Cisco training or certification. Did Wisconsin Cisco instructors teaching at the secondary level have assistance available to help obtain/maintain the training and/or certification? The "yes/no" answers from questions 9 and 10 may provide simple statistical data demonstrating a relationship between the instructor encountering barriers and an assistance plan in place helping him/her obtain or maintain the certification.

Questions 13 through 16 were questions seeking demographic information from the respondent. The last question, question 17, offered the respondent the opportunity to add any barriers they deemed necessary to identify. Perhaps a relationship between barriers encountered and the respondent's demographics would arise. A hard copy of the instrument was created and submitted for approval by the UW-Stout Human Subjects Department.

A list of 60 email addresses of Cisco instructors in Wisconsin teaching at the secondary level was developed and marked as responses came in. Upon receiving a response, a checkmark would go next to the respondent's email address showing a completed survey was received. A record of who responded, or not, was developed by placing a "Y" next to the email address of a respondent who did respond. The answers given by the respondent were printed out and marked with the number in the order it was received, i.e. 1, 2, 3.... Another document in the recording process was developed. This document had each survey question written on it. Under the question the number

of the respondent with his/her answers was placed. An example: There were nine responses. Question one read, "Are you currently a Cisco instructor or becoming a Cisco instructor?" This question required a "yes/no" answer. When the first response came back, the researcher checked the email address off on the list confirming completion, placed a "Y" by it and then wrote a number one on the printed response. The number one was placed under question one and to the right of the number was the response. This same format continued throughout the collection period of the research. When all data collection was complete, the document had all 17 questions on it and under each question were the nine responses with their answers to the right of the respondent's number. See Appendix C for an example of the data collection document.

Pilot Study

A decision was made to pilot the instrument to determine whether or not the directions and questions were clearly stated. It was necessary to find out if the multiple-choice questions contained appropriate answers for the respondent. The test-run would check the flow and continuity of the survey. It would demonstrate the feasibility of emailing the survey, obtaining the responses, and finally, if the barriers listed as possible answers to the multiple-choice questions were legitimate possibilities for Cisco instructors. The piloting of the survey was crucial in establishing whether or not the questions were pertinent to the objectives and would gather the information related to the objectives relating to whether or not high school Cisco instructors were encountering barriers while obtaining training or certification.

A preliminary email survey was then sent to three Cisco instructors instructing at post-secondary institutions and was presented to the investigation advisor for advice.

The first instructor that replied offered positive feedback regarding the structure of the instrument and its potential to be effective. This instructor also stated the barriers seemed accurate, yet noted that it did not contain a question establishing or qualifying participants as a Cisco instructor in order to establish credibility. The second and third instructors identified the same problem. Both the investigation advisor and instructors suggested including a multiple-choice answer of "other" be provided offering respondents the opportunity to provide a brief comment or suggestion of other possible barriers. As a result, the survey was altered and the very first question of the survey identified whether or not the respondent was a Cisco instructor. The next change made created a multiple-choice answer titled "Other", allowing the respondent to input an answer "other" than that of which was provided. The survey was finalized and checked for grammar, spelling, and the understanding of questions and directions.

Procedures Followed

In June of 2001, a meeting with the program director to develop a preliminary program of study and decide on a preliminary research topic took place. A topic was chosen based upon the researcher's own experiences in obtaining and maintaining certification for Cisco to teach the curriculum at the secondary level. Review of literature extended from June of 2000 to July of 2002. The investigation advisor was chosen and the topic was accepted. Work began on the process of narrowing down the statement of the problem. In July of 2001, a completed form appointing the investigation advisor was turned into the graduate office. Determination that a survey would be the most effective instrument in obtaining data for this descriptive research was established.

Between June and July of 2002, the revised objectives of the study were discussed with the investigation advisor and finalized by the researcher and a Cisco instructor at the University of Wisconsin-Stout. Through reviewing the literature, possibilities of specific questions the survey should address began to surface. Survey questions were developed on the basis of the articles reviewed pertaining to professions relating to certifications, encountering barriers, the researchers own questions, brainstorming with colleagues, and assistance of the investigation advisor. During June of 2002, the completion of University of Wisconsin-Stout's web-based Human Subjects Training required in order to conduct research was completed. The completion of this training enlightens the researcher to regulations, rules, and guidelines relating to obtaining data through instruments. An abstract describing the method of study, statement of the problem, objectives, and type of instrument intended to collect data were sent to the Institutional Review Board (IRB) for approval.

Toward the end of June of 2002, survey questions were developed to meet the objectives established for the study. After reviewing the questions and the objectives with the investigation advisor, a matrix was developed by the researcher. This matrix provided not only a balance between the questions and objectives, but a visual structure relating the questions to the objectives. By the end of June 2002, a preliminary survey instrument was designed utilizing the matrix. The survey instrument contained an introduction of the researcher, an explanation to the proposed participant describing how they were selected, an explanation stating that their participation was voluntary and that any data collected would remain strictly anonymous, how to complete the survey and return it, and finally, a time to return it by.

On July 8, 2002, a preliminary survey was sent out as a pilot survey to three post secondary Cisco instructors. They were asked to take the survey, critique it, and provide feedback as to the survey's validity, the flow of the questions, understanding, and feasibility. The instructors identified a couple of possible problems. The first problem identified that there was no question(s) qualifying the subject as a certified instructor. The second suggested a multiple-choice selection allowing the participant to input an answer. A revision of the survey was made and brought to the investigation advisor for approval July 9, 2002. A final hard copy of the instrument was completed by July 10, 2002. The survey consisted of 17 questions. The questions had mostly yes/no answers and guided the respondent to move on to other multiple-choice questions or make choices. Between July 8, 2002 and July 12, 2002 a list of the 60 subjects was compiled from a meeting of secondary Cisco instructors held by Wisconsin Department of Public Instruction in April of 2000. On July 17, 2002 a letter from the Research Administrator and Human Protection Administrator from University of Wisconsin-Stout's Institutional Review Board for the Protection of Human Subjects (IRB) was received. This letter stated the study was approved and the survey instrument could be sent out.

On July 18, 2002, 1:00 a.m. the survey instrument typed in a Microsoft Word document was attached to a new outgoing email using Microsoft Outlook. The email began by appealing to the subjects to please help in data collection for the purpose of completion of a study for a masters' degree regarding Cisco certifications. The 60 addresses were typed in and entire email survey was sent.

Subjects were given eight days to complete the survey based upon time constraints of the researcher. All responses were to be returned by July 26, 2002. As an

email was returned a checkmark was placed next to the address on the list, followed by a "Y" which represented "yes" this person responded. The response was printed and given a number one if it was the first response back. The respondent number one was marked under questions one through 17 with his/her responses off to the right. After two days, July 20, 2002, 7:30 am, a reminder was sent to those who did not respond and a number two was placed next to the email address to indicate a reminder was sent out. The subject was emailed a reminder only if the absence of a checkmark and/or "Y" was next to the address. This indicated that a response had not been received. The number two placed next to the address indicated the subject received a second email and the first reminder. On July 22, 2002, a third reminder was to be sent out, however, the email server(s) at the University of Wisconsin-Stout "crashed" after a storm. The servers were not functioning until Tuesday, July 25, 2002. Any email responses sent to the researcher's email address were not received at that time. July 26, 2002 was the last day for data collection.

Of the 60 email surveys distributed, only nine were returned. The eight days to respond expired and data was collected on nine responses. In an attempt to expedite data analysis, an appointment was made with Professor Gillette, a University of Wisconsin professor to input the raw data into a computer and analyze the data utilizing various data analysis tests. On July 29, the raw data was taken to Professor Gillette in the form of the document containing the questions and the respondent's answers in rank order. The data needed to be assigned variable numbers to be input into the computer for the statistical programs to utilize and develop possible relationships between the variables. This prepared the raw data for statistical analysis in an attempt

to establish correlation between barriers encountered versus, demographic information, assistance plans, time requirements and the objectives of the study.

Tests such as Npar, Chi-Square frequencies, Ranking, and Moses Test were utilized to determine any significance the data may have. The data was entered into various programs to establish some type of validity. Unfortunately, such a minimal amount of data was gathered from only nine respondents. Based upon this fact it was discovered that there was not a sufficient amount of data to be analyzed. Hence, all appropriate statistical operations were applied by Professor Gillette no correlation, trend, or significance, was established. The data is simple data.

On August 1, 2002, another document was designed in attempt to relate the minimal data accumulated. This document separated the certified and non-certified Cisco instructors and listed them. Across the top of the document the questions were listed in order from 1 through 17 and represented as a Q1 through Q17. Next to the question the objective number was represented by a O1 through O4 representing the four objectives. The answers from each respondent in the order they responded were placed beneath each question and objective.

Continuation of the data analysis would be placed on hold until the following summer. The researcher needed to return home due to personal and professional responsibilities. The following summer brought unforeseen circumstances and an extension was sought and obtained. Over the course of the next year data was analyzed based upon the document created. This document offered a simple visual chart to obtain any results from the simple data.

Data Collection and Recording

As the respondents sent in completed surveys, responses were printed and a log was developed. Each survey question was typed out. As the respondents replied, the data was entered under each question according to the respondent's number based upon the order in which it was received. For example: the first completed survey was obtained and printed. The respondent was identified as respondent one. In the log where the questions were typed out, respondent number one replied "yes" to question one. Under question one of the log, a number one represented "respondent one" and a "Y" was placed to the right of the number, indicating "respondent one" answered "yes" to question one, i.e. Q1, (1 Y). Respondent one answered "No" for question number two. Under question two of the log, a number one was placed to represent "respondent number one" and a "N" was placed next to the number one establishing that respondent one answered "no" to question two, i.e. Q2, (1 N).

If a respondent selected a response from the choices provided, "A" through "G", the letter(s) the respondent identified as his/her answer(s) were placed next to the number which represented the respondent. For example: if respondent 5 answered question 3 with a "yes", the respondent was instructed to choose one or more of the choices provided below the question in order to identify possible barriers. If the respondent chose barriers A, B, and C, an A, B, and C was placed next to the number 5 which represented the fifth respondent, under the third question of the survey, i.e. Q3, (5 A,B,C). The same procedure followed throughout the log for all of the nine respondents.

Once the data was accumulated under the questions another document was designed according to the respondent's rank based upon his/her return number and whether or not he/she was certified as a Cisco instructor. The questions and objectives were placed across the top and to the right of the respondents number were the answers under each question. The purpose of this document was to align the questions and answers according to the objective and respondent. This document would demonstrate whether or not the simple data obtained exposed any relationships the barriers, and other answers had relating to the statement of the problem.

Data Analysis

The raw data required alterations in order to input the data into various programs to analyze what was collected and run comparisons to establish correlation between variables. The raw data was organized by assigning a "yes" answer with a label of 2 and a "no" answer with a label 1. Each question and answer needed to be represented as a variable in the program. There were 39 total variables labeled as var00001through var00039. Question 1 was identified as variable one (var00001). Question 2 was identified as variable two (var00002). Question 3 had multiple responses, hence the first part of question three was identified as variable three (var00003), and selections provided yes/no became variable 4 (var00004). As "A through G", became variables, "A" became variable 5, "B" became variable 6, and so on up to "G" which became variable10.

An explanation is as follows: A question became a variable and the multiple choice answers became a "place". A's, B's, C's etc. to G. If a letter response was chosen for that particular variable, a 1 was placed in the place that would represent the

letter chosen by the respondent. The "1" expressed the respondent selected an A, B, or C. If the respondent chose A, C, and F, for question 3, the data was entered as 1,_,1,_,_,1_. The first 1 represents the barrier A. The blank represents barrier B. The next one represents barrier C and so on. Question 3 with a "yes" answer (variable 11), chose A (variable 12), C (variable 14) and F (variable 17). Each variable received a one in the place of a letter to identify the letter answer.

Table 2 was developed to show the nine respondents and the answers they chose. Below is an example of the grid to assist in the explanation above.

Table 2

Assignment of variables and values to questions and answers

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR7	VAR8	VAR9	VAR10
1	2	1	2	1(A)	B	C	D	E	F	G
2	2	2	1							
3	2	1	1							
4	2	2	2	1	1				1	
5	2	1	2	1	1		1			
6	2	2	1							
7	2	1	2							
8	2	1	1							
9	2	1	2							

The grid shows the nine respondents on the left side. The top of the grid shows the variables. Variable 1 is question 1. Variable 2 is question 2. Variable 3 is question three, however, question three contains multiple-choice selections and is assigned variables up to 10 to represent answers A through G of the multiple choice answers. Variable 11 is question 4 and so on. In question 14, the respondents were asked to establish if their school would be categorized as small, medium, or large. Each category was labeled with a number. A small school was given a 1, medium a 2, and large a 3. The same was done for question 16 where the respondent provided the city in which he/she took CISCO courses for training or certification. There were five areas where courses were taken, hence, five labels (1-5) were given.

Noticing that only nine responses were obtained of 60 email surveys sent out, the researcher determined, only nominal or ordinal level data was obtained. In an attempt to process and analyze the data obtained, the decision to utilize Npar, Chi-Square frequencies, Ranking, and Moses Test, and several other statistical analysis tests was made and performed by Professor Gillette of the University of Wisconsin-Stout. After attempting to process the data utilizing the different statistical programs, it was determined that there was insufficient data to determine any statistical significance.

The next step involved observing the simple data from a spreadsheet created by the researcher, charting who was certified, who was not certified and what their answers were to each question (see Appendix C). Perhaps this would demonstrate whether or not data suggested relationships between the barriers versus certification or non-certification. This analysis would also show any possibilities of statistical significance pertaining to any assistance plan established relating to the barriers, certification, most

common barriers, and any possible role demographics may have. The lack of data was due in part by the unforeseen weaknesses while conducting the research and data collection. Identification of limitations arose as the survey was conducted. These limitations are listed as follows:

1. Only the summer months to email the survey and collect the data and analyze it were allowed due to time restrictions.
2. Instructors may not have been checking their school email on a consistent basis during the summer.
3. Some of the email addresses on the list were not current or in use.
4. Responses arriving during the situation with the University of Wisconsin-Stout's server were not received. It "crashed" and remained out of service for five days. These five days included the weekend.
5. The list of Cisco instructors was not a complete list of all Wisconsin high school Cisco instructors statewide. It contained only the 60 Cisco instructors present at the Department of Public Instruction's meeting in April of 2000, held in Stevens Point.
6. An electronic email survey service provided by the university was overlooked and not utilized which could have made a difference during the email server breakdown.
7. Time restrictions as a result of personal and professional responsibilities to return home limited the time to extend the survey data collection.
8. Instrument questions needed to be more specific. An example would be question 1. This question should have validated whether or not the

instructor was a secondary instructor. Although the email list in the possession of the researcher was compiled of secondary instructors, this would have validated the response.

By utilizing a descriptive data research method and a survey instrument to obtain data relating to the possibility that Cisco instructors in Wisconsin teaching at the secondary level are encountering barriers while obtaining or maintaining Cisco certification, the assumption was made that valid data would provide evidence confirming barriers are encountered or not encountered in relation to the variables listed as barriers on the survey instrument. However, limitations have caused a low response rate and an insignificant amount of data to validate any assumptions.

CHAPTER FOUR

Results and Discussion

Review of Methodology

While reviewing literature pertaining to professions requiring certification, information regarding those professions was discovered and some professions do encounter problems while certifying and or maintaining certifications required for employment. The review of literature also discovered many professions are requiring certifications for numerous reasons. Other professions previously not requiring certifications have decided to switch gears and require certifications to increase their public image and the public's view of the services they are offering. Professions such as networking require certifications as a factor of employment. The economy and jobs offered within it, have caused an increase regarding need and demand for technical certifications. Both the need and demand increased as employers desired technically trained employees. As the need and demand for a certified technical workforce grew, so did the need and demand for training and institutions offering training and certification. Providing training and certification was trickling into the high school where it once was the responsibility of the corporations seeking technically skilled workers, and two and four year degree institutions.

The decision to obtain quantitative information by utilizing a descriptive research method in determining whether or not Wisconsin high school instructors teaching the Cisco curriculum, are encountering barriers while obtaining and/or maintaining the required Cisco certification. The descriptive research method would best be conducted in the form of a survey. Perhaps Wisconsin secondary educators teaching Cisco

Networking curriculum were encountering barriers while obtaining and/or maintaining certification in order to teach the curriculum. Hence, the purpose of the paper is to determine whether or not, Wisconsin secondary educators certified to teach Cisco networking were possibly encountering barriers while maintaining or obtaining their instructor certification to teach the curriculum.

The study as to whether Wisconsin high school instructors teaching Cisco Networking are encountering barriers while obtaining and maintaining training and/or certification evolved through researching literature pertaining to occupations which have credentials and certifications, new jobs in the Information Technology industry that require certification, and occupations that encounter barriers while obtaining and maintaining training and certification. A descriptive research study was selected and an email survey was chosen as the instrument to utilize in obtaining data.

A set of objectives was established to identify specific aspects regarding this topic. A survey was designed in alignment to the objectives seeking information and data pertaining to the topic. The survey consisting of 17 mostly yes/no questions was developed, reviewed, tested and sent out to 60 Wisconsin high school instructors teaching Cisco. The following information is the accumulation of the results of the survey and discussion of the results found.

Findings

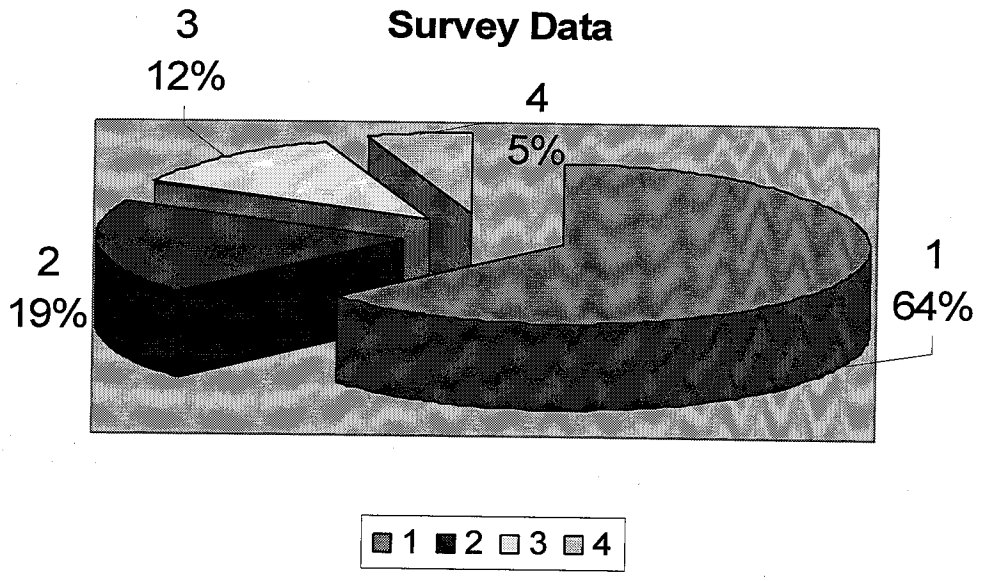
The following paragraphs will state the findings related to the objectives and the questions related to those objectives. The findings will be presented as follows: Objective 4 with questions; 13 through 16 relating to demographics. Objective 3 with questions: 1, 6, 7, 8 relating to schools or districts establishing requirements in obtaining

the Cisco training or CCNA certification. Objective 2 with questions: 9, 10, 11 and 12 attempting to establish any affect an assistance plan may or may not have had on obtaining or maintaining the Cisco CCNA certification. Objective 1 with questions: 2, 3, 4, and 5 seeking to identify barriers in obtaining and maintaining the CCNA training and/or certification. Question 2 is a multi-part question seeking to establish whether or not the respondent is CCNA certified and if the respondent encountered any barriers while training or certifying.

A total of 60 surveys were sent out via email. Thirteen surveys of the 60 were returned. Of the 13 surveys returned, four were no longer Cisco instructors. This left the total number of Cisco instructor responses at nine. Figure 1 organizes the total number of surveys into a visible grouping showing the percents of responses received and not received.

The pie chart below represents the 60 surveys sent out. The large blue portion, (number 1), of the pie represents the 64% of surveys not returned. The purple portion, (number 2), of the pie represents the 19% of surveys returned out of the 60 surveys sent. The gray portion of the pie chart (number 3), represents the 12% of surveys actually returned by Wisconsin high school instructors teaching Cisco. The light blue portion of the pie chart, (number 4), represents 5% of respondents no longer Cisco instructors at the secondary level.

*Figure 1.*Response Pie Chart



Findings relating to objective four are covered in the paragraphs leading up to Figure 1. They deal with questions 13, 14, 15, and 16. These questions relate to objective four in an attempt to identify the significance demographics has in relation to possible barriers identified by the respondents. The demographics of this study were city/town, number of years teaching experience, and if their school district was small, medium, or large.

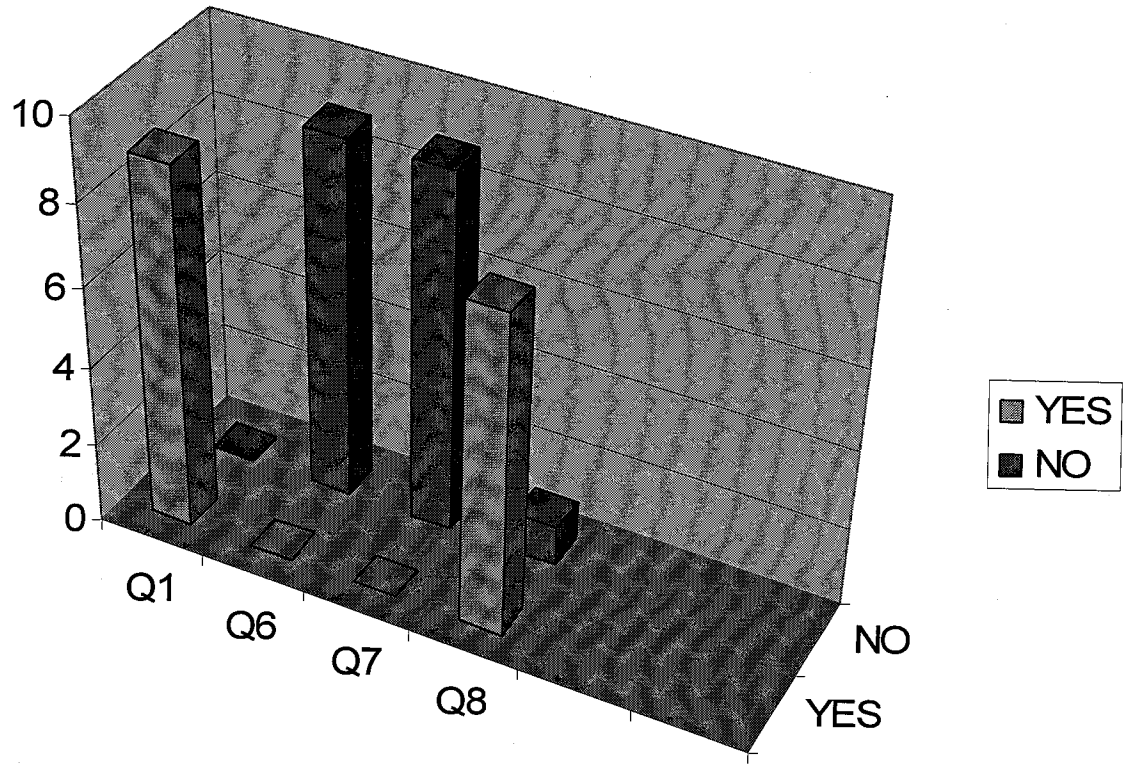
Respondents were from around the state: Milwaukee, St. Francis, Kenosha, La Crosse, West Bend, New Berlin, Menomonie, and Minocqua. The years of experience ranged from seven to 31 years of teaching. One respondent categorized their school as a small district. Four respondents categorized their schools as medium sized, and four categorized their schools as large.

The locations at which the respondents were able to take Cisco courses varied across the state. Four respondents take courses at Milwaukee Area Technical College. One simply stated Milwaukee, while another takes course work in Rhinelander. One

respondent seeks courses in Elkhorn, and one at the University of Wisconsin Stout. One did not know where to take courses.

Findings for objective 3 are covered in the following paragraphs. Questions 1, 6, 7, and 8 were designed to attempt to identify if any schools or districts established requirements in obtaining the Cisco training or CCNA certification. Question 1 asks the respondent if he/she is a Cisco instructor or becoming a Cisco instructor. Of the nine respondents, all nine answered yes. Question 6 attempts to establish if the respondents school or district have any requirements for the respondent to obtain the CCNA certification. All nine respondents answered "no". Question 7 sought to identify whether or not the respondent's school or district had requirements for the instructor to maintain Cisco refresher training courses. Once again, all nine respondents answered "no". The last question addressing research objective 3 is question 8 of the survey. This question attempted to identify if Cisco instructors deemed it necessary for Wisconsin Cisco instructors at the high school level, to obtain the CCNA certification to teach the Cisco curriculum. All nine respondents answered the question. Of the nine respondents, eight answered "no", with respondent 2 the only one that answered "yes". The results can be seen in Figure 2 below.

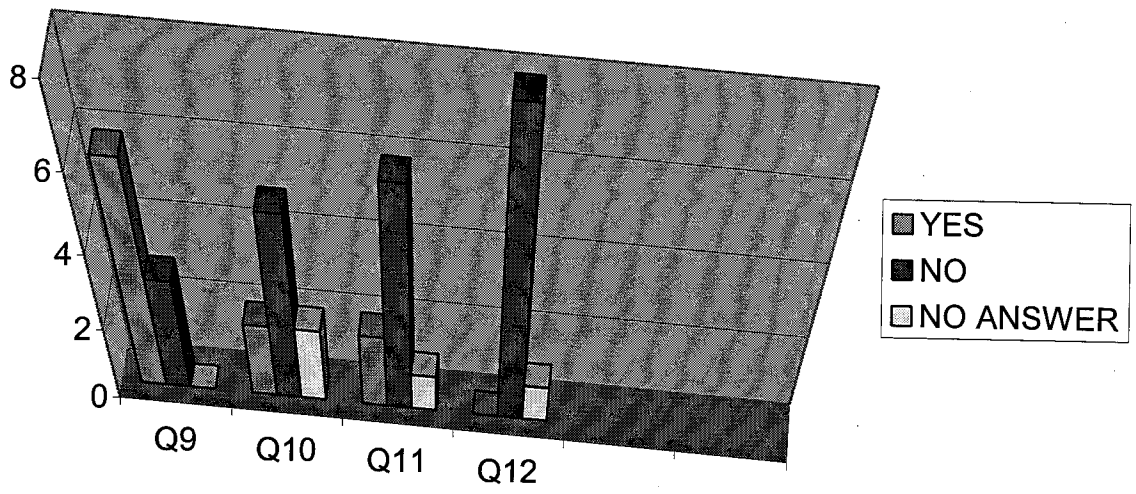
Figure 2. Responses to Questions 1, 6, 7, and 8



The findings for research objective 2 are covered by questions 9, 10, 11 and 12 attempting to establish any affect an assistance plan may or may not have had on obtaining or maintaining the Cisco CCNA certification. The following paragraphs provide the data pertaining to the answers for questions 9, 10, 11, and 12. In Figure 2 the data from the answers of those questions is represented. Question number 9 asks the respondent if their school or district had a plan to assist instructors in obtaining Cisco training. All nine respondents answered the question. Six respondents answered "yes", there was a plan to assist in obtaining Cisco training. Three respondents answered "no", their school or district did not have a plan in place to assist in obtaining Cisco training.

Question 10 attempts to establish if the respondent's school or district had a plan in place to assist in obtaining Cisco certification. Figure 3 portrays the respondent's answers. Of the nine respondents, only the first seven respondents answered the question. Of the seven that replied, five responded "no" and 2 answered "yes". In question 11, respondents were asked if their school or district had a plan in place to assist in maintaining their training. Of the nine respondents, the first eight respondents answered this question. Six of the respondents answered "no", with the remaining two answered "yes". The last question pertaining to research objective 2 was question 12. This question sought to establish if the respondent's school or district had a plan in place to assist in maintaining Cisco certification. Once again, of the nine respondents, the first eight responded. All eight answered "no".

Figure 3. Responses to Questions 9-12



The last research objective to be addressed is Objective 1. The findings for Objective 1 which seeks to identify barriers in obtaining and maintaining the CCNA

training and/or certification, are in the following paragraphs. This objective is addressed by questions 2, 3, 4, and 5. Question 2 is a multi-part question seeking to establish whether or not the respondent is CCNA certified and if the respondent encountered any barriers while training or certifying.

All nine respondents answered question 2. It read: Are you CCNA certified? Type YES or NO. If the respondent answered "YES", he/she was directed to move on to question 3. If the respondent answered "NO", they were to answer the question immediately following it. It asked if the respondent encountered barriers while taking Cisco Instructor training. If the respondent answered, "YES" to this part of the question, a multiple-choice selection was provided to choose a barrier or barriers possibly encountered. If none of the choices provided suited the respondent, a selection of "G" allowed the respondent to enter a response.

Of the nine respondents, six answered "no", and three answered "yes". Table 3 organizes the data to assist in explaining it. This table is identifying how respondents answered. The three respondents that answered, "yes" were directed to answer question 3. The six respondents that answered "no" to question 2, were to establish whether or not he/she encountered barriers while taking Cisco instructor training.

Table 3

Responses to Question 2

Respondent	1	2	3	4	5	6	7	8	9
Yes		X		X		X			
No	X		X		X		X	X	X

Respondents 1, 3, 5, 7, 8, and 9 answered "no" to question 2. They were to answer the second part of question 2. However, all nine answered part two of question 2 which directed respondents to identify barriers by choosing from a selection of possible barriers or identify any barriers that may have been encountered by choosing option "G", allowing for their input. Table 4 shows the nine responses. Five respondents; 1, 4, 5, 7 and 9 answered "yes", establishing that barriers were encountered while taking Cisco instructor training and four of the respondents, 2, 3, 6, and 8 answered "no", barriers were not encountered while taking Cisco instructor training.

Table 4

Responses to part two of question 2

Respondent	1	2	3	4	5	6	7	8	9
Yes	X			X	X		X		X
No		X	X			X		X	

Respondents whom answered "yes" to the second part of question 2, were provided the opportunity to identify barriers by choosing from a list of choices A through G. These choices represent possible barriers as mentioned previously. Table 5 identifies the letter choice and what it represents. Choice "A", was time, choice "B", was personal money, "C", was district funding, "D", was difficulty in learning the material, "E", was difficulty in taking the courses, "F", was difficulty with passing the exam and selection "G" offered respondents an opportunity to provide an answer other than what was provided.

Table 5

Potential barriers

Choice	Barrier
A	Time
B	Personal money
C	District funding
D	Difficulty in learning material
E	Difficulty in taking courses
F	Difficulty passing the exam
G	Other: Respondent entry

Respondents 1, 4, 5, 7, and 9 answered "yes" and were to choose from the selection of barriers. Table 6 organizes the responses. Respondent 1, selected time as the barrier encountered while training. Respondent 4 selected "G", and entered the barrier encountered as "no incentive". Respondent 5 selected "A" (time) and "D" (difficulty in learning the material) as barriers encountered. In addition to selection "D", respondent 5, typed in additional information stating, "Not enough hands in labs in class.", was a barrier. Respondent 7 selected "A", "B", and "F", time, personal money and difficulty in passing the exam as the barriers encountered. Respondent 9 selected "A", "B", and "D" as barriers encountered.

Table 6

Respondent's choices of barriers

Respondent	Barrier(s) Chosen
1	A
4	G: No incentive
5	A, D: Not enough labs in class
7	A, B, F
9	A, B, D

Question 3 asks the respondent if he/she encountered barriers while obtaining certification. All nine respondents answered question 3. If the respondent answered "yes"; directions to choose from the listed possible barriers was offered again. If the respondent chose "no", instructions were to move to question 4. The following table identifies respondent answers.

Respondents 1, 7 and 9 answered "yes". Respondent 1 identified choices "A" and "C" as barriers encountered while obtaining CCNA certification. Respondent 7 identified choice A as the barrier encountered, and Respondent 9 identified choices "D" and "E" as the barriers encountered while obtaining CCNA certification. The remaining respondents answered "no". Stating they did not encounter any barriers while obtaining CCNA certification.

Question 4 asks respondents if they encountered barriers while maintaining Cisco training and/or certification. All nine respondents answered question 4. Six

respondents out of the nine answered "yes", barriers were encountered while maintaining Cisco training and/or certification. The remaining three respondents did not encounter barriers. Respondents 1, 2, 3, 7, 8, and 9 answered "yes".

Respondent 1 selected choices "A" and "C" as barriers. Respondent 2 selected "A" and "B" as barriers encountered. Respondent 3 selected A as the only barrier. Respondents 7, 8, and 9, all selected "A" and "B" as barriers encountered while maintaining training and/or certification.

Question 5 sought to identify whether or not the 24-month time requirement for taking the CCNA certification exam is enough time for instructors. Once again, all nine respondents answered question 5. Five respondents answered "yes", and four respondents answered "no". Respondents 1, 2, 3, 5, and 6 answered "yes" and respondents 4, 7, 8 and 9 answered "no".

Question 17 offers respondents an opportunity to add any other barrier(s) encountered that were not mentioned. Respondent 2 stated, "More time was needed to refresh Cisco 1 and 2." Respondent 4 stated, "Money is a factor for school district plans." Respondent 6 stated, "No time for updates and lack of assistance by regional academies. The time period in which Cisco instructor classes are offered is too short. Not enough time to learn curriculum and not enough lab work." Respondent 8 stated, "Difficult to find training for refresher courses without having to take college credit. Renewing a DPI license requires five credits and when additional training is added, it makes it difficult to fit it all into a summer schedule."

Discussion

As mentioned earlier, of the 60 email surveys distributed, 13 were returned, only the nine presented qualified. The eight days to respond expired and data was collected on the nine responses provided above. In an attempt to expedite data analysis, an appointment was made with Professor Gillette, a University of Wisconsin professor. This appointment was made to input the raw data into a computer and analyze the data utilizing various data analysis tests. The tests sought to use were N-par, Chi-Square frequencies, Ranking, and Moses Test because they deal with rank order and simple data. The raw data was taken as a document containing the questions with the respondent's answers placed under each question. The data required labels on the variables, which were assigned to the questions and answers allowing the statistical programs to analyze the data and develop possible relationships between variables. Relationships comparing demographic data and encountering barriers, assistance plans and encountering barriers, and any other possible significant findings.

The investigation advisor and researcher, assigned each question and answer that label preparing the raw data for statistical analysis in an attempt to establish the previously mentioned statistical significances relating to barriers encountered, demographic information, assistance plans, time requirements and the objectives of the study. Tests such as N-par, Chi-Square frequencies, Ranking, and Moses Test were utilized. Unfortunately, such a minimal amount of data was gathered from only nine respondents, it was determined by the researcher and the investigation advisor, that insufficient amounts of data was gathered and after applying the various statistical analysis's it did not provide valid, significant results.

In the following paragraphs the findings are summarized. In the attempt to identify whether or not barriers are encountered while obtaining Cisco instructor training or certification as mentioned in Chapter Two, Review of Literature, it seems the simple data gathered from the nine respondents did identify barriers encountered while obtaining Cisco instructor training, CCNA certification, and maintaining training and/or certification. The most common barrier chosen was "A – time". The second most recognized barrier was "B - personal money". Other barriers identified were: difficulty in learning the material, difficulty in taking the courses and district funding. Respondents also chose "G" and offered personal input, the barriers respondents identified are as follows: time to refresh for Cisco one and two, money is a factor for the school district plans, no time for updates and lack of assistance by regional academies, the time period in which Cisco instructor classes are offered is too short, not enough time to learn curriculum and not enough lab work, difficulty to find training for refresher courses without college credit, and finally renewing a DPI license requires five credits and when additional training is added, it makes it difficult to fit it all into a summer schedule.

The validity that barriers were encountered can be justified because 100% of the respondents were Cisco instructors teaching at the secondary level. Three of the nine respondents were certified. Respondent number 6 was certified and the only respondent that did not encounter barriers. All other respondents, certified or not, encountered at least one barrier while obtaining Cisco instructor training, CCNA certification, or while maintaining training and/or certification. Five of the nine respondents stated the 24-month requirement by Cisco to become certified after training is complete was acceptable.

All nine of the respondents stated that their school or district did not have requirements for instructors to maintain refresher courses or obtain the CCNA certification. Only one respondent, respondent number 2, felt it was necessary to obtain the CCNA certification to teach the Cisco curriculum. Six of the nine respondents had an assistance plan in place from the school or district to assist in obtaining the Cisco training. Only two of the nine stated they had an assistance plan to assist them in obtaining Cisco certification, and maintaining the Cisco training. Eight of the nine stated they did not have an assistance plan in place to assist them in maintaining Cisco certification. Respondent 9 did not answer. All nine respondents stated they did not have an assistance plan offered by the school or district to assist them in maintaining Cisco certification. All respondents except for one, knew where to get Cisco courses for training. Four of the respondents taught at "medium" sized schools, four taught at "large" size schools and only one responded they taught at a small school. The years of teaching ranged from 7 to 31, with an average of 13.8 years of teaching.

Respondent number 6 was the only respondent certified that did not encounter any barriers and did have assistance plans in place to assist in obtaining the Cisco training and obtaining the Cisco Certification. This respondent taught at a medium size school, and had 12 years of teaching experience. Respondent number 6 was also the respondent stating he/she did not know where to take Cisco courses for training and offered barriers no mentioned in the survey. Respondent six stated that there was "No time for updates and lack of assistance by regional academies." "The time period in which Cisco instructor classes are offered is too short." And "Not enough time to learn curriculum and not enough lab work".

CHAPTER FIVE

Summary, Conclusions, and Recommendations

After restating the purpose of the study and restating the statement of the problem, the following chapter is divided into three parts: (1) summary (2) conclusions (3) recommendations.

Purpose of the Study

The purpose of the study is to identify barriers Wisconsin instructors at the high school level are encountering, as measured by a survey, with regards to obtaining and maintaining Cisco training and certifications.

Restatement of the Problem

Obtaining and maintaining Cisco training and certification for Wisconsin instructors at the high school level may be a serious problem. The barriers Wisconsin high school educators are encountering while keeping up with maintaining Cisco training and certification requirements is not known.

Summary

After reviewing literature pertaining to professions requiring certification, information regarding those professions was discovered, indicating some do encounter problems while certifying and or maintaining certifications required for employment. The decision was made to obtain quantitative information by utilizing descriptive research in determining whether or not Wisconsin high school instructors teaching the Cisco curriculum, are encountering barriers while obtaining and/or maintaining the required Cisco certification.

The descriptive research method would best be conducted in the form of a survey allowing for specific questions relating to the topic to be asked. Perhaps

Wisconsin secondary educators teaching Cisco Networking curriculum were encountering barriers while obtaining and/or maintaining certification in order to teach the curriculum. Hence, the purpose of the paper is to determine whether or not, Wisconsin secondary educators certified to teach Cisco networking were possibly encountering barriers while maintaining or obtaining their instructor certification to teach the curriculum.

The study evolved through researching literature pertaining to occupations which have credentials and certifications, new jobs in the Information Technology industry that require certification, and occupations that encounter barriers while obtaining and maintaining training and certification. Objectives were established to identify specific items regarding this topic. The objectives are as follows: Determine the barriers in obtaining and maintaining the CCNA training and/or certification. Identify the affect that an assistance plan had on obtaining or maintaining the Cisco CCNA certification. Identify any district or school requirements in obtaining the Cisco training or CCNA certification. Determine if there is any difference in barriers based on demographics. Questions relating to the objectives were designed to obtain information and data in an attempt to identify whether or not there are barriers encountered while obtaining or maintaining certification. A matrix was designed to balance the number of questions addressing each objective, as well as offer a visual document showing which questions relate to each objective.

Soon after a preliminary survey was developed. The introduction to the survey explained to the respondent all responses will be strictly confidential and voluntary. The introduction of the survey also explained the process desired to return the survey and

the time allotted for data collection. A pilot of the survey was sent to three post-secondary instructors to evaluate by taking the survey, critiquing it, and making suggestions to improve it's validity.

The preliminary survey was returned and changes were made to the survey. Prior to sending the survey out the researcher completed the Human Subjects training required by the University of Wisconsin-Stout and a form to the Institutional Review Board was completed and sent in with an attached abstract containing a brief review of literature, statement of the problem, objectives and limitations and a copy of the instrument. The final survey was designed in alignment to the objectives seeking information and data pertaining to the topic. The survey consisting of 17 mostly yes/no questions and answers was developed, reviewed, tested and sent out to 60 Wisconsin high school instructors teaching Cisco using Microsoft Outlook email system. The following paragraph will summarize the major findings after utilizing the survey instrument.

A summary of the major findings establishes 13 returned responses represented a 19% rate of return based on the 60 surveys sent. Five of the 13 responses did not meet the requirements for valid data. Removing the five responses that did not qualify, the response rate was 12% of surveys actually returned by Wisconsin high school instructors teaching Cisco. Three of the nine qualified respondents were Cisco certified.

The following paragraphs review the major findings. In the attempt to identify whether or not barriers are encountered while obtaining Cisco instructor training or certification as mentioned in Chapter Two, Review of Literature, it seems the simple data gathered from the nine respondents did identify barriers encountered while

obtaining Cisco instructor training, CCNA certification, and maintaining training and/or certification. The most common barrier chosen was "A – time". The second most recognized barrier was "B - personal money".

The validity that barriers were encountered can be justified because 100% of the respondents were Cisco instructors teaching at the secondary level. Three of the nine respondents were certified. Respondent number 6 was certified and the only respondent that did not encounter barriers. All other respondents, certified or not, encountered at least one barrier while obtaining Cisco instructor training, CCNA certification, or while maintaining training and/or certification. Respondent number 3 did have assistance plans to assist while obtaining Cisco's training and an assistance plan to assist while maintaining Cisco training, however, was not certified and did encounter barriers of time, difficulty in learning the material, and not enough hands on labs. Respondent number 2 was certified and only had an assistance plan in place to assist while obtaining Cisco's training. Respondent number 2 did encounter barriers of time and personal money. Five of the nine respondents stated the 24-month requirement by Cisco to become certified after training is complete was acceptable.

One hundred percent of the respondents stated that their school or district did not have requirements for instructors to maintain refresher courses or obtain the CCNA certification. Only one respondent, respondent number 2; felt it was necessary to obtain the CCNA certification to teach the Cisco curriculum. Six of the nine respondents had an assistance plan in place from the school or district to assist in obtaining the Cisco training. Only two of the nine stated they had an assistance plan to assist them in obtaining Cisco certification, and maintaining the Cisco training. Eight of the nine stated

they did not have an assistance plan in place to assist them in maintaining Cisco certification. Respondent number 9 did not answer. Not one respondent had an assistance plan offered by the school or district to assist them in maintaining the Cisco certification.

All respondents except for one, knew where to get Cisco courses for training. Four of the respondents taught at "medium" sized schools, four taught at "large" size schools and only one responded they taught at a small school. The years of teaching ranged from 7 to 31, with an average of 13.8 years of teaching.

Respondent number 6 was the only respondent certified that did not encounter any barriers and did have assistance plans in place to assist in obtaining the Cisco training and obtaining the Cisco Certification. This respondent taught at a medium size school, and had 12 years of teaching experience. Respondent number 6 was also the respondent stating he/she did not know where to take Cisco courses for training and offered barriers no mentioned in the survey. Respondent 6 stated that there was "No time for updates and lack of assistance by regional academies." "The time period in which Cisco instructor classes are offered is too short." And "Not enough time to learn curriculum and not enough lab work."

Conclusions

The conclusions to the purpose of this study in identifying barriers Wisconsin instructors at the high school level are encountering, as measured by a survey, with regards to obtaining and maintaining Cisco training and certifications will be stated in the following paragraphs. Obtaining and maintaining the Cisco training and certification for Wisconsin instructors at the high school level may be a serious problem. The

barriers Wisconsin high school educators are encountering while keeping up with maintaining Cisco training and certification requirements is not known. Do Wisconsin high school educators encounter barriers while keeping up with maintaining Cisco training and certification requirements? If so, what are they?

Four objectives were established to identify barriers or even if barriers are encountered at all. The objectives are listed as follows: Determine the barriers in obtaining and maintaining the CCNA training and/or certification. Identify the affect that an assistance plan had on obtaining or maintaining the Cisco CCNA certification. Identify any district or school requirements in obtaining the Cisco training or CCNA certification. The following conclusions to the objectives are stated in the paragraphs below and pertain only to the sample population surveyed by the researcher.

According to the findings relating to Objective 1: determine the barriers while obtaining and maintaining the CCNA training and/or certification, barriers are encountered while obtaining Cisco instructor training, obtaining Cisco CCNA certification, and while maintaining the Cisco training or certification. There were three questions asking if the respondent encountered barriers. The questions asked if barriers were encountered while taking Cisco instructor training, while obtaining Cisco CCNA certification, and while maintaining Cisco CCNA training or certification. The most common barrier encountered in all of those situations by respondents was selection "A" (time). Time was the major barrier encountered while obtaining training and maintaining training and/or certification. In the review of literature time was a barrier to the Kentucky Auto technicians as well as the nurses. Although not as significant, selection "B" was chosen as another barrier encountered. Selection "B" represented personal money.

Based upon the findings of this study, barriers are encountered while obtaining and maintaining Cisco training and/or certification. The most common barrier for these respondents was time.

The findings relating to Objective 2: identify the affect that an assistance plan had on obtaining or maintaining the Cisco CCNA certification, are as follows. Over 50% of the respondents had an assistance plan to assist them while obtaining the Cisco training. Out of the nine respondents, six stated they had that assistance. Two of the respondents were identified as having more than one assistance plan. Those respondents were number 6 and number 3. None of the respondents had an assistance plan to assist in maintaining the Cisco certification. Respondent 6 had an assistance plan while obtaining Cisco's training and while obtaining Cisco certification. Respondent 6 was certified and the only respondent that did not encounter barriers. All other respondents, certified or not, encountered at least one barrier while obtaining Cisco instructor training, CCNA certification, or while maintaining training and/or certification. It was hoped to find some type of trend here. However, respondent 3 had assistance plans while obtaining training and maintaining training, yet as mentioned above, encountered barriers while taking the training and while maintaining the training and/or certification. The barriers chosen were "A" time and "D" difficulty in taking the courses. Respondent 3 also chose option "G" other and expressed there were not enough hands on labs in class. Hence, the conclusion that there is not enough significant data to make any determinations as to whether or not an assistance plan had an affect while obtaining or maintaining the Cisco training and/or certification.

While attempting to identify any district or school requirements in obtaining the Cisco training or CCNA certification for Objective 3 the following conclusions are made. All nine respondents were currently Cisco instructors or training to become a Cisco instructor. After reviewing the answers to questions 1, 6, 7, and 8 none of the respondents had any requirements from the school, or district to obtain the Cisco CCNA certification or to maintain refresher courses. There was no significant data to make any conclusion stating that district/school requirements had an affect one way or another pertaining to obtaining and maintaining Cisco instructor training and/or certification.

Conclusions relating to Objective 4: determine if there is any difference in barriers based on demographics are similar to objective three. There was not enough data collected to identify whether or not demographics had any affect pertaining to whether or not Wisconsin Cisco instructors at the secondary level are encountering barriers while obtaining training and/or certification.

Limitations of the findings were critical in this study. The small sample size limited the response possibilities. The sample was limited to the availability of email addresses obtained from the researcher at a Cisco Instructor meeting held by Wisconsin Department of Public Instruction and a few colleagues of the researcher. Another enormous limitation was a problem with the University of Wisconsin-Stout's email server. During the collection of responses a storm damaged the email server blocking any emails sent back as a response from entering the email server and system for over three days. If a respondent had sent a response while the email server was down, the response was never received. Only the summer months to email the survey and collect the data and analyze it were allowed due to time restrictions. Other

limitations affecting the study were: Instructors may not have been checking their school email on a consistent basis during the summer. Some of the email addresses on the list may not have been current or in use. The electronic email survey service provided by the university was overlooked and not utilized which may have made a difference during the email server breakdown. Time restrictions as a result of personal and professional responsibilities to return home limited the time to extend the survey data collection.

Recommendations Related to this Study

Recommendations are typically based upon the conclusions stated above. Not enough data was collected to obtain significant information to conclude upon inferences made by the objectives. In relation to the sample population of this study and the barriers identified, the following recommendations are made.

1. In relation to the barrier of time, it is a commodity hard to adjust in some circumstances and is difficult to recommend adjusting. Respondents need to find the best option for his/her own situation when acquiring time to obtain or maintain instructor training and/or certification. Perhaps contacting the institution at which the respondent takes the course work and discussing implementing self-paced courses where one may take independently can make a difference.
2. A recommendation concerning personal money would be to seek assistance from the school district in which the respondent is an instructor and come to some type of agreement for payment and/or reimbursement. Applying for grants as a graduate student taking technology classes can be helpful. While reading the many articles and literature, the government has dedicated monies,

significant in some cases, to those pursuing degrees or course work pertaining to technology.

3. A recommendation concerning district money available to provide assistance would be the same as above, search for technology grants locally within your community or government grants.
4. A recommendation concerning lack of assistance by regional academies, the time period in which Cisco instructor classes are offered is too short, and not enough time to learn the curriculum and not enough lab work could possibly worked out with other institutions. Contact the institution at which refresher courses can be taken and work something out. If the institution you go to is not flexible, call another.

Recommendations for Further Study

Recommendations for further study pertaining to barriers encountered while obtaining and/or maintaining Cisco instructor training and/or certification are as follows:

1. Further research pertaining to barriers encountered while obtaining and/or maintaining Cisco instructor training and/or certification should be conducted. The need to identify barriers and validate them is still needed.
2. Further research pertaining to assistance plans assisting the instructor while obtaining and/or maintaining Cisco training and/or certification need to be conducted.
3. Further research relating to funding and monetary resources for instructors attempting to obtain and maintain Cisco instructor training and/or certification

must be done. The curriculum changes frequently and updating knowledge and skills in this field can be time consuming resulting in rising costs.

4. Perhaps studies can be conducted relating to two and four year degree institutions offering Cisco training and certification. Are the instructors teaching Cisco encountering similar impediments.
5. Reproducing a survey with a sample size larger that what was utilized would be beneficial in possibly providing more valid data.

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Appendix A

Matrix

SURVEY MATRIX

OBJECTIVES

1. Determine the barriers in obtaining and maintaining the CCNA certification.
2. Identify the affect that an assistance plan had on obtaining or maintaining the Cisco CCNA certification.
3. Identify any district or school requirements to obtain the Cisco CCNA certification.
4. Determine if there is any difference in barriers based on demographics.

SURVEY QUESTION	**OBJECTIVE**			
	1	**2**	**3**	**4**
1			X	
2	X			
3	X			
4	X			
5	X			
6			X	
7			X	
8.			X	
9		X		
10		X		
11		X		
12		X		
13.				X
14.				X
15.				X
16.				X
17.	X			

Objective 1 = 5 questions
Objective 2 = 4 questions
Objective 3 = 4 questions
Objective 4 = 4 questions

Appendix B

Survey

Arthur E. Greco is conducting a survey for his Masters Degree through the University of Wisconsin Stout. You were selected from a list of CISCO instructors obtained from the Wisconsin Department of Public Instruction and other CISCO instructors.

This brief survey can be answered by clicking on FORWARD in email and then typing YES/NO or the LETTER(s) that answer the question. The data will be utilized to determine if Wisconsin high school Educators encounter barriers while obtaining and maintaining Cisco Certification and training.

I understand that my participation in this study is strictly voluntary and I may discontinue my participation at any time without any prejudice. I understand that the purpose of this study is to investigate whether Wisconsin High School Educators encounter barriers while obtaining or maintaining CISCO certification. I further understand that any information about me that is collected during this study will be held in the strictest confidence and will not be part of my permanent record. I understand that at the conclusion of this study all records, which identify individual participants, will be destroyed. I understand that by fully completing this form and submitting my responses, I am volunteering my data for use in the research project.

NOTE: Questions or concerns about participation in the research or subsequent complaints should be addressed first to Arthur Greco (agreco@wisp.k12.wi.us) or the research advisor, Dr. Howard Lee (leeh@uwstout.edu) and second it to Janice Coker, Chair, UW-Stout Institutional Review Board for the Protection of human Subjects in Research, 11 HH, UW-Stout, Menomonie, WI 54751, phone (715) 232-1126.

SURVEY

Please respond by July 25, 2002. Thank you for your cooperation.

To Answer the survey, CLICK on FORWARD in your email.
Please Type the responses in the provided space. When finished, please send this back to agreco@wisp.k12.wi.us.

1. Are you currently a CISCO Instructor or becoming a CISCO instructor?
   Type YES or NO: _____

   If **NO**, please stop and send back with a reply NO
   If **YES,** move on to the next question.

2. Are you CCNA certified? **Type YES** or **NO**: _____

***If "YES", move to question 3 please.**

If "**NO**", Did you encounter BARRIERS while TAKING Cisco Instructor TRAINING:
Type YES or **NO**: _____

If "YES", Type the letter(s) that you would identify as/a barrier(s):_____ (After answering, please **Go to Question 5**)

a. Time
b. Personal Money
c. District Funding
d. Difficulty in learning the material
e. Difficulty in taking the courses
f. Difficulty with passing the exam
g. Other **Briefly** Explain:

3. Did you encounter BARRIERS in OBTAINING the Cisco CCNA certification required to teach the Cisco curriculum? **Type YES** or **NO**: _____

***If "NO", move to question 4.**

If "YES", Type the letter(s) that you would identify as/a barrier(s):_____

a. Time
b. Personal Money
c. District Funding
d. Difficulty in learning the material
e. Difficulty in taking the courses
f. Difficulty with passing the exam
g. Other **Briefly** Explain:

4. Did you encounter BARRIERS while MAINTAINING the Cisco CCNA certification, required to teach the Cisco curriculum? **Type YES** or **NO**: _____

If "NO", move to question 5.

If "YES", Type the letter(s) that you would identify as/a barrier(s):_____

a. Time
b. Personal Money
c. District Funding
d. Difficulty in learning the material
e. Difficulty in taking the courses
f. Difficulty with passing the exam
g. Other **Briefly** Explain:

5. Cisco requires educators to obtain CCNA within 24 months of taking the instructor courses. Is this enough time?
   Type YES or **NO**: ____

6. Did your school district or school have any requirements for you to obtain CCNA?
   Type YES or NO: _____

   If YES, please state them briefly:

7. Does your district have any requirements to maintain refresher training courses?
   Type YES or NO: _____

   If YES, please state them briefly:

8. Is it necessary, for Wisconsin Cisco instructors at the high school level, to obtain the CCNA certification to teach the Cisco curriculum? **Type YES** or **NO**: _____

9. Did your school or school district have a plan to assist you in OBTAINING the CISCO TRAINING? **Type YES or NO**: _____

10. Did your school district have a plan to assist you in OBTAINING Cisco CERTIFICATION? **Type YES or NO**: _____

11. Did your school or school district have a plan to assist you in MAINTAINING the CISCO TRAINING? **Type YES or NO**: ____

12. Did your school district have a plan to assist you in MAINTAINING Cisco CERTIFICATION? Type **YES or NO**: _____

13. What City/Town do you teach?: _____

14. Is your school: Small Medium Large _____

15. How many years have you been teaching? _____

16. Where are you able to take CISCO courses for training? _____

17. Are there any barriers not mentioned you would briefly identify, please specify for training or certification:

Appendix C

Data

APPENDIX B

Respndent	Years of Service	School Size	Question Objective Q2a01	Q3 O1	Q4 O1	Q5 O1	Q6 O3	Q7 O3
Certified (Q2,O1)								
2	13	M	N	N	Y:A,B	Y	N	N
4	22	L	Y: G Noinctive	N	N	N	N	N
6	12	M	N	N	N	Y	N	N
Non-Certified (Q2,O1)								
1	13	S	Y:A	Y:A,C	Y:A,C	Y	N	N
3	7	L	N	N	Y:A	Y	N	N
5	31	L	Y:A,D	N	N	Y	N	N
7	10	M	Y:A,B,F	Y:A,C	Y:A,B	N	N	N
8	28	M	N	N	Y:A,B	N	N	N
9	9	L	Y:A,B,D	Y:D,E	Y:A,B	N	N	N

Respondent	Question Objective Q8 O1	Q9 O2	Q10 O2	Q11 O2	Q12 O2	Q15O 4	Q14O 4
Certified (Q2,O1)							
2	Y	Y	N	N	N	13	M
4	N	N	N	Y	N	22	L
6	N	Y	Y	N	N	12	M
Non-Certified (Q2,O1)							
1	N	Y	N	N	N	13	S
3	N	Y	N	Y	N	7	L

5	N	Y	Y	N	N	31	L
7	N	N	N	N	N	10	M
8	N	Y	NA	N	N	28	M
9	N	N	NA	NA	N	9	L

Question Objective		
Q13 O4	**Q16O4**	**Q17O 2**
Kenosha (2)	Elkhorn	Time to refresh Cisco 1 and 2
LaCrosse (4)	Unknown	Money is a factor for the school district plans
Menomonie (6)	UWStout	No time for updates and lack of assistance by regional academies
		The time period in which Cisco instructor classes are offered are too short
		Not enough time to learn curriculum and not enough lab work
St. Francis (1)	Milwaukee	
Milwaukee (3)	MATC	
West Bend (5)	MATC	
New Berlin (7)	WCTC/MATC	
Minocqua (8)	Rhinelander	
Milwaukee (9)	MATC	