A COMPARISON OF ACADEMIC SUCCESS IN WEB-BASED VERSUS CAMPUS-BASED COURSES IN THE COMPUTER INFORMATION SYSTEMS - PROGRAMMER/ANALYST ASSOCIATE DEGREE PROGRAM AT WISCONSIN INDIANHEAD TECHNICAL COLLEGE NEW RICHMOND

by

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A Research Paper

Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
With a major in
Education

Approved: 2 Semester Credits

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August, 2002

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ABSTRACT

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A Comparison of Academic Success in Web-Based versus Campus-Based Courses in the Computer Information Systems - Programmer/Analyst Associate Degree Program at Wisconsin Indianhead Technical College New Richmond
(Title)

Education Dr. Katherine Navarre August 2002 75
(Graduate Major) (Research Advisor) (Month/Year) (No. of Pages)

American Psychological Association (APA) Publication Manual, Fifth Edition
(Name of Style Manual Used in this Study)

The purpose of this study is to compare the academic success and course completion rates of students enrolled in traditional classroom courses with those students enrolled in the same courses offered in a web-based format within the Computer Information Systems-Programmer/Analyst (CISPA) Associate Degree at Wisconsin Indianhead Technical College (WITC) New Richmond. Data from courses offered in the fall semester 2001 were included in the research. Six questions were specifically addressed by the study. These questions were:

1. How academically successful are students enrolled in web-based courses?
2. How academically successful are students enrolled in campus-based courses?

3. What is the completion rate of students enrolled web-based courses in the CISPA program?

4. What is the completion rate of students enrolled in campus-based courses in the CISPA program?

5. What are the demographics of students enrolled in web-based courses?

6. What are the demographics of students enrolled in campus-based courses?

Results of the study found campus-based courses to have a significantly higher mean grade point average (GPA) than web-based courses. Although completion rates of web-based and campus-based courses did not differ, successful completion rates were greater in web-based courses than campus-based courses. Finally, the research revealed that students enrolled in web-based courses tend to be older than those enrolled on campus. No significant difference was discovered between the age or GPA of campus-based male and female students; however, female students enrolled in web-based courses have a statistically significant lower GPA than male students.

ACKNOWLEDGEMENTS

As I think about my educational pursuit over the past few years, it is apparent that the achievement of earning a Masters of Science-Education and completing this thesis was not done in isolation. A number of people were instrumental in helping me attain my goals and deserve to be recognized for their support and patience.

First, a special thank you to Dr. Katherine Navarre, my research advisor, who gave me a whole new understanding of the word “curriculum., “ ultimately leading to this thesis topic. Dr. Navarre’s flexibility and technological knowledge facilitated completion of this study on a strict timeline. And, thank you, also to Dr. Amy Gillett and Jill Stanton for the valuable learning experiences and advising provided in a number of their courses.

A number of people at Wisconsin Indianhead Technical College New Richmond have assisted me in the process of this research. The input received from James Kiley, Diane Pettis and Jeff Heathman when I first considered the topic is greatly appreciated. My gratitude is extended to Dori Marty for her assistance in the data collection process. A huge “Thank you!” to my mentor Deborah Ballinger Hellerud, Dean of Student Services. Deb’s encouragement, guidance and support inspired me to strive towards higher goals and develop a deep commitment to life-long learning.

To my parents, Thomas and Charlotte Yohnk, I forever am indebted to them for the countless Saturdays of watching Baby Elizabeth during this research project. Thank you for instilling a belief in me that hard work and education pay off in the long run.

Finally, thank you to my husband Eric for his unending support, strength, understanding and love. Without his encouragement and patience, I could not have completed this task. Through frustrating nights, reading of numbers to be used in calculations, computer glitches and dirty diapers, you have stood by me. We now have the time to focus on family life. Thank you, Eric. I love you with all my heart.

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CHAPTER ONE

Introduction

Throughout history, curriculum in education has evolved with changes in society. The evolution of the college curriculum has been particularly great during the last half of the twentieth century (Power, 1991). One effect of this evolution is the increased accessibility to higher education. Over the past 50 years more students have been able to attend college. From 1960 through 1998, for example, the number of students enrolling in degree granting institutions expanded from approximately 2 million students to 14.5 million students (National Center for Educational Statistics [NCES], 2001). The G.I. Bill of Rights for veterans of World War II and the Korean War, the development of community colleges, and the creation of financial aid programs provided the necessary vehicle to access higher education for many students (Goldberg & Seldin, 2000).

Other factors contributing to increased accessibility to postsecondary education are technological developments. In a recent report prepared for the American Federation of Teachers, it was stated, “Technology is having, and will continue to have, a profound impact on colleges and universities in America and around the globe” (Phipps & Merisotis, 1999, p. 7). Examining the history of education reveals that technological change not only affects the present, but greatly influenced college curriculum of the past. The area of distance education, in particular, has been advanced by these advancements in technology.

Distance education can be defined generally as instruction delivered over a distance to individuals at one or more different locations (Lewis, Snow, Farris, & Levin, 1999). Based on this definition, the foundation of distance education in the United States was laid in the nineteenth century. Commercial correspondence colleges, attempting to give more access to college, provided education via the postal service (Phipps &

Merisotis, 1999). As advances were made, efforts to integrate the new tools into distance education were attempted. For example, as early as the 1920's, radio was used to enhance correspondence study (Van Kekerix & Andrews, 1991). The movement to incorporate new technology into distance education continued throughout the twentieth century. Although the latest media such as audio and video was used to supplement courses, distance education remained passive in format (Schrum, 1998). The advent of the Internet transformed distance education. The new trend in education is "learning anytime, anyplace" (Mariani, 2001, p. 2). By breaking the barriers of distance and time for both instructors and students, the Internet increases access to higher education (Truell, 2001).

The development of the Internet over the last decade has changed not only the face of distance education, but higher education in general. According to research by Frank Jewett:

> Classroom instruction (based upon classroom technology) has been the primary mode of instructional delivery in higher education for many years. The advent of electronic media (especially TV, computers, and computer networks) is facilitating the development of alternative instructional delivery modes. (2000, p. 115)

The extensive availability and flexibility of the Internet offers the chance to provide education anywhere, anytime at overall costs lower than those of early distance education and traditional instructional methods (Sankaran, Sankaran, & Bui, 2000). Both the number of colleges offering Internet-based education and the number of students enrolling in the courses has grown significantly. For example, between fall 1995 and 1997-98, the number of postsecondary institutions in the United States offering distance education courses increased from 33 percent to 44 percent and the percentage of the institutions using asynchronous Internet-based technology almost tripled from 22 percent

to 60 percent. In addition, the number of distance education enrollments doubled in the same time frame to 1,661,100 enrollments (Lewis, et al., 1999). "Distance education is moving with increasing speed into the mainstream of college and university life" (Miller, 1995, p. 48).

Distance education via the Internet in Wisconsin follows the same trend seen throughout the rest of the United States. Between 1997 and 2000, the number of students enrolled in Internet-based distance education courses within the Wisconsin Technical College System (WTCS) increased 675 percent (S. E. Belda, personal email, March 13, 2001). The most popular of courses offered online include applications of computer technology, general business education, and computer technician training courses. Wisconsin Indianhead Technical College (WITC), one of Wisconsin's sixteen technical college districts, provides a number of its courses via the Internet. Of the 19 courses available for the fall semester 2001, twelve were in the area of computer technology (WITC, 2001).

WITC began its venture into offering distance education via the Internet four years ago with two courses, Written Communication and Technical Reporting (L. Gee, personal communication, October 22, 2001). The college plans to expand its web-based offerings. Eventually, all nine of WITC's core general education courses will be available online. Furthermore, the potential for students to complete a degree via the Internet exists. According to Deborah Ballinger Hellerud, Dean, Student Services:

> In December 2000, the Higher Learning Commission (formerly North Central Association) gave WITC permission to offer the Computer Information Systems-Programmer/Analyst (CISPA) Associate Degree program totally web-based. Currently, the first year of the degree, including the general education requirements , is online or close. By fall 2002, Semester Three of the program should be set, with Semester Four to follow in January 2003. (personal

communication, October 17, 2001)

In addition to the Computer Information Systems-Programmer Analyst degree, other programs may partially be offered online in time.

There are reasons that WITC plans to implement more online learning. Distance learning utilizing the Internet is "..creating opportunities to serve new student clienteles and better serve existing populations, and it is encouraging innovation throughout the academy (Higher Learning Commission, 2001). Web-based learning provides opportunity to expand the number of students enrolled in the college, and thus, generating more FTEs. As stated in WITC's Strategic Directions 2001-2003:

> Wisconsin Indianhead Technical College is committed to achieving excellence by pursing customer-focused strategic directions. An image of excellence will be reflected throughout our organizational culture and promoted within marketing efforts to various segments of the population...WITC will use information technology to deliver, support and enhance learning;...(WITC, 2001, n.p)

Furthermore, the advancement of web-based learning opportunities provides access to higher education. This embraces one of the general purposes of WITC, to "...provide access to educational opportunities for adults who wish to continue their learning experience" (WITC, 2001, p. 12).

As WITC continues to develop web-based courses and to modify its current face-to-face curriculum into an online delivery format, the focus must go beyond enrollment growth and increased access for students. The effectiveness of the courses must be considered. When evaluating distance education, one thing to consider is the college's assessment and improvement of quality in terms of student learning (Higher Learning Commission, 2001). One way to measure course effectiveness would be to compare web-based courses to their traditional face-to-face counterparts. At this time, no such

evaluation has been completed at WITC. A comparison of the completion rates and academic success between students enrolled in online courses and those taking the same course on campus needs to be completed to rate the effectiveness. In addition, demographic information must be collected from the two groups of students. These pieces of information will assist the college in developing courses that not only increase enrollments and accessibility, but encompass its mission of "providing comprehensive educational programming and support services for meaningful career preparation and personal effectiveness" (WITC, 2001, n.p.)

Statement of the Problem

The purpose of this study was to compare the academic success and course completion rates of students enrolled in traditional face-to-face campus-based courses with those students enrolled in the same courses offered in a web-based format within the Computer Information Systems-Programmer/Analyst Associate Degree at Wisconsin Indianhead Technical College New Richmond. Data was collected at the end of the fall 2001 semester via instructor grade rosters.

Research Questions

The six questions this research wished to address included:

1. How academically successful are students enrolled in web-based courses?
2. How academically successful are students enrolled in traditional on-campus courses?
3. What is the completion rate of students taking web-based courses in the CISPA program?
4. What is the completion rate of students taking campus-based courses in the CISPA program?

5. What are the demographics of students enrolled in web-based courses?

6. What are the demographics of students enrolled in campus-based courses?

Definition of Terms

Academic success: The letter grade assigned at the end of a course at WITC based on the student's achievement of the course objectives. According to the *2001-2002 WITC Catalog and Student Handbook,* the individual class letter grades contribute to a student's GPA.

Asynchronous computer-based education: Instruction that occurs at different times for each student and utilizes computer technology, especially the Internet,

Campus-based course: Courses offered through WITC in which enrolled students meet face-to-face with the instructor and other students on campus.

CISPA (Computer Information Systems-Programmer/Analyst): An associate degree program offered through WITC New Richmond. Required core courses in this academic plan may be taken via the Internet or in traditional face-to-face classroom.

Completion: When a student receives a terminal grade in a course.

Distance education: The model in which a student and teacher, separated by time and distance, use technology to complete instruction. At WITC, distance education includes courses offered on-line, through Computer-Based Training (CBT), and through Interactive Television (ITV).

Flex Lab Course: A number of campus-based courses offered through WITC in which students can learn at their own pace. Students are given a syllabus, text and reference listing, assignment sheet, and other instructional materials to guide them. An instructor is available to help students face-to-face on an individual basis when problems or questions arise during assigned Flex Lab hours.

Fractionalized course: A WITC course that is broken down into one-credit

increments. The increments must be completed consecutively (e.g.: Part A must be completed before part B, and B is a prerequisite for part C). Students may enroll and complete one, two or three credits of the fractionalized course during a given semester.

GPA: Grade point average for the individual student at WITC New Richmond. GPA is computed by multiplying the point value assigned to each letter grade by each course's credit value. The totaled point values divided by the total number of credtis per semester equals the student's GPA, according to the *2001-2002 WITC Catalog and Student Handbook.* Students must have a cumulative GPA of 2.0 to maintain academic good standing.

Incomplete: An extension of time to complete a course granted by an instructor. Students must complete the coursework requirements within the first six weeks of the following semester. If a student does not complete the requirements, an incomplete will become a failing (F) or unsatisfactory (U) grade unless the student justifies additional time due to circumstances and receives approval from the instructor.

Terminal grade: The letter grade assigned when a student completes a course, including: A, A-, B+, B, B-, C+, C, C-, D+, D, D-, and F.

Traditional campus-based course: Courses offered through WITC in which enrolled students meet face-to-face with the instructor and other students on campus.

Web-based course: Courses offered on-line through WITC in which enrolled students interact with the instructor and other students via computer. Like students enrolled in traditional courses, those enrolled in web-based courses learn concepts, read textbooks, complete assignments and take exams; however, students enrolled in web-based courses do not have to be physically present on campus.

Wisconsin Indianhead Technical College (WITC): One of the 16 technical college districts in the State of Wisconsin. The college is a public post-secondary educational institution offering associate degrees, technical diplomas, certificates and

non-credit courses. The campuses located in Ashland, New Richmond, Rice Lake and Superior serve residents in the northwest 20 percent of Wisconsin as well as eastern Minnesota.

Wisconsin Technical College System (WTCS): The technical college system in Wisconsin, consisting of 16 individual districts.

Withdrawl: When a student withdraws from a course and no letter grade is earned. Students enrolled in courses during the 2001-2002 could withdraw from courses at anytime, including the final day of the semester. Students withdrawing from coursework receive a "W" on their transcript.

Assumptions

It is an assumption of this study that the information collected from instructor rosters is accurate. It is also assumed that demographic data extracted about students by Student Services staff at WITC New Richmond is complete and specific to the rosters used in the study. Furthermore, demographic information originally provided by students to Student Services is believed to be true.

Limitations

One of the limitations of this study includes the limited sample size of college students. The study was restricted to students enrolled in CISPA courses through WITC New Richmond in the Fall Semester 2001. This is not necessarily representative of other technical colleges or of other semesters. Results may vary by semester, with the number of students enrolled, and with number of courses offered. Students included in the study may be enrolled in multiple courses, thus reducing the size of the population used in the study. Grade changes after data was collected are not included in the current study. Finally, web-based courses and its campus-based counterpart courses are not necessarily taught by the same instructor. Although the expected outcomes for students enrolled in both campus-based and web-based courses are the same, the instructor's

individual style could have an effect.

CHAPTER TWO

Review of the Literature

Introduction

The Review of the Literature will examine the evolution of education in society, with an emphasis placed on the history and evolution of distance education. A historical account of distance education at WITC, current offerings via distance education, and WITC's vision of future online courses will also be considered. Current studies comparing web-based courses with traditional face-to-face courses will be covered. In addition, a discussion of how this study can be used by WITC in its planning and development of future web-based programs will be included.

Evolution of Education in Society throughout History

Throughout history, curriculum in education has evolved with the changes in society. For hundreds of years, the importance of education, its outcomes and its structure have been of major concern. Curriculum design and judgments are often based on the prevailing educational aims or ideas of the day. From ancient Greece to the present, societal ideas influenced such leaders in educational thought as Plato, Jean-Jacques Rousseau, and John Dewey (Walker & Soltis, 1997). Numerous examples exist throughout history to demonstrate how education vacillates with societal beliefs. For example, Harvard, founded just sixteen years after the first settlers came to America, had a theological basis for it curriculum. The new colonists feared the ministry would become illiterate in America. To combat this, Harvard was built on the idea that "knowledge of Christ was the foundation for all knowledge" (Willis, Schubert, Bullough, Kridel, & Holton, 19993, p. 7).

Throughout the seventeenth and eighteenth centuries colleges, secondary and grammar schools were patterned after Harvard. The ministry during this period was viewed as most respected profession in both Europe and America. The study of Latin,

Greek and reading of scriptual text dominated the curriculum. The purpose of education was to understand the Bible to gain salvation and spread the gospel (Johnson, Dupuis, Musial, Hall, & Gollnick, 1999). In the early nineteenth century, as the population increased in the newly-formed United States, national concern existed with developing a "citizenry worthy of participation in the new republic" (Willis, et al, 1993, p. 27). Local academies which prepared students for colleges began to teach practical subjects such as commerce, agriculture and surveying.

Early in the twentieth century, the United States focused on efficiency. The idea of social efficiency, in which unnecessary tasks were weeded out through pre-determined goals and no-frills management, peaked between 1910 and 1920. The notion of efficiency can be traced to education of the time. For example, the Committee on Economy of Time in Education was appointed by the National Education Association Department of Superintendence in 1911. The committee reported that efficiency needed to be attained by the schools. To accomplish this efficiency, teaching methodology had to be improved, non-essentials had to be eliminated and curriculum had to be arranged to fit the development of children (Willis, et al, 1993). During this same period, Franklin Bobbitt's book *How to Make a Curriculum* used scientific management and time-and-motion study techniques found in industry to develop curriculum that would educate people to act effectively and efficiently in the world (Walker & Soltis, 1997).

During the 1930's, the increasing threat of rising Fascism again spurred changes to education in the United States (Walker & Soltis, 1997). Progressive education, with its focus on the individual, experimentation and change, was pushed aside in favor of more society-centered curriculum. Boyd H. Bode urged educators to concentrate on democracy and the good of society. In *Democracy as a Way of Life* Bode wrote*:*

> Social theory must become a part of the bone and tissue of everyday life if it is to be more than an academic showpiece. In other words, education must make

> provision for the application of social theory to conduct if it is to escape from futility and frustration (Willis, et al..., 1993, p. 244).

The society-centered education pendulum swayed back to a more progressive education model after the end of World War II. As military men and women returned to the civilian life and the economy boomed, Life Adjustment Education emerged. The purpose of Life Adjustment Education was to help students learn to deal with problems in everyday life, such as finding work, managing money, and dealing with relationships (Walker & Soltis, 1997).

Increased Cold War tensions and the launching of the Russian satellite Sputnik ushered in educational change once again during the late 1950s and early 1960s. The American public perceived a lack of rigor in education as the reason for the Russians accomplishments occurring first. A new curriculum with increased science and math emphasis was created. The U.S. Congress authorized unprecedented funding for educational programs in order to compete with the Soviet Union in technology and science (Willis, et al, 1993).

The 1970s brought change again to the education arena. Open Education, which focused on open exploration for students as a way to promote intellectual development, grew in popularity in the United States (Walker & Soltis, 1997). However, the 1980s saw a more conservative sentiment among the American public. The lack of rigor in public schools was blamed for the economic problems (Good, 2000). A movement began to improve school curriculum as a way to strengthen the economy. Within one year of the publishing of *A Nation at Risk*, over 250 commissions were developed in the United States to tackle the problem of poor education. New standards, teacher education reform and accountability, school choice, and testing were established by these commissions (Willis, et al., 1993).

The emphasis on standards and the economy continued into the 1990s and the

new century. On March 31, 1994, *Goals 2000: Educate America* Act was signed into law. The act "establishes a framework in which to identify world-class academic standards, to measure student progress, and to provide the support that students may need to meet the standards" (North Central Regional Educational Laboratory, 2002, n.p.). Although the *Educate America* Act was retired in 2000, the movement towards excellence and standards in education continues (Fritzbert, 2001). In January 2002, President Bush signed into law the *No Child Left Behind* Act. Four principles are emphasized in the act: accountability, expanded options for parents, local control and flexibility, and funding for what works (Committee on Education and the Workforce, 2001). Based on historical information, it appears education will continue to evolve in the twenty-first century as society changes, particularly in relation to technological advancements.

Changing Technology: The History of Distance Education

In addition to changing economics, prevailing viewpoints and politics, the technology a society possesses greatly influences education. As technology develops within a society, educational systems have incorporated the new tools. No where is this more evident than in the area of distance education. Distance education can be defined generally as instruction delivered over a distance to individuals at one or more different locations (Lewis, Snow, Farris, & Levin, 1999). Based on this definition, the foundation of distance education in the United States was laid in the nineteenth century.

The first distance education available in the United States was in the form of correspondence study. The development of a national postal service was a major technological advance that contributed to distance education. Commercial correspondence colleges, attempting to give more access to college, provided education via the postal service (Phipps & Merisotis, 1999). For example, in 1873 Anna Eliot Ticknor of Boston founded the Society to Encourage Studies at Home. More than

10,000 students, predominantly female, corresponded monthly with instructors in a 24 year span (Watkins, 1991).

Academic degrees were also available via correspondence. Chautauqua College of Liberal Arts in New York was authorized to confer degrees to students that completed the required correspondence courses along with summer institutes (Hanson, Maushak, Schlosser, Anderson, Sorensen, & Simonson, 1997). Some institutions provided the opportunity to earn degrees entirely through distance education. For example, in 1900 approximately 500 students were seeking bachelor's, master's or doctoral degrees from Illinois Wesleyan via correspondence. The University of Chicago, which also utilized correspondence distance education, offered 350 courses taught by 125 instructors to 3000 students in the 1900s (Watkins, 1991).

Correspondence courses were even available for trades in industry as early as 1901. Thomas J. Foster, editor of a newspaper called *The Mining Herald,* offered a class in mining and the prevention of mining accidents. As enrollment grew from 225,000 in 1900 to over 2,000,000 in 1920, Foster's developed the International Correspondence Schools (Rose, 1991). The University of Wisconsin promoted distance education via correspondence actively. It even created a Correspondence Study Department within the school's University Extension Division (Watkins, 1991). Distance education via the postal service was even used to deliver agricultural education to farmers in rural areas (Dirr, 1999).

As advances were made, efforts to integrate the new tools into distance education were attempted. For example, one of the first advancements utilized was radio. As early as the 1920's, radio was used to enhance correspondence study. Instructors could lecture students at multiple locations with live-performance radio shows. During the 1920s and 1930s, over 175 radio stations were built at educational institutions (Hanson, et al., 1997). Although a variety of educational establishments

owned radio stations, only one level of credit course was offered via radio by 1940 (Public Broadcasting System [PBS], 2002).

Television was the next medium to be included in distance education. By 1934, the State University of Iowa began experimenting with teaching courses through television (PBS, 2002). Although early research demonstrated television instruction to be as effective as traditional classroom instruction, television use grew slowly. Courses for college credit were not offered until the 1950s (Hanson, et al., 1997). As with radio, the lack of two-way communication between student and teacher proved to be a limitation in this mode of distance education. Furthermore, television production technology, confined to studios in which master teachers conducted courses, appeared dull to the student audience (Sherry, 1996). During this period, televised courses were not limited to broadcasts by colleges and universities. Commercial television course offerings, such as *Sunrise Semester* and *Continental Classroom,* were launched (Dirr, 1999).

In the 1960s, experiments utilizing multiple modes of communication began in distance education. For example, the University of Wisconsin's Articulated Instructional Media (AIM) Project attempted to incorporate various communication media such as television and radio broadcasts, audio tapes, teleconferencing, and correspondence materials into instructional curriculums (PBS, 2002). As evolving technology became available, instructors incorporated it into distance education courses. By 1970, the first "virtual college" came into existence. Coastline Community College, which had no physical campus, broadcast courses to libraries, colleges and universities in Orange County, California (PBS, 2002).

Throughout the 1970s and 1980s, distance education grew through broadcasting of television courses. Satellite technology, made cost effective in the 1980s, allowed for rapid increase of instructional television (Hanson, et. al, 1997). Additionally, cable programming services contributed to the evolving world of distance education. Satellite

television networks were created to provide training and instruction. For example, the Annenberg/Corporation for Public Broadcasting (CPB) funded the development of television courses by the Public Broadcasting Service (PBS) in the early 1980s (Dirr, 1999). PBS then established a programming service committed to national delivery of educational programs known as the Adult Learning Service (ALS). ALS, which began with only seven televised courses, currently coordinates with over 190 public television stations and some 2,000 colleges to deliver over 100 telecourses for college credit (PBS, 2002).

Although media such as radio, audiocassettes, television and videocassettes was used to supplement courses, distance education remained passive in format (Schrum, 1998). The development of fiber optic communication systems of the late 1980s and early 1990s again changed the face of distanced education. Fiber optic systems allowed for high quality, live, two-way audio and video communication (Hanson, et. al, 1997). Unlike previous distance education technology, instructors could communicate more complex information to students. In addition, live interaction among students and between students and faculty was possible (Lewis, et. al, 1999).

Computer mediated communications advanced distance education even further. The current generation of distance education technology incorporates media such as electronic mail, bulletin boards using computers and computer networks, chat sessions via computer, computer programs, disks, CDs, desktop video and audio conferencing, fax and the Internet (Lewis, et. al, 1999). Although a plethora of media is now being used in distance education, the Internet has altered distance education significantly.

Distance Education in the United States Today: The Internet

The advent of the Internet transformed distance education. The new trend in education is “learning anytime, anyplace” (Mariani, 2001). By breaking the barriers of distance and time for both instructors and students, the Internet increases access to

higher education (Truell, 2001). The extensive availability and flexibility of the Internet offers the chance to provide education anywhere, anytime at overall costs lower than those of early distance education and traditional instructional methods (Sankaran, Sankaran, & Bui, 2000).

The development of the Internet over the last decade has changed not only the face of distance education, but higher education in general. According to research by Frank Jewett:

> Classroom instruction (based upon classroom technology) has been the primary mode of instructional delivery in higher education for many years. The advent of electronic media (especially TV, computers, and computer networks) is facilitating the development of alternative instructional delivery modes. (2000, p. 115)

Alternative instructional delivery modes has exploded in higher education. Both the number of colleges offering Internet-based education and the number of students enrolling in the courses has grown significantly. For example, between fall 1995 and 1997-98, the number of postsecondary institutions in the United States offering distance education courses increased from 33 percent to 44 percent and the percentage of the institutions using asynchronous Internet-based technology almost tripled from 22 percent to 60 percent. In addition, the number of distance education enrollments doubled in the same time frame to 1,661,100 enrollments (Lewis, et al., 1999). “Distance education is moving with increasing speed into the mainstream of college and university life” (Miller, 1995, p. 48). The growth of distance education is expected to continue. It is estimated that the number of students in the United States enrolling in distance learning courses will grow to 2.3 million within the next few years (United States Distance Learning Association [USDLA], 2002).

In addition to individual courses and programs offered via distance education,

entire certificates or degrees may be earned. Twenty-five percent of colleges and universities offering distance education courses in 1997-98 had college-level degree or certificate programs designed to be completed fully via distance education. This totaled approximately 1,230 college-level degree programs and 340 college-level certificates designed to be completed through distance education (Lewis, et al, 1999). Furthermore, in 1997-98, the preferred technology in distance education was the Internet. Sixty percent of institutions offering distance learning opportunities utilized asynchronous computer-based instruction (Lewis, et al, 1999).

Besides campus-based colleges and universities expanding opportunities through the Internet, a number of other new arrangements have emerged in distance education. For example, Phipps, Wellman, and Merisotis (1998) have reported one new arrangement occurs when multiple institutions join together and form consortia to offer courses and degrees. Also, contracted arrangements between institutions, faculty and other providers to deliver distance education have emerged. Even virtual universities and colleges have been created. “Virtual universities are institutions that offer most or all of their instruction via technological means and are distinguished by their nearly exclusive use of technology as the educational delivery device” (Lewis, et al, 1999, p. 6). Virtual institutions, such as University of Phoenix, which have offered degrees and courses through the Internet since the late 1980s, continue to grow in size and number (PBS, 2002).

Distance Education via the Internet in Wisconsin

Distance education via the Internet in Wisconsin follows the same trend seen throughout the rest of the United States. The Wisconsin Technical College System (WTCS), consisting of 16 districts and 47 campuses, is one provider of education in the State (WTCS, 2002, n.p.) Similar to the movement throughout the United States, a renewed interest in distance education has formed in Wisconsin. A commitment to

distance education, particularly technology-based education, can clearly be found in WTCS's vision statement:

> The Wisconsin Technical College System is the premier provider of technical education. We develop individuals who apply knowledge and skills to enhance quality of life and boost economic vitality. We are committed to extending learning beyond the classroom and throughout life. To meet each student's educational needs, we: Deliver high quality instruction and services that are responsive, flexible and accessible; Join talent and technology to make learning generously available and imaginatively delivered; Commit to high standards and accountability; Create strategic alliances that expand students' learning opportunities. Respect each other's dignity, embrace diversity, and offer opportunities for growth (WTCS, 2002, n. p.)

Wisconsin has seen significant growth in distance education over the past few years. Between 1997 and 2000, the number of students enrolled in web-based distance education courses within WTCS increased 675 percent (S. E. Belda, personal email, March 13, 2001). The most popular of courses offered online include applications of computer technology, general business education, and computer technician training courses. One college, Moraine Park Technical College, increased enrollment by 900 students in one semester by adding four online degrees and two certificates (Jorgensen, 2002).

Each of the16 technical college districts in Wisconsin has offered at least one web-based course (eTech College of Wisconsin, 2002). Wisconsin Indianhead Technical College (WITC), one of Wisconsin's 16 technical college districts, provides a number of its courses via the Internet (WITC, 2001). As with the entire Wisconsin Technical College System, the number of web-based courses offered through WITC is expected to increase in the future.

Wisconsin Indianhead Technical College's History with Web-based Courses

WITC began its venture into offering distance education via the Internet four years ago with two courses, Written Communication and Technical Reporting (L. Gee, personal communication, October 22, 2001). The college plans to expand its web-based offerings. Eventually, all nine of WITC's core general education courses will be available online. Furthermore, the potential for students to complete a degree via the Internet exists. According to Deborah Ballinger Hellerud, Dean, Student Services:

> In December 2000, the Higher Learning Commission (formerly North Central Association) gave WITC permission to offer the Computer Information Systems-Programmer/Analyst (CISPA) Associate Degree program totally web-based. Currently, the first year of the degree, including the general education requirements, is online or close to being online. By fall 2002, Semester Three of the program should be set, with Semester Four to follow in January 2003. (personal communication, October 17, 2001)

In addition to the Computer Information Systems-Programmer Analyst degree, other programs may partially be offered online in time.

There are reasons WITC plans to implement more online learning. Distance learning utilizing the Internet is "..creating opportunities to serve new student clienteles and better serve existing populations, and it is encouraging innovation throughout the academy (Higher Learning Commission, 2001). Web-based learning provides opportunity to expand the number of students enrolled in the college, and thus, generating more FTEs. As stated in WITC's Strategic Directions 2001-2003:

> Wisconsin Indianhead Technical College is committed to achieving excellence by pursing customer-focused strategic directions. An image of excellence will be reflected throughout our organizational culture and promoted within marketing efforts to various segments of the population...WITC will use

information technology to deliver, support and enhance learning;...(WITC, 2001, Furthermore, the advancement of web-based learning opportunities provides access to higher education and embraces one of the general purposes of WITC, to "...provide access to educational opportunities for adults who wish to continue their learning experience" (WITC, 2001, p. 12).

During the fall 2001 semester, a total of 19 web-based courses were available at WITC. Of the courses available through the Internet, 12 were in the area of computer technology (WITC, 2001). Table1 lists WITC's fall 2001 web-based courses and their credit value.

Table 1

Summary of WITC Web-Based Courses, Fall 2001

Course title	Credits
AS400 Operations	3
Control Language Programming	3
Current Topics in Retail	3
Database Concepts/Applications	3
Introduction to E-Commerce	2
Introduction to Microcomputers	2
Introduction to Psychology	3
Job Quest	1
Managing Human Resources	3
Program Logic	2
Psychology of Human Relations	3
RPG/400 - Beginning	3
RPG/400 - Advanced	3
RPG/IV Interactive - Beginning	3
Server-Side Web Development	3
Technical Reporting	3
Visual Basic - Beginning	3
Visual Basic - Intermediate	3
Written Communications	3

The number of web-based courses continues to expand at WITC. Tentatively, 76 web-based courses are scheduled for the fall 2002 semester, with approximately 50 courses originating from the New Richmond campus (WITC, 2002).

Current Research on Web-based Education

Along with the recent surge in distance education, particularly asynchronous web-based courses, a vast amount of literature on the subject has emerged. Much of the writing about distance education focuses on institutional policies, benefits of distance learning, and articles that describe how to design and implement an online course. For example, one study provides a qualitative description of experiences by current professors teaching online (Smith, Ferguson, & Caris, 2001). In addition, Piotrowski and Vodanovich (2000) claim a large amount of the literature focuses on the benefits of the Internet for teaching functions, such as quick and remote access to information, convenience, flexibility to change, cost savings, and speed of communication.

Although original research on web-based distance education does exist, it is somewhat limited. “It is important to emphasize that, despite the large volume of written material concentrating on distance learning, there is a relative paucity of true, original research dedicated to explaining or predicting phenomena related to distance learning” (Phipps & Merisotis, 1999, p. 2). A majority of the existing experimental studies conclude that distance learning courses are as effective as traditional face-to-face instruction (Hanson, et al, 1997). However, the results of the research needs to be examined further; not all studies concur. For example, Faux and Black-Hughes (2000) found that Internet instruction was not as effective as traditional classroom lecture. Other research shows web-based instruction to be more effective than face-to-face instruction. For example, a study by Dominguez and Ridley (2001) had results that favored students enrolled online.

Summary: The Future of Distance Learning at WITC

It is apparent that WITC plans to continue its expansion in the area of distance education, particularly web-based courses and programs. David Hildebrand, WITC President stated on the college's website:

> At WITC, we understand that learning is a journey of exploration and discovery. Using the latest learning theories and technology, we can also offer flexible alternatives to a traditional classroom—whether it's at night, in accelerated classes, special labs, or online—so you can fit higher education into your busy lifestyle (WITC, 2002).

As WITC continues to develop web-based courses and to modify its current face-to-face curriculum into an online delivery format, the effectiveness of the courses must be considered. When evaluating distance education, the college's assessment and improvement of quality in terms of student learning must be considered (Higher Learning Commission, 2001). One way to measure course effectiveness in terms of student learning would be to compare online courses to their traditional face-to-face counterparts.

Although comparative research exists about the effectiveness of campus-based versus web-based courses, the results are mixed. For example, a number of studies find web-based courses to be as effective as campus-based, while other research claims face-to-face instruction is more effective or vice versa. Additionally, no comparative evaluation of courses has been completed at WITC. Based on the varying results of previous comparative studies and the fact that no research has been completed at WITC, an analysis of WITC web-based and campus-based courses would prove beneficial. A study conducted at WITC about its own courses and students could provide the pertinent information, specific to the College and the students it serves. A comparison of the completion rates and academic success between students enrolled in

online courses and those taking the same course on campus needs to be completed to rate the effectiveness. In addition, demographic information must be collected from the two groups of students. The information collected will assist the college in developing courses that not only increase enrollments and accessibility, but encompass its mission of “providing comprehensive educational programming and support services for meaningful career preparation and personal effectiveness” (WITC, 2001, n.p.)

CHAPTER THREE

Introduction

The purpose of this study was to compare the academic success and course completion rates of students enrolled in traditional face-to-face classroom courses with those students enrolled in courses offered in a web-based format within the Computer Information Systems-Programmer/Analyst Associate Degree at Wisconsin Indianhead Technical College New Richmond during the fall semester of 2001. Data was collected in 2002 via instructor grade rosters and student application and registration forms. Specifically, the questions this research wished to address included:

1. How academically successful are students enrolled in web-based courses?
2. How academically successful are students enrolled in campus-based courses?
3. What is the completion rate of students taking web-based courses in the CISPA program?
4. What is the completion rate of students taking campus-based courses in the CISPA program?
5. What are the demographics of students enrolled in web-based courses?
6. What are the demographics of students enrolled in campus-based courses?

Subject selection, courses included in the study, data collection and analysis, assumptions and limitations are to be covered in this chapter.

Subject selection and description

The population utilized in this research consisted of all students enrolled in either web-based or face-to-face campus-based courses that required in the Computer Information Systems-Programmer/Analyst Associate Degree offered at Wisconsin

Indianhead Technical College-New Richmond. The population consisted of exactly 446 students. Subjects were selected by enrolling in the courses studies in this research. Only students who were enrolled in the fall semester of 2001 were included.

Courses Included in the Study

In the fall semester of 2001, WITC New Richmond offered 31 courses in the area of Computer Information Systems-Programmer/Analyst were offered. Nineteen courses were offered on campus, while the remaining 12 were web-based. Three different instructors taught all the courses.

Data collection

Data was collected via fall 2001 instructor grade rosters semester by WITC Student Services personnel. Instructor grade rosters for web-based and campus-based courses in the Computer Information Systems-Programmer/Analyst Associate Degree were used in this study. Utilizing the instructor grade rosters, demographic data for each student listed was collected by Student Services personnel through the review of application or registration forms completed by the students to enroll for the courses included in the study. Application and registration forms are kept on file in the Student Services office at WITC New Richmond. Demographic information collected from the application or registration forms included student age and gender.

Instructor grade rosters also included semester end grades for each student. Student Services personnel tallied the total number of students enrolled in each course included in the study. In addition, the total number of letter grades and withdrawls in each course were tallied. The total of the number of students enrolled in each course, the total number of letter grades earned in each course, the number of withdrawls, and a listing of students' age and gender by course was then given to the researcher. No names or identification numbers of individual students were shared with the researcher.

Data analysis

Data received from WITC New Richmond Student Services personnel about the courses used in the study included: number of students enrolled by course, letter grade summaries, withdraw information, and student age and gender. The data was analyzed by several methods.

Tallied summaries of the number of letter grades earned in each course were transferred into a spreadsheet program which yielded mean, median and mode for the letter grades. Demographic information was also transferred into a spreadsheet program to yield a mean and standard deviation of age by gender. Percentages of male and female enrollees was determined for both web-based and traditional campus-based courses. Furthermore, the average age of students enrolled in web-based courses was compared to the average age of students enrolled in traditional campus-based courses using a two-tailed t-test.

To determine student academic success, data was collected from instructor grade rosters. Student academic success was determined by calculating a combined Grade Point Average (GPA) for all students enrolled in every web-based and traditional campus-based courses. To compute a course GPA, the point value assigned to each letter grade (i.e. A= 4.00, A- = 3.67, etc.) earned by each student was multiplied by each course's credit value (i.e. Visual Basic - Beginning = 3 credits, RPG/400 - Beginning = 3 credits, etc.). The totaled point value for all students in the course was divided by the total number of credits attempted by all students enrolled in the course to equal the course GPA. Table 2 illustrates WITC's grade point values for each letter grade (WITC, 2002, n.p.) The academic student success rate for web-based courses was then compared to traditional campus-based courses using a two-tailed t-test.

Table 2

Summary of Letter Grades and Grade Point Values at WITC

Letter	Equivalent work	Grade points	Numerical value
A	Excellent	4.00	95-100
A-		3.67	93-94
B+		3.33	91-92
B	Above Average	3.00	87-90
B-		2.67	85-86
C+		2.33	83-84
C	Average	2.00	80-82
C-		1.67	78-79
D+		1.33	76-77
D	Below Average	1.00	72-75
D-		0.67	70-71
F	Failure	0.00	0-69

To determine completion rate for each course, data was collected from instructor grade rosters from the fall semester 2001. The completion rates for traditional campus-based courses and web-based courses were computed by counting the number of students that enrolled in each course. The number of students in each course that received a passing semester-end grade was then divided by the total number of students that originally enrolled in the course. This decimal was then multiplied by 100 to arrive at a percentage.

Overall completion rates for web-based and campus-based courses were also calculated. The total number of students who received a passing grade at semester-end in all web-based courses was divided by the total number of students who initially enrolled in all web-based courses. The resulting number was then multiplied by 100 to obtain the percentage of completion. The overall completion rate for all traditional campus-based courses was calculated by dividing the total number of students that received a passing grade by the total number of students enrolled in traditional campus-based courses at the beginning of the semester. This decimal was then multiplied by 100 to arrive at the percentage of students that completed traditional campus-based courses. Furthermore, completion rates for web-based and traditional campus-based courses were compared using a two-tailed *t*-test.

Finally, the demographic data from the web-based courses and campus-based courses were compared. The average age of students enrolled in the two delivery modes were evaluated using a two-tailed *t*-test. Male and female age averages within web-based courses and campus-based were also compared using the two-tailed *t*-test.

Assumptions

It is an assumption of this study that the information collected from instructor rosters is accurate. It is also assumed that demographic data extracted about students by Student Services staff at WITC New Richmond is complete and specific to the rosters

used in the study. Furthermore, demographic information originally provided by students to Student Services is believed to be true.

Limitations

One of the limitations of this study includes the limited population used in this research. The study was restricted to students enrolled in CISPA courses through WITC New Richmond in the Fall Semester 2001. This is not necessarily representative of other technical colleges or of other semesters. Results may vary by semester, with the number of students enrolled, and with number of courses offered. Students included in the study may be enrolled in multiple courses, thus reducing the size of the population used in the study. Grade changes after data was collected are not included in the current study. Finally, web-based courses and its campus-based counterpart courses are not necessarily taught by the same instructor. Although the expected outcomes for students enrolled in both campus-based and web-based courses are the same, the instructor's individual style could have an effect.

CHAPTER FOUR

Results

This chapter will present the results of comparing the academic success and course completion rates of students enrolled in face-to-face campus-based courses with those students enrolled in the same courses offered in a web-based format within the Computer Information Systems-Programmer/Analyst Associate Degree at Wisconsin Indianhead Technical College New Richmond. The descriptive statistics will be reported first. Data collected on each of the research questions will then be given. Finally, comparisons of the data collected on web-based and campus-based courses will be made.

Descriptive Statistics

The population for this study included 466 students enrolled in either web-based or traditional classroom courses that are part of WITC's Computer Information Systems-Programmer/Analyst Associate Degree in the fall semester of 2001. Of the subjects, 54.29 percent (n=253) were male and 45.71 percent (n=213) were female.

In the fall semester 2001, three different instructors taught 31 courses in the Computer Information Systems-Programmer/Analyst Associate Degree program were offered through WITC New Richmond. Twelve of the courses were web-based in delivery. The remaining 19 being were taught on campus in either a traditional face-to-face format or face-to-face flex lab format. Figure 3 summarizes the courses included in the study.

Table 3

Summary of Web-based and Campus-Based Courses in Study, Fall 2001

Course Name	Delivery Format
AS400 Operations (A)	Campus-based
AS400 Operations (A)	Campus-based
AS400 Operations (A, B, C)	Web-based
AS400 Operations (A, B, C)	Campus-Based (Flex Lab)
Client/Server Systems	Campus-based
Control Language Programming	Campus-based
Control Language Programming (A, B, C)	Web-based
Database Concepts/Applications (A, B, C)	Web-based
Database Design and Programming	Campus-based (Flex Lab)
Introduction to E-Commerce	Campus-based
Introduction to E-Commerce	Web-based
Java Programming - Beginning	Campus-based
Program Logic	Campus-based
Program Logic	Campus-based
Program Logic (A, B)	Web-based
RPG/400 - Beginning	Campus-based
RPG/400 - Beginning	Campus-based
RPG/400 - Beginning (A, B, C)	Campus-based (Flex Lab)
RPG/400 - Beginning (A, B, C)	Web-based
RPG/400 - Advanced (A)	Campus-based (Flex Lab)
RPG/400 - Advanced (A, B, C)	Web-based
RPG/IV Interactive - Beginning	Campus-based

Course Name	Delivery Format
RPG/IV Interactive - Beginning (A, B, C)	Web-based
RPG/IV Interactive - Advanced (B)	Campus-based (Flex Lab)
Server-Side Web Development	Campus-based
Server-Side Web Development (A, B, C)	Web-based
Visual Basic - Beginning	Campus-based
Visual Basic - Beginning (A, B, C)	Campus-based (Flex Lab)
Visual Basic - Beginning (A, B, C)	Web-based
Visual Basic - Intermediate	Campus-based
Visual basic - Intermediate (A, B, C)	Web-based
Web Design and Development	Campus-based
Web Design and Development (A, B, C)	Campus -based (Flex Lab)

Research Question 1

Research question 1: How academically successful are students enrolled in web-based courses? A combined GPA of all web-based courses was computed on the data pertaining to this question. The results indicated that the combined GPA of all enrolled students receiving terminal grades in CISPA web-based courses (n=159) was 2.18 on a 4.0 scale. The most commonly earned grade was “A”, with 42.76 percent (n=68) of the students receiving this grade. Nearly 60 percent (n=93) of terminal grades were “C” or better. However, 40.88 percent (n=65) of the students receiving terminal grades failed. Detailed information on the number of students which earned each letter grade in individual web-based courses may be found in Appendix A.

In addition, the GPA of the individual web-based courses were calculated. The GPA for individual courses ranged from 0.00 to 4.00, with an average course GPA of 2.46. Of the 30 one-credit course increments offered via the Internet in Fall 2001, 22 credits had a course GPA of 2.00 or greater. Table 4 provides a summary of the GPA, the median letter grade and the most frequent letter grade earned each web-based course. Note in the table the data is listed for each one-credit increment of the fractionalized web-based courses.

Table 4

Summary of GPA for Individual Web-Based Courses, Fall 2001

Course Name	Course GPA	Median Letter Grade	Most Common Letter Grade
(A) AS400 Operations	1.66	C-	F
(B) AS400 Operations	0.80	F	F
(C) AS400 Operations	1.33	F	F
(A) Control Language Programming	3.80	A	A
(B) Control Language Programming	2.66	A	A
(C) Control Language Programming	2.00	C	A, F
(A) Database Concepts/Applications	3.56	A	A
(B) Database Concepts/Applications	4.00	A	A
(C) Database Concepts/Applications	3.67	A	A
Introduction to E-Commerce	2.45	B+	A
(A) Program Logic	1.55	F	F
(B) Program Logic	1.93	C-	F
(A) RPG/400 - Advanced	3.67	A-	A-
(B) RPG/400 - Advanced	2.22	B+	B+
(C) RPG/400 - Advanced	2.00	C	A, F
(A) RPG/400 - Beginning	1.26	F	F
(B) RPG/400 - Beginning	0.80	F	F
(C) RPG/400 - Beginning	0.80	F	F
(A) RPG/IV Interactive - Beginning	3.67	A-	A, B+

Course Name	Course GPA	Median Letter Grade	Most Common Letter Grade
(B) RPG/IV Interactive - Beginning	3.50	B+	A, B
(C) RPG/IV Interactive - Beginning	3.67	A-	A, B+
(A) Server-Side Web Development	2.00	C	F
(B) Server-Side Web Development	2.00	C	A, F
(C) Server-Side Web Development	2.00	C	A, F
(A) Visual Basic - Beginning	2.38	C	A
(B) Visual Basic - Beginning	2.34	B+	A
(C) Visual Basic - Beginning	2.67	B+	A, A-,B, F
(A) Visual Basic - Intermediate	2.67	A	A
(B) Visual Basic - Intermediate	2.67	A	A
(C) Visual Basic - Intermediate	4.00	A	A

Research Question 2:

Research question 2: How academically successful are students enrolled in campus-based courses? A combined GPA of all campus-based courses was computed on the data pertaining to this question. The results indicated that the combined GPA of all enrolled students receiving terminal grades in CISPA campus-based courses was 2.87 on a 4.00 scale. The most commonly earned grade was “A”, with 44.22 percent (n=88) of the students receiving this grade. Of the 199 students that received terminal grades at the end of Fall 2001, 78.39 percent (n=156) enrolled in campus-based completed with a grade of “C” or better. Only 16.08 percent (n=32) of the students that received terminal grades failed. Detailed information on the number of students which earned each letter grade in individual web-based courses may be found in Appendix B.

The GPA of the individual campus-based courses was also computed. The GPA for individual courses ranged from 0.00 to 4.00, with an average of 2.34. In 15 of the campus-based courses and fractionalized increments of courses, a GPA greater than 2.00 was attained. In five of the courses, a GPA of 0.00 was calculated. The courses in which this occurred were all Flex Lab courses. In six courses, no terminal grades were assigned at the end of the semester because all enrolled students either withdrew or received incompletes. Table 5 provides a summary of the GPA, the median letter grade and the most frequent letter grade earned in each campus-based course. Note in the figure the data is listed for each one-credit increment of the fractionalized Flex Lab courses held on campus.

Table 5

Summary of GPA for Individual Campus-Based Courses, Fall 2001

Course Name	Course GPA	Median Letter Grade	Most Common Letter Grade
(A) AS400 Operations	3.33	A-	A
(A) AS400 Operations	2.89	A-	A
(A) AS400 Operations (Flex)	0.00	F	F
(B) AS400 Operations (Flex)	0.00	F	F
(C) AS400 Operations (Flex)	0.00	F	F
Client/Server Systems	2.79	B	A
Control Language Programming	3.33	A	A
Database Design and Programming (Flex)	N/A	N/A	N/A
Introduction to E-Commerce	2.70	B+	A
Java Programming - Beginning	3.73	A	A
Program Logic	2.49	B	B
Program Logic	2.39	C+	B
(A) RPG/400 - Advanced (Flex)	N/A	N/A	N/A
RPG/400 - Beginning	2.65	B+	A
RPG/400 - Beginning	3.00	A-	A-
(A)RPG/400 - Beginning (Flex)	0.00	F	F
(B)RPG/400 - Beginning (Flex)	N/A	N/A	N/A
(C)RPG/400 - Beginning (Flex)	N/A	N/A	N/A

Course Name	Course GPA	Median Letter Grade	Most Common Letter Grade
RPG/IV Interactive - Beginning	3.10	A	A
(B)RPG/IV Interactive - Advanced (Flex)	4.00	A	A
Server Side Web Development	2.97	A	A
(A) Visual Basic - Beginning (Flex)	0.00	F	F
(B) Visual Basic - Beginning (Flex)	4.00	A	A
(C) Visual Basic - Beginning (Flex)	N/A	N/A	N/A
Visual Basic - Intermediate	2.97	A	A
Web Design and Development	N/A	N/A	N/A
(A) Web Design and Development	2.00	C	A,F
(B) Web Design and Development	0.00	F	F
(C) Web Design and Development	3.20	C	A

Research Question 3:

Research question 3: What is the completion rate of students taking web-based courses in the CISPA program? Of the 212 students that enrolled in the web-based courses in the beginning of fall semester 2001, 75.00 percent (n=159) earned terminal grades. Approximately 44 percent (n=93) of the enrolled students received passing terminal grades in the web-based courses. Forty-three students, or 20.28 percent of the students that enrolled, withdrew at some point during the fall semester. The remaining 4.72 percent of students (n=10) received incompletes.

Completion rates of individual courses were also computed. The average completion rate among web-based courses was 73.08 percent, with individual course completion rates ranging from 50 percent to 100 percent. Further analysis determined the successful completion rate of each web-based course. To have successfully completed a course, students earned a passing terminal grade of “D-“ or better. The average successful completion rate among the individual web-based courses was 65.50 percent. Table 6 illustrates the completion results for each web-based course. Note in the figure the data is listed for each one-credit increment of the fractionalized web-based courses.

Table 6

Completion Rates for Web-Based Courses, Fall 2001

Course	Number Enrolled	Completion Rate (%)	Successful Completion Rate (%)
(A) AS400 Operations	13	69.23	38.46
(B) AS400 Operations	5	80.00	20.00
(C) AS400 Operations	4	75.00	25.00
(A) Control Language Programming	7	71.43	71.43
(B) Control Language Programming	7	85.71	57.14
(C) Control Language Programming	5	80.00	40.00
(A) Database Concepts/Applications	10	90.00	80.00
(B) Database Concepts/Applications	5	80.00	80.00
(C) Database Concepts/Applications	5	60.00	60.00
Introduction to E-Commerce	9	66.67	44.44
(A) Program Logic	23	86.96	34.78
(B) Program Logic	14	71.43	35.71
(A) RPG/400 - Beginning	11	81.82	27.27
(B) RPG/400 - Beginning	7	71.43	14.29
(C) RPG/400 - Beginning	7	71.43	14.29
(A) RPG/400 - Advanced	2	50.00	50.00
(B) RPG/400 - Advanced	4	75.00	50.00
(C) RPG/400 - Advanced	3	66.67	33.33

Course	Number Enrolled	Completion Rate (%)	Successful Completion Rate (%)
(A) RPG/IV Interactive - Beginning	3	66.67	66.67
(B) RPG/IV Interactive - Beginning	3	66.67	66.67
(C) RPG/IV Interactive - Beginning	3	66.67	66.67
(A) Server-Side Web Development	11	81.82	45.45
(B) Server-Side Web Development	9	55.56	33.33
(C) Server-Side Web Development	8	50.00	25.00
(A) Visual Basic - Beginning	8	100.00	62.50
(B) Visual Basic - Beginning	9	88.89	55.55
(C) Visual Basic - Beginning	6	66.67	50.00
(A) Visual Basic - Intermediate	4	75.00	50.00
(B) Visual Basic - Intermediate	4	75.00	50.00
(C) Visual Basic - Intermediate	3	66.67	66.67

Research Question 4:

Research question 4: What is the completion rate of students taking campus-based courses in the CISPA program? Of the 254 students that enrolled in the campus-based courses in the beginning of fall semester 2001, 78.35 percent (n=199) earned terminal grades, thus completing the course. Of the students who earned terminal grades, 167 students, or 65.75 percent of the enrolled students, received passing letter grades. Forty-seven students, or 18.50 percent of the students that enrolled, withdrew at some point during the fall semester. The remaining 3.15 percent of students (n=8) received incompletes.

Completion rates individual courses were also computed. Completion rates in individual courses ranged from zero to 100 percent, with an average completion rate of 61.17 percent. Further analysis determined successful completion rate in individual campus-based courses. The average successful completion rate, or the percentage of enrolled students that earned passing letter grades, was 42.03 percent. A majority of courses with low or 0 percent successful completion rates were offered as Flex Lab courses. These include: AS400 Operations (Flex), Database Design and Programming (Flex), RPG/400 - Beginning (Flex), (A) RPG/400 - Advanced (Flex), and Web Design and Development. Table 7 illustrates the completion results for each campus-based course. Note that courses offered in the Flex Lab on campus are fractionalized into one-credit increments.

Table 7

Completion Rates of Campus-Based Courses, Fall 2001

Course	Number Enrolled	Completion Rate (%)	Successful Completion Rate (%)
(A) AS400 Operations	9	55.56	55.56
(A) AS400 Operations	25	76.00	68.00
(A) AS400 Operations (Flex)	4	25.00	00.00
(B) AS400 Operations (Flex)	1	100.00	00.00
(C) AS400 Operations (Flex)	1	100.00	00.00
Client/Server Systems	25	88.00	80.00
Control Language Programming	14	64.29	57.14
Database Design and Programming(Flex)	2	00.00	00.00
Introduction to E-Commerce	25	88.00	80.00
Java Programming	12	91.67	91.67
Program Logic	17	88.24	76.47
Program Logic	12	50.00	50.00
(A) RPG/400 Advanced (Flex)	1	00.00	00.00
RPG/400 - Beginning	16	100.00	73.33
RPG/400 - Beginning	12	75.00	75.00
(A) RPG/400 - Beginning (Flex)	5	60.00	00.00
(B) RPG/400 - Beginning (Flex)	1	00.00	00.00
(C) RPG/400 - Beginning (Flex)	1	00.00	00.00

Course	Number Enrolled	Completion Rate (%)	Successful Completion Rate (%)
RPG/IV Interactive - Beginning	14	92.86	85.71
(B) RPG/IV Interactive - Advanced (Flex)	1	100.00	100.00
Server-Side Web Development	21	90.48	80.95
(A) Visual Basic - Beginning (Flex)	3	33.33	00.00
(B) Visual Basic - Beginning (Flex)	2	50.00	50.00
(C) Visual Basic - Beginning (Flex)	1	00.00	00.00
Visual Basic - Intermediate	24	83.33	62.50
Web Design and Development	3	00.00	00.00
(A) Web Design and Development	4	50.00	25.00
(B) Web Design and Development	1	100.00	00.00
(C) Web Design and Development	5	100.00	80.00

Research Question 5:

Research Question 5: What are the demographics of student enrolled in web-based courses? Of the 212 students that enrolled in web-based courses in Fall 2001, 58.02 percent (n=123) were male and 41.98 percent (n=89) were female. Students ranged in age from 16 to 53, with an average age of 29.80. Specifically, the average age of male students was 29.47, with a range of 16 to 52. Female students ranged in age from 18 to 53, with an average age of 30.42. Utilizing a two-tailed *t*-test, no significant difference was found between the average male and female student ages, $t(210) = .45$, $p > .05$.

Additional analysis found the average GPA by gender. Ninety-two male students enrolled in web-based courses earned terminal grades. The average GPA of the male students these courses was 2.58 on a 4.00 scale. Compared to the 74.80 percent of males which earned terminal grades, 75.28 percent (n=67) of females completed the web-based courses. Female students averaged a GPA of 1.71 in the web-based courses in Fall 2001. Utilizing a two-tailed *t*-test, the GPA's of male and female students were analyzed. A significant difference at the alpha level .05 was found in the GPA earned in web-based courses by male students ($M = 2.58$) and female students ($M = 1.71$), $t(157) = 2.98$, $p < .05$.

Research Question 6:

Research Question 6: What are the demographics of students enrolled in campus-based courses? In Fall 2001, 254 students enrolled in campus-based courses in the CISPA program. Male students composed 51.18 percent (n=130) of the enrolled students, while 48.82 percent (n=124) were female. Students ranged in age from 15 to 57 years old, with an average age of 25.98. Specifically, the average age of male students was 25.27, with a range of 15 to 50. Female students ranged in age from 17 to 57, with an average age of 26.67. No significant difference was found in the average

ages of male students (*M* = 25.27) and female students (*M* = 26.67), *t*(252) = 1.28, *p* > .05, using a two-tailed *t*-test.

The number of males to earn terminal grades in the campus-based courses totaled 103, with an average GPA of in the campus-based CISPA courses of 2.67 on a 4.00 scale. Ninety-six of the 124 enrolled female students earned terminal grades in the campus-based courses. Female students averaged a GPA of 3.02 in campus-based courses during Fall 2001. Utilizing a two-tailed *t*-test, the GPA's of male and female students were analyzed. No significant difference was found in the GPA earned in campus-based courses by male students (*M* = 2.67) and female students (*M* = 3.02), *t*(197) =1.65, *p* > .05

Comparison of Web-Based and Campus Based Courses

Several comparisons were made between the data collected on web-based courses and campus-based courses. The academic success rate (GPA), total letter grades earned, completion rate and the successful completion rates were compared for the courses included in the study.

Academic success.

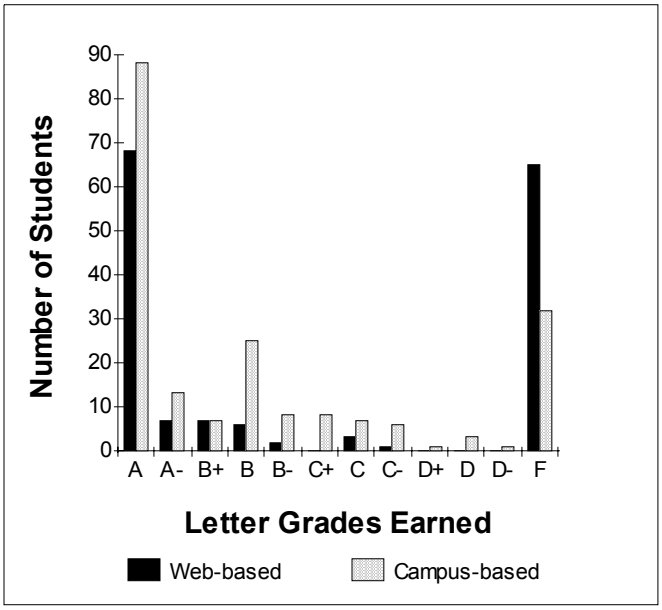
A two-tailed t-test was used to compare the academic success of students enrolled in web-based and campus-based courses. The combined GPA of web-based courses and the combined GPA of campus-based courses were used as measures of academic success. There was a significant difference in the GPA of web-based courses (*M* = 2.18) and the GPA of campus-based courses (*M* = 2.87), *t* (356) = 3.95, *p* < .05.

Academic success was further examined by comparing the total number of individual letter grades earned in web-based and campus based courses. In web-based courses, 42.77 percent (n=68) of terminal letter grades were "A"s as where 44.22 percent (n = 88) of campus-based terminal letter grades were "A"s. In both delivery formats, "A" was the most common letter grade earned. "F" was the second most

frequent terminal letter grade with 40.88 percent (n=65) of web-based students and 16.08 percent (n = 32) of campus-based students earning it. Figure 1 depicts a comparison of letter grades earned in the web-based and campus-based courses in Fall 2001.

Figure 1

Summary of letter grades earned in campus-based and web-based courses, Fall 2001



Completion rates.

Overall completion rates of web-based courses and campus-based courses were compared using a two-sample *t*-test. The percentages of students completing web-based and campus-based courses were evaluated. No significant difference was found between the completion rate of web-based courses (73.08 percent) and the completion rate of campus-based courses (61.17 percent), t (57) = 1.643, $p > .05$.

The average successful completion rates of web-based and campus-based courses offered in Fall 2001 were also evaluated utilizing a two-sample *t*-test. A significant difference does exist between the successful completion rates of web-based courses (M = 65.50) and campus-based courses (M = 42.03), t(57) = 2.83, $p < .05$.

Demographic comparisons.

The average age of students enrolled in web-based courses and campus-based

courses was compared using a two-tailed t-test. With an alpha level of .05, a significant difference existed between the average age of web-based students (M = 29.80) and campus-based students (M = 25.98), $t(464) = 4.33$, $p < .05$. Table 8 summarizes the average age and GPA by gender of students enrolled in both web-based and campus-based courses in Fall 2001.

Table 8

Mean Age and GPA of Web-Based and Campus-Based Students, Fall 2001

	Web		Campus	
Mean	Male	Female	Male	Female
Age	29.80	30.42	25.27	26.67
GPA	2.58	1.71	2.67	3.02

CHAPTER FIVE

Discussion, Conclusions and Recommendations

Introduction

This chapter will begin with a summary of the research, including the purpose of the study, research questions, and design. A discussion of the research results and conclusions based on the results will be presented. Recommendations for further research will conclude the chapter.

Summary

The purpose of this study was to compare the academic success and course completion rates of students enrolled in campus-based courses with those students enrolled in the same courses offered in a web-based format within the Computer Information Systems-Programmer/Analyst Associate Degree at Wisconsin Indianhead Technical College New Richmond. A study conducted at WITC about its own courses and students could provide pertinent information in the development of courses, specific to the College and the students it serves. A comparison of the completion rates and academic success between students enrolled in web-based courses and those enrolled in campus-based courses, coupled with demographic information, may assist the College in developing courses encompass its mission of “providing comprehensive educational programming and support services for meaningful career preparation and personal effectiveness” (WITC, 2001, n.p.)

Six questions were addressed in the research. These questions were:

1. How academically successful are students enrolled in web-based courses?
2. How academically successful are students enrolled in traditional on-campus courses?

3. What is the completion rate of students taking web-based courses in the CISPA program?

4. What is the completion rate of students taking campus-based courses in the CISPA program?

5. What are the demographics of students enrolled in web-based courses?

6. What are the demographics of students enrolled in campus-based courses?

To answer the research questions, data was collected from Student Services via instructor grade rosters from Fall Semester, 2001. Number of students enrolled, age and gender of each enrolled student, the number withdraws and incompletes, and letter grades given was the data collected about individual web-based and campus-based courses.

Discussion

According to the research findings, students enrolled in both web-based (*M* = 2.18) and campus-based courses (*M* = 2.87) would be considered academically successful overall, based on WITC's Good Student Standing policy. This policy requires a cumulative GPA of 2.00 to maintain good academic standing (WITC, 2002). However, campus-based courses had a significantly higher GPA than web-based courses. The difference found in this study conflicts with other research, such as the study performed by Schulman and Sims (1999) which found learning of students online and on campus to be comparable. In fact, the majority of research suggests that outcomes for web-based and campus-based courses are similar. In the annotated bibliography *The No Significant Difference Phenomena*, Thomas Russel records hundreds of sources supporting similar learning outcomes for distance learning and classroom instruction (Phipps & Merisotis, 1999).

This study also examined the difference between completion rates in web-based

and campus-based courses. Although no significant difference was found in the completion rates, a difference was found in successful completion rates. Students enrolled in web-based courses were more likely to receive a passing terminal grade than students enrolled in campus-based courses. This finding diverges from other research, in which web-based students are more likely to drop out before the end of a course (Phipps & Merisotis, 1999).

Examining the ages of students enrolled in web-based and campus-based courses found web-based students to be significantly older than campus-based students. The older mean age in web-based courses, coupled with a higher successful completion rates diverges from previous research. For example, Fjorloft (1995) found younger students to be more likely to complete distance education courses. Additional work by Dille and Mezack (1991) found students over age 25 to be at higher risk of not completing distance education courses, conflicting with the findings of this study.

Age of students was further analyzed. When comparing the average ages of male and female students in both web-based and campus-based courses, no significant differences were found. However, the mean GPA of female web-based students was statistically lower than that of male students enrolled in web-based courses.

Conclusions

The results of this research are mixed compared to previous comparative studies of web-based and campus-based courses. Based on the data from Fall 2001, it is clear that student choosing web-based courses tend to be older and complete more courses; however, the students enrolled in campus-based courses are completing courses with higher letter grades. The findings of this study are unique to WITC and to the population of students enrolled during one specific semester.

A number of researchers are questioning the appropriateness of comparative studies of web-based and campus-based courses. For example, Phipps and Merisotis

(1999) have identified a number of shortcomings found in the current research on distance education such as lack of randomly assigned subjects, no control for extraneous variables, and the occurrence of reactive effects. Additionally, Weigel (2000) poses the question which asks why do campus-based courses serve as the benchmark for new delivery modes such as the Internet. Considering the questions being raised as to the appropriateness of comparative studies, suggestions for further research on the courses offered at WITC may be made.

Recommendations for Further Research

As WITC continues to expand its web-based courses, the potential for further research also expands. One area untapped by the current research is student opinion. Follow-up on why students choose web-based courses is necessary. Surveys of both students that complete courses and those that withdraw will also allow WITC to identify the needs of students. The reasons identified may help faculty and staff in the advisement of students and find courses that better fit their individual needs and circumstances while increasing the chances of success. WITC may also evaluate other courses beyond the CISPA program. Completion rates and demographics may vary by program or instructional area. As technology continues to evolve, education will continue to be affected and will change. With change, research must also continue in order to best serve the needs of the students at WITC.

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Appendix A

Summary of Letter Grades Earned in Individual Web-Based Courses, Fall 2001

Course Name	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F	W	I
(A) AS400 Operations	1	0	2	0	1	0	1	0	0	0	0	4	3	1
(B) AS400 Operations	1	0	0	0	0	0	0	0	0	0	0	3	1	0
(C) AS400 Operations	1	0	0	0	0	0	0	0	0	0	0	2	1	0
(A) Control Language Programming	4	0	0	1	0	0	0	0	0	0	0	0	1	1
(B) Control Language Programming	4	0	0	0	0	0	0	0	0	0	0	2	1	0
(C) Control Language Programming	2	0	0	0	0	0	0	0	0	0	0	2	1	0
(A) Database Concepts/Applications	8	0	0	0	0	0	0	0	0	0	0	1	1	0
(B) Database Concepts/Applications	4	0	0	0	0	0	0	0	0	0	0	0	0	1
(C) Database Concepts/Applications	2	0	0	1	0	0	0	0	0	0	0	0	0	2
Introduction to E-Commerce	3	0	0	0	1	0	0	0	0	0	0	2	2	0
(A) Program Logic	6	1	1	0	0	0	0	0	0	0	0	12	2	1
(B) Program Logic	3	2	0	0	0	0	0	0	0	0	0	5	3	1
(A) RPG/400-Beginning	1	2	0	0	0	0	0	0	0	0	0	6	2	0
(B) RPG/400-Beginning	1	0	0	0	0	0	0	0	0	0	0	4	1	1
(C) RPG/400-Beginning	1	0	0	0	0	0	0	0	0	0	0	4	1	1
(A)RPG/400-Advanced	0	1	0	0	0	0	0	0	0	0	0	0	1	0
(B)RPG/400-Advanced	0	0	2	0	0	0	0	0	0	0	0	1	1	0
(C)RPG/400-Advanced	1	0	0	0	0	0	0	0	0	0	0	1	1	0
(A) RPG/IV Interactive - Beginning	1	0	1	0	0	0	0	0	0	0	0	0	1	0
(B) RPG/IV Interactive - Beginning	1	0	0	1	0	0	0	0	0	0	0	0	1	0

Course Name	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F	W	I
(C) RPG/IV Interactive - Beginning	1	0	1	0	0	0	0	0	0	0	0	0	1	0
(A) Server-Side Web Development	3	0	0	0	0	0	2	0	0	0	0	4	2	0
(B) Server-Side Web Development	2	0	0	0	0	0	1	0	0	0	0	2	4	0
(C) Server-Side Web Development	2	0	0	0	0	0	0	0	0	0	0	2	4	0
(A) Visual Basic - Beginning	4	0	0	1	0	0	0	0	0	0	0	3	0	0
(B) Visual Basic - Beginning	4	0	0	1	0	0	0	0	0	0	0	2	1	0
(C) Visual Basic - Beginning	1	1	0	1	0	0	0	0	0	0	0	1	2	0
(A) Visual Basic - Intermediate	2	0	0	0	0	0	0	0	0	0	0	1	2	1
(B) Visual Basic - Intermediate	2	0	0	0	0	0	0	0	0	0	0	1	1	0
(C) Visual Basic - Intermediate	2	0	0	0	0	0	0	0	0	0	0	0	1	0

Appendix B

Summary of Letter Grades Earned in Individual Campus-Based Courses, Fall 2001

Course Name	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F	W	I
(A)AS400 Operations	7	1	1	2	0	1	0	0	0	0	0	3	2	0
(A)AS400 Operations	2	2	0	0	1	1	1	0	0	0	0	0	4	0
(A)AS400 Operations (Flex)	0	0	0	0	0	0	0	0	0	0	0	1	3	0
(B)AS400 Operations (Flex)	0	0	0	0	0	0	0	0	0	0	0	1	0	0
(C)AS400 Operations (Flex)	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Client/Server Systems	8	0	0	5	1	2	3	0	0	1	0	2	3	0
Control Language Programming	7	0	0	0	0	0	1	0	0	0	0	1	5	0
Database Design and Programming (Flex)	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Introduction to E-Commerce	7	4	0	6	1	0	0	2	0	0	0	2	3	0
Java Programming	9	0	0	1	0	0	1	0	0	0	0	0	0	1
Program Logic	1	0	3	4	2	1	1	1	0	0	0	2	2	0
Program Logic	0	0	0	2	1	1	0	2	0	0	0	0	6	0
(A)RPG/400 - Advanced (Flex)	0	0	0	0	0	0	0	0	0	0	0	0	1	0
RPG/400 - Beginning	7	1	1	1	0	1	1	0	0	0	0	4	0	0
RPG/400 - Beginning	2	3	0	0	1	1	1	1	1	0	0	0	2	1
(A)RPG/400 - Beginning (Flex)	0	0	0	0	0	0	0	0	0	0	0	3	2	0
(B)RPG/400 - Beginning (Flex)	0	0	0	0	0	0	0	0	0	0	0	0	1	0
(C)RPG/400 - Beginning (Flex)	0	0	0	0	0	0	0	0	0	0	0	0	1	0
RPG/IV Interactive - Beginning	7	3	1	0	0	0	0	0	0	1	0	1	1	0
(B)RPG/IV Interactive - Advanced (Flex)	1	0	0	0	0	0	0	0	0	0	0	0	0	0

(C)Visual Basic - Beginning (Flex)	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Visual Basic - Intermediate	14	0	1	0	0	0	0	0	0	0	0	5	2	2
Web Design and Development	0	0	0	0	0	0	0	0	0	0	0	0	2	1
(A) Web Design and Development (Flex)	1	0	0	0	0	0	0	0	0	0	0	1	1	1
(B) Web Design and Development (Flex)	0	0	0	0	0	0	0	0	0	0	0	1	0	0
(C) Web Design and Development (Flex)	4	0	0	0	0	0	0	0	0	0	0	1	0	0