

A CASE STUDY OF NORTH DAKOTA INTERACTIVE VIDEO NETWORK AT NORTH
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A CASE STUDY OF NORTH DAKOTA INTERACTIVE VIDEO
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North Dakota State University's regulations and meets the accepted standards
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ABSTRACT

North Dakota State University (NDSU) has delivered courses utilizing the North Dakota Interactive Video Network (IVN) since 1989. The technology used an Integrated Services Digital Network but switched to Internet Protocol in 2001, greatly expanding the locations served.

NDSU student and institutional data was collected but never examined. The collected data examined for this study included course and credit numbers, undergraduate and graduate student enrollments, and IVN locations. An analysis of the data found that the student enrollments did not increase at the same rate as the IVN locations. There were differences in the findings of the undergraduate and graduate data in terms of courses offered, student enrollments and financial impact.

The conclusion is the North Dakota Interactive Video Network had a positive influence on NDSU in both undergraduate and graduate areas but in different aspects. Some aspects are direct and measurable, while others are indirect and need more study.

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CHAPTER 1. INTRODUCTION

Distance delivery of educational services has been an important component of the educational mission at North Dakota State University (NDSU) since its establishment as a land grant institution in 1890. NDSU continues today to disseminate research and knowledge for the betterment of people not only in North Dakota but world-wide. At NDSU, originally called North Dakota Agricultural College (NDAC), the history of distance education and delivery has more than one historical path and the evolution has been dramatic and ongoing.

When NDSU started distance learning and education, the faculty delivered the information to people in face-to-face demonstrations and print material. Today, both access to information and methods of dissemination have evolved dramatically. Most of North Dakota was settled by homesteaders between 1875 and 1915. Many were direct emigrants or sons and daughters from settled emigrants from states further east. Many could speak little or no English and their agricultural knowledge was linked to their previous native countries. This is the background into which the land grant institution was born in 1890 and the start of delivering educational services and research to the rural people who did not have the opportunity to attend formal schooling (Bale, 1989). It was important to educate farmers in new and improved farming methods to increase food productivity. The survival and success of the rural farm family was critical in keeping North Dakota towns growing and prosperous and allowed for their growth and prosperity.

Since the founding of North Dakota State University the Extension Service has been a cornerstone of its distance delivery outreach. For over 100 years, Extension Service personnel

have traveled the state educating the populous on the most current research through demonstrations and training sessions. Pates (n.d.) stated that as early as 1894 the North Dakota Agricultural College faculties started meetings called “farmers institutes” with one of the first held at Casselton, North Dakota, featuring college faculty from North Dakota Agricultural College. Pates continues to explain that by 1912 these young North Dakota Agricultural College graduates drove throughout the state to bring the education and research to farmers. Physically delivering the university information to people across the state of North Dakota was the main instructional venue for distance delivery at NDSU until the introduction of correspondence classes. In 1935, the North Dakota Division of Correspondence Study was started at NDSU as a high school correspondence program when the North Dakota Legislative Assembly established the division (“Finding Aid”, 1999). NDSU began to deliver distance education through correspondence courses utilizing the United States Postal Service.

Until 1920, NDSU’s distance education across the state of North Dakota was in the form of physical face-to-face delivery of its education or information. As new technologies became available, radio and television, NDSU took advantage of these and offered education utilizing these mediums. In 1920, technology-based distance education was introduced. This technology was broadcast radio and was utilized in addition to actual physical face-to-face delivery of education and research. Pates (n.d.) stated that, “Radio broadcasts with scientific education are transmitted from Ladd Hall at the North Dakota Agricultural College [NDSU] in the 1920’s” (p. 3) from Fargo, North Dakota. In 1922, the [Cooperative] Extension [Program] Service began a weekly half-hour program on a local broadcast radio station, WDAY, in Fargo, North Dakota. It was not until 1953 that another major technology platform entered the distance education

delivery spectrum, broadcast television. WDAY-TV in Fargo, North Dakota and KCJB-TV in Minot, North Dakota started broadcasting live half-hour programs at North Dakota Agricultural College, largely with Extension programming (Pates, n.d.).

The traditional correspondence delivery of education was functional but had a number of pedagogical constraints. A person could obtain a high school diploma throughout the state of North Dakota, but college and university delivered courses still eluded many. As the state of North Dakota's infrastructure progressed so did NDSU's distance delivery methods. In 1989, a new technology was introduced to the state of North Dakota, dedicated two-way interactive video conferencing. Initially, this system was called the North Dakota Interactive Video Network Project and was intended for distance education. It facilitated offering college and university degree courses at specific locations across North Dakota. This project gave place bound individuals the opportunity to register for college or university credit classes that could be used towards a degree at NDSU or the University of North Dakota.

North Dakota was the first state to connect all of its state-supported post-secondary campuses by synchronous interactive video system called North Dakota IVN (Presentation to the North Dakota State Board of Higher Education Sept. 23, 1993). This first of a kind network created a statewide system that allowed multiple video conference sites to connect for synchronous learning processes. Synchronous learning refers to a group of people learning the same subject matter at the same time in the same place, except in this instance the same place was not physical; it was achieved by connecting independent video locations across the state of North Dakota. Synchronous learning gives the immediacy of contact between instructors and students, something asynchronous learning cannot achieve. It also expands the horizons of the students by broadening and diversifying the student population by eliminating geographical

barriers. Traditional correspondence distance delivery was asynchronous, which resulted in all students learning independently from one another since they were accessing the instructional materials at different times. This new technology simulates face-to-face learning and integrates new learning and teaching methods since all the students are in the virtual “classroom” at the same time.

North Dakota IVN “was the first step in a long-range plan to connect all corners of North Dakota using the latest communications technology” (Tykwinski & Poulin, 1991, p.1).

Beginning in 1989, North Dakota IVN eventually connected all North Dakota higher education institutions through two-way compressed video and audio signals which utilized the H.320 standard. The H.320 standard requires dedicated bandwidth and transmission lines across North Dakota. It is considered a closed network, which means only those on the connected network could participate. It is expensive; the transmission lines are dedicated to the video network only, serving only one purpose. The H.320 standard provided audio and visual communication sessions utilizing cameras and microphones at each location, allowing participants to both see and hear one another. Tykwinski and Poulin (1991) stated the purpose or vision in creating the North Dakota Interactive Video Network

is to create and maintain a cooperative among North Dakota’s public campuses to use communications technology to: deliver quality postsecondary programs and services to citizens who would not otherwise have access to these services; improve the quality of offerings on each campus by sharing knowledge, courses, services, and resources with each other; and expand services to the state through cooperative arrangements with elementary, secondary, and vocational education, state agencies, the private sector and other states (p. 2).

The purpose and vision of North Dakota IVN and the mission of NDSU, to take the university to the people, form a great partnership.

In 1989, the original system started with four locations. “During the 1990-1991 academic year, the video network was established and connected ten campuses and the State Capitol with fourteen classrooms” (Tykwinski & Poulin, 1991, p.1). At this time, NDSU had two interactive video classrooms on the main campus (Fargo, North Dakota).

In 1995, the system consisted of four independent networks; one network combined 22 higher education locations; a second network had five North Dakota Tribal locations; there were also two K-12 consortiums. These networks however, could not be bridged together in part because they did not use the same equipment. Consequently, a system existed but its networks did not share bridging connections easily. This incapability made it difficult to connect to the different networks within the state of North Dakota.

Over the years, the state system evolved and grew. The North Dakota IVN was originally its own entity, but now resides in the state unit called Advanced Learning Technologies (ALT). ALT focuses on current and emerging educational technologies that enhance and expand teaching and learning opportunities across the North Dakota University System (North Dakota Alternative Learning Technologies, n.d.). As the state system advanced so did the North Dakota IVN and its locations. In 2001, the original H.320 system that once required dedicated transmission lines to connect locations across the state of North Dakota was replaced with H.323 Internet Protocol (IP) technology that uses the Internet as its connection network. As a result, the number of video sites on the network, increased dramatically. From June, 2001 to November, 2002 the number of sites expanded from approximately 40 to nearly 200.

The new H.323 IP allowed for technology to be connected in a consistent manner statewide for the first time. It connected all of state government, political subdivisions, K-12 schools and higher education institutions in a united and seamless system, using the same cost effective technology. Not only did the technology become more effective, but so did the effective use of the video rooms. Before the H.323 IP, the rooms were dedicated studios for video conferencing only, but now the rooms became a more versatile environment for teaching and learning.

North Dakota was one of the first states to successfully complete such a large coordinated effort in interactive video technology. The significant resources needed were made available through the assistance of the North Dakota legislature and this allowed for the creation of the North Dakota Statewide Technology Access for Government and Education network (North Dakota STAGEnet, n.d.). “STAGEnet provides broadband connectivity, Internet access, video conferencing and other network services. All state agencies, colleges and universities, local government, and K-12 are required to participate” (North Dakota STAGEnet, n.d., para. 1). For the first time in the state’s history, this vision allowed for a true state-wide system with coordinated consistency for everyone who participates.

H.323 is a video standard that uses the Internet to deliver audio and video, is easy to use, and moderately priced compared to H.320. The H.323 standard does not require dedicated transmission lines like the H.320; this means that data can share the transmission lines with the video, making it more cost effective. Videoconferencing equipment that utilizes the H.323 standard can connect with other H.323 systems as easily as dialing a phone number and is compatible with other videoconferencing standards. This new standard has the capability to not

only connect locations across North Dakota, but to connect virtually anywhere in the world that has high speed Internet capabilities.

In 2012, the number of North Dakota connected locations reached nearly 600. In addition to delivering education to learners across the state, NDSU is now able to take its courses and research beyond local, state and national borders. Today with the development of new video technologies and advanced Internet capabilities, this technology permits NDSU to achieve its land-grant mission by disseminating education and research knowledge to any place in the world with Internet capabilities. The information dissemination and instruction have gone from physical face-to-face, print, radio, television, two-way interaction in a dedicated setting to two-way interactive via the Internet.

Today, synchronous (real time) instruction occurs in homes or anywhere learners can access the Internet. The traditional delivery method has evolved as student clientele changed in both age and learning dynamics. The realization of a 19th century goal required 21st century technology to achieve its objective.

Statement of the Problem

The North Dakota Interactive Video Network has existed since 1989, but there has been no investigation of these data and the impact on North Dakota State University. It has not been determined what impact NDSU's participation in delivering credit courses over the Interactive Video Network had and whether the expansion of video locations, beginning in 2001, had an influence on the overall number of NDSU student enrollments.

To determine whether there has been an impact at NDSU the researcher evaluated the data for both the undergraduate and graduate students in the following areas:

1. Course offerings utilizing the North Dakota Interactive Video Network
2. Course credits utilizing the North Dakota Interactive Video Network
3. Number of video locations on the North Dakota Interactive Video Network
4. Off-campus student enrollments at North Dakota State University
5. Financial impact from off-campus student enrollments utilizing the interactive video network
6. Compare off-campus student enrollments with the increase in video locations

Purpose of the Study

The purpose of this case study is to examine and interpret data to determine what impact North Dakota State University's participation in delivering courses over the North Dakota Interactive Video Network had and if the expansion of video locations, beginning in 2001, had an influence on the overall number of North Dakota State University student enrollments.

Importance of the Study

North Dakota State University student registration and video location data have been collected since the early beginning of the North Dakota Interactive Video Network, but a review of the data has not been conducted. The importance of this study is three-fold: (a) to record and analyze the findings of North Dakota State University data, utilizing the Interactive Video Network, (b) to evaluate if, during the expansive growth of the North Dakota IVN, there has been a corresponding enrollment increase (or did enrollments just disperse on the trend line), and (c) to record and preserve the history of NDSU's role in the initial video delivery within the state of North Dakota.

Research Questions

North Dakota State University has been part of the North Dakota IVN and delivered courses, since it began in 1989. The IVN student data was recorded from academic years 1990-1991 through 2010-2011, the duration of the study. The student data resided in many different documents and databases throughout the campus but was not compiled in one database. Once the data was collected and entered into a single database it could be analyzed. This study addresses the following questions about North Dakota IVN and the role it had at NDSU.

1. Did North Dakota State University course and credit offerings, utilizing the North Dakota Interactive Video Network, from academic years 1990-1991 through 2010-2011, have an impact on undergraduate and graduate student enrollments?
2. Did North Dakota State University course and credit offerings, utilizing the North Dakota Interactive Video Network, from academic years 1992-1993 through 2010-2011, impact revenue at NDSU?
3. Did the expansion of video locations, beginning in 2001, have an influence on the overall number of NDSU student enrollments?

Significance of the Study

The significance of this study was to record the findings (August 1992 – December 2011) of NDSU and its participation in the North Dakota IVN, from its conception and throughout the growth of the video network. The study included examination of data collected in: student enrollment, program offerings, tuition/financial contributions and video location increases.

The results of this case study were positive. They revealed a direct financial impact at North Dakota State University. Because NDSU offered credit courses utilizing North Dakota

IVN, off-campus student could access North Dakota IVN locations for credit courses. The off-campus student registrations generated for addition tuition revenue for NDSU. The results also showed that the technology enhanced NDSU's land grant mission in "taking the learning to the people", by allowing learning to take place beyond the physical boundaries of our brick and mortar institution. The education now extended across the state of North Dakota and throughout the world.

Limitations of the Study

The data analyzed in this study were taken from recorded university undergraduate and graduate credit registration archives. The limitation was that the credit data gathered was done without a consistent set of guidelines and by different people. This could mean Distant Education Units (courses) may or may not have been included in the data, depending on a personal interpretation of the definition of a credit course. The archives were recorded in an Access database populated by different NDSU IVN Site Coordinators until 2011. After 2011, they were recorded in a consistent manner by the Registrar's Office at NDSU.

This case study documented only the impact of the North Dakota IVN and the NDSU credit courses delivered until 2011. The financial impact only used the recorded off-campus student enrollments, not on-campus students enrolled at NDSU, where the instructor was provided at a distance (instructor separated by space and time). This on-campus student enrollment revenue was due to the technology within our state of North Dakota but was recorded differently and not calculated for this case study.

Definition of Terms

Advanced Learning Technologies (ALT) is a unit within the System Information Technology Services and resides within the North Dakota University System

H.320 Protocol is a standard that provides a foundation for audio, video, and data communications across dedicated or ISDN dialup-based networks, usually at 128k or above. H.320 was the original video standard adopted by IVN.

H.323 Protocol is a protocol standard for multimedia communications. H.323 was designed to support real-time transfer of audio and video data over packet networks like IP. The standard involves several different protocols covering specific aspects of Internet telephony. (Mitchell, n.d.)

Internet Protocol (IP) is the primary network protocol used on the Internet, developed in the 1970s. On the Internet and many other networks, IP is often used together with the Transport Control Protocol (TCP) and referred to interchangeably as TCP/IP. (Mitchell, n.d.)

Integrated Services Digital Network (ISDN) is a set of communications standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network (POTS: Plain Old Telephone Service).

North Dakota Agricultural College, NDAC, original name of NDSU.

North Dakota Interactive Video Network (IVN) is a statewide videoconferencing system established to provide the availability of higher education opportunities across the state.

PeopleSoft, Inc. was a company that provided Human Resource Management Systems (HRMS), Financial Management Solutions (FMS), Supply Chain (SCM) and customer relationship management (CRM) software, as well as software solutions for manufacturing, enterprise performance management, and student administration to large corporations, governments, and organizations. It existed as an independent corporation until its acquisition by Oracle Corporation in 2005. The PeopleSoft name and product line are now marketed by Oracle (Wikipedia, n.d.).

Plain Old Telephone System (POTS) refers to the standard telephone service that most homes use prior to cell phones. The main distinctions between POTS and non-POTS services are speed and bandwidth.

Tri-College University Tri-College University (TCU) is an official partnership among the three higher education institutions in Fargo, North Dakota and Moorhead, Minnesota. TCU is a unique cooperative agreement between Concordia College, Minnesota State University Moorhead, and North Dakota State University.

CHAPTER 2. LITERATURE REVIEW

Summary of Literature

To understand where North Dakota State University is today, in the 20th Century, it is important to understand its beginnings in 1862. Congress established the land-grant system in 1862, the passage of Morrill Act. NDSU became one of the original, 57 land-grant institutions in 1890 when the university (NDSU) was established. The original land-grant mission was to provide a broad segment of the population with a practical education relating to everyday life. Today, NDSU has expanded the original mission to include addressing the needs and aspirations of people in a changing world by building on the land-grant foundation (North Dakota State University Mission, Vision, 2006).

Education has always held an important role in the United States. As early as the 1600's a few of the U.S. colonies realized the importance of education and enacted laws that established government-operated public education system. Although this idea was embraced by the American revolutionaries educational opportunities were still limited to affluent individuals because education did not necessarily mean free of charge.

As the American West expanded the importance of education was an essential element in the "state trust lands" – parcels of land granted to new states or territories for educational purposes (Culp, Conradi & Tuell, 2005). This was the beginning of North Dakota's history as a territory, then as a state, and the beginning of North Dakota State University's land-grant legacy. The legacy consists of three major legislative components. The Morrill Act of 1862, the Hatch Act of 1887, and the Smith Lever Act of 1914. These three components have been described as a three-legged stool with each leg offering long lasting stability to the land grant status.

Morrill Act

An important piece of legislation for higher education in America and the first leg in the stool analogy was the Morrill Act of 1862, championed by Rep. Justin Morrill of Vermont. Under this Act each state originally received 30,000 acres of federal land for every representative and senator in Congress based on the census in 1860. This land could be sold to create trust funds to finance educational programming (Safransky, 2011). Brunner (1966) stated there has been much discussion since the passage of the Morrill Act as to its true intent. In the Act, the purpose is stated in the following words:

at least one college where the leading object shall be, without excluding other scientific and classical studies and including military tactic, to teach such branches of learning as are related to agriculture and the mechanic arts ... in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.
(p.12)

Originally fifty-seven land-grant institutions were established, North Dakota Agricultural College was one of the original institutions granted this status.

The Morrill Act addressed the growing demand of providing a broad segment of the population with a practical education relating to their everyday lives. The land grant universities and colleges would help address this educational need in the early development of our country. Today NDSU continues to meet this goal as part of its mission.

Hatch Act

The second leg of the stool is the Hatch Act of 1887; it created the agricultural experiment stations, another key component of the land-grant system. The Hatch Act authorized

federal-grant funds to experimental stations that were established under the direction of a land-grant institution. The Hatch Act was the first time the federal government leveraged funds to conduct research at the institutions (Fischer, 2000). The missions of the land-grant institutions were expanded to include research and to pass along the new information. This new Act mandated that the land-grant universities take their research and education to the people rather than having the people always come to the place bound institution. This was a new and different approach to educating North Dakota's population and progressive for the late 1880s.

The North Dakota State University Experiment Stations began issuing research bulletins as the research programs were initiated. The written information was an important aspect but Rasmussen (1989) also noted the importance of some sort of direct person-to-person contact between those who had the information and those who needed it. Pates (n.d.) stated that North Dakota home economics agents rode the rails in the late 1920s to the 1940s delivering educational information and were on the road as much as a month at a time.

Smith Lever Act

The three-legged stool was completed with the introduction and passage of the Smith Lever Act. This Act was signed into law on May 8, 1914 by President Woodrow Wilson, who called it "one of the most significant and far-reaching measures for the education of adults ever adopted by the government" (Rasmussen, 1989, p. 48). The Smith Lever Act created what is known today as the Cooperative Extension System. Congressman Lever introduced the bill to the House of Representatives and explained that the role of the county agent was to educate through instruction and practical demonstration. Extension agents also would provide social, economic and financial leadership in rural activities.

The purpose of the Smith Lever Act was “to aid in diffusing among the people of the United States useful and practical information on subjects relating to agricultural and home economics and to encourage the application of the same” (Rasmussen, 1989, p. 27). This purpose again stressed bringing education to the people. Such a dissemination strategy facilitated the public taking advantage of the agricultural colleges and research without attending the place bound institution. The outreach education provided useful and practical information to the American farmer and homemaker beyond the classroom, which could continue throughout a lifetime. Rasmussen (1989) explained that Extension went even further when it went from the transfer of information to the idea of helping people identify the problems and find the tools to assist them in solving them. This idea remains an integral concept of the land-grant institution today.

NDSU History

In 1889 during the North Dakota Constitutional Convention, the decision was made that the Agricultural College and State Agricultural Experimental Station would be located in Fargo. The bill creating the North Dakota Agricultural College (NDAC) was passed and signed into law on March 8, 1890 by Governor John Miller.

In May of 1892 the first North Dakota Agricultural College Annual Catalogue, stated (as cited in North Dakota State University Archives, (n.d.b):

The North Dakota Agricultural College is a state and national institution, belonging to the group of so-called land-grant colleges of the country, owing their existence to the provisions of the act of Congress, approved July 2, 1862, whereby grants of public lands were made to each of the states and territories for the purpose of endowing in each at

least one college whose leading object shall be, without excluding other classical and scientific studies, and including military tactics – to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal education of the industrial classes and professions of life.

Unofficially, students were calling North Dakota Agricultural College, North Dakota State College. On December 8, 1960, North Dakota Agricultural College officially became North Dakota State University (North Dakota State University Archives, n.d.b) by the vote of the people of the state.

Today's mission and vision of NDSU is still closely linked to the original land-grant mission: to teach agriculture, military tactics, and the mechanic arts as well as classical studies so the working class could obtain an advanced education (Association of Public and Land-Grant University, 2012). Today NDSU's mission has an expanded definition as it states "North Dakota State University addresses the needs and aspirations of people in a changing world by building on its land-grant foundation" (North Dakota State University Undergraduate Bulletin, n.d., para. 1). NDSU envisions a vibrant university that will be globally identified as a contemporary metropolitan land-grant institution (North Dakota State University Archives, (n.d.a). Just as the early Dakota Territory progressed to become a state in 1889, NDSU has advanced in its growth and strives to provide its students, North Dakota residents, and the world with quality programs; strategic knowledge and research. One important way to disseminate knowledge is through quality and global delivery methods of education at NDSU.

Universities propagate knowledge through distance delivery. At NDSU, a major force in distance delivery is the North Dakota Interactive Video Network. The North Dakota IVN's

impact on North Dakota State Universities' distance education course delivery and registrations is what this case study explores and examines.

Evolution of Distance Education

In meeting its land-grant mission NDSU has evolved to sustain the awareness of educational opportunities that resulted from the country's growth and innovation. One hundred years ago, manufacturing jobs were growing and sometime between 1910 and 1920 surpassed farming to lead the workforce in jobs (Draves & Coates, 2007). NDSU advanced and developed to meet the needs of the populous when the country was originally an agrarian society, and then evolved and changed to meet the new and challenging needs of the Industrial Age. Today, society is in midst of another major change. It has yet to be officially named but the authors of "Nine Shift" call it the new Information or Internet Age (Draves & Coates, 2007).

Draves and Coates (2007) suggested that today manufacturing jobs show the same decline as farm jobs did more than one hundred years ago. They predict that between 2010 and 2020, Information Age or knowledge sector jobs will exceed industrial jobs and life again will have culminated to reach the end of a revolution (Draves & Coates, 2007). The authors noted that the leading business thinker of this metamorphous from the Industrial Age to the Internet Age is Peter F. Drucker, who coined the term "knowledge worker". In "Nine Shift" Drucker notes, "the Next Society will be a knowledge society. Knowledge will be its key resource, and knowledge workers will be the dominant group in its work force," and he concludes, "All this suggests that the greatest challenges are almost certainly ahead of us" (Draves & Coates, 2007, pg. 4).

Draves and Coates (2007) explored the uncanny parallels between today and one hundred years ago, examining the changes between the two transition periods and the forces that restructure society in the new economic era. The authors suggest that in just 20 years, between 2000 and 2020, 75% of our lives will change dramatically. We know this because it happened once before. Between 1900 and 1920, life significantly changed. Society shifted from an agrarian lifestyle to an industrial way of life and now it is happening again in the realm of information. This transitional shift also is taking place in higher education instruction and how we deliver this information to our customers. The traditional higher education institution has evolved from a brick and mortar physical institution to a virtual entity anywhere the Internet has connectivity. The next step in this educational progression is already emerging, that is wireless accessibility

North Dakota University System

The North Dakota University System was organized in 1990 and consists of eleven public colleges and universities governed by the State Board of Higher Education. The system includes two research universities, four regional universities and five community colleges. Each institution is unique in its mission to serve the people of North Dakota. In the late 1980s the higher education institutions began working together to share courses and programs utilizing interactive video (Poulin, n.d.).

Partnerships of North Dakota Interactive Video Network

The state-wide video network had partnerships that spanned many levels. At the federal level there is the United State Department of Agriculture (USDA), then North Dakota at the state level and educational institutions at the local level, each contributing to its success.

The conception of the state-wide video network began with a Rural Health Project. This funded project included the NDSU Extension Service and the University of North Dakota Center for Rural Health; both of these entities are part of the North Dakota University System. This Rural Health Project allowed place-bound students to earn degrees through distance education in Nursing, Social Work, and Medical Technology (North Dakota Interactive Video Network, 1993).

The stakeholders in the initial partnership, USDA and the North Dakota University System, agreed that they could combine their funds and create a service for the state that would be greater than either could provide alone. This collaboration allowed for network planning and implementation at a state-wide level, which included network connections among the higher education institutions.

The North Dakota University System assembled a group with expertise in varied backgrounds to address this unique state-wide challenge. North Dakota State University provided a broadcast engineer, the University of North Dakota provided their knowledge in audio conferencing, and Valley City State University contributed a faculty member well-versed in educational technology (North Dakota Interactive Video Network, 1993).

Interactive Video Network History

Non-traditional instruction is not new to North Dakota or the United States, Shum and Chan (2000) stated that as early as the 1890s, Pennsylvania State University began offering correspondence courses. The authors go on to state that distance education has moved from correspondence courses to television and today distance education continues to evolve with the development of the Internet. The history of the North Dakota IVN was only twenty-two years old

in 2011. During that time, the network grew both in terms of locations within the state and connective abilities outside the state. More information about the Interactive Video Network can be found at the North Dakota University System web site. (North Dakota University System, 2012).

The initial collaborative partnership between the NDSU Extension Service and the University of North Dakota Center for Rural Health was funded by The United States Department of Agriculture. This was the first project but it initiated other partnerships across the state, to eventually create a state-wide system. The eleven North Dakota University campuses were subsequently connected by the Interactive Video Network to allow courses and complete degree programs to be taught to more than one campus at a time through two-way interactive video. This meant students had more choices of programs and courses than what may be offered on the physical campus (place bound) that the student was attending.

This new Interactive Video Network also allowed campuses to collectively share resources by joining resources with similar expertise at different institutions. They could offer complete programs to students by sharing the delivery of courses and sharing the student registrants at respective campuses. As a result, programs could be enhanced by courses offered by other North Dakota institutions, resulting in an expansion of educational choices not available at a student's local campus. This was a new opportunity for the North Dakota University System and for other continuing educational opportunities. The Interactive Video Network was another avenue for NDSU to further its land grant mission in disseminating its research and education easily and cost effectively.

North Dakota Information Technology Department (ITD)

North Dakota Information Services Division (ISD) renamed Information Technology Department (ITD) in 1989 became a partner in network planning for the state, because it had considerable experience in managing communication lines. Subsequently, it was eventually agreed that the ITD would manage the video network lines, perform scheduling duties, and bill for network usage.

ITD's history dates from 1969 when it was created as the Central Data Processing Division with the Office of Management and Budget. The division set up an electronic data processing center used by all state agencies except the institutions of higher education, Job Service, and the office of the Adjutant General. ITD is responsible for all wide area network services planning, selection, and implementation for all state agencies, including institutions under the control of the State Board of Higher Education, counties, cities, and school districts (North Dakota Information Technology Department, n.d.).

Creating the Network and Implementation

The North Dakota University System assembled a team of experienced staff with varied backgrounds from three campuses to plan the implementation of the network. NDSU provided a broadcast engineer, the University of North Dakota shared their expertise in audio conferencing, and Valley City State University contributed a faculty member experienced in educational technology.

In 1989 the North Dakota IVN consisted of four videoconferencing sites. NDSU in Fargo, the NDSU Research Extension Center at Carrington, the North Dakota State Hospital at Jamestown and the University of North Dakota in Grand Forks.

With the start of this network, NDSU's land-grant mission to disseminate education and information from the university and the Research Extension Centers could be delivered even faster and more economically. This meant that rural farmers, bankers, teachers or any other citizen could access significant educational resources without having to move to a large metropolitan area. People across the state of North Dakota could now be within an hour or two of the information or advanced education they needed. This accessibility would offer learning opportunities that may not have been available due to the physical limitation of distance and time.

Expansion of the Network

After 1989, the North Dakota IVN quickly expanded. By Fall of 1990, there were six interactive video conference classrooms, and 14 classes were being offered teaching subjects in Nursing and Social Work. By January 1991, 10 of the 11 university campuses, plus one room at Jamestown State Hospital were connected and the number of classes increased to 24 (North Dakota Interactive Video Network, 2000).

In 1999, the North Dakota legislature mandated that a state-wide network should be developed to include higher education; K-12, and political sub divisions (STAGENet, 2001). This state-wide approach also included a move from the old Integrated Services Digital Network (ISDN) technology, to the new Internet Protocol (IP) across the entire state. The Internet has played a significant role in the advancement and expansion of the North Dakota IVN and is one of the reasons videoconferencing has substantially expanded in the state.

The new network which allowed for synchronous learning was an important element in the continued operation of rural K-12 schools across North Dakota. Not every rural school could

financially afford to hire teachers for required pre-college or dual-credit courses (credit for high school and college). North Dakota IVN allowed schools to share teachers in rural school districts that often cannot attract teachers in certain disciplines, and/or accommodate courses that attract a small number of students. This collaboration, via technology, allowed rural school districts the flexibility to offer greater diversity of courses or programs, especially for students who needed specialized courses for college (e.g. physics). This network helped ensure that students across North Dakota had the opportunity to meet the application requirements of higher education institutions.

The state-wide connective technology, which includes interactive video conferencing, put North Dakota ahead of most other states. Education and training could be delivered through cooperative agreements with the North Dakota University System; K-12 education community; vocational education; state agencies; the private sector; and other states. This latest technology allowed North Dakota IVN sites not only to connect with each other, but to connect with locations around the world that have adequate Internet connectivity.

The North Dakota Interactive Video Network grew gradually during the 1990's but growth accelerated during the period of June 2001 to September 2002 from less than 40 sites to nearly 200. This growth coincided with the prediction of Draves & Coates (2007) that between 2000 and 2005 the momentum into the Information Age from the Industrial Age would increase. North Dakota was on target for this time-line and continues to deliver educational instruction meeting the goal of NDSU's land-grant mission.

The conception of the Interactive Video Network in 1989 and its subsequent connection to all state-wide campuses assisted NDSU to reach its original land-grant mission across North Dakota and its bordering neighbors. The expansion that is made possible through the new

Internet connectivity has allowed North Dakota's land grant mission to reach beyond the state and its bordering neighbors to virtually world-wide.

Academic Programs Utilizing the Interactive Video Network

In August of 1990, a total of fourteen classes were instructed using six Interactive Network sites. Nursing and Social Work classes were the first subjects taught (North Dakota Interactive Video Network, 2000) and soon followed by entire degree programs. The first full degree was approved for delivery in Fall of 1991. NDSU's first approved programs were delivered in the fall of 1993. They were a Specialist Degree in Educational Administration and a Masters in Counseling Education (North Dakota Information Technology Department, n.d.).

According to the North Dakota IVN statistics in 1995, there were 11 degree programs (North Dakota University System, 1995-1997 biennium): in 2011, there were 26 degree programs from North Dakota University System (NDUS) campuses (North Dakota Advanced Learning Technologies, n.d.), which offered all or most of their courses via the North Dakota IVN. While some programs utilize other instructional technologies in addition to North Dakota IVN, all credit course requirements for the approved degree programs can usually be completed through North Dakota IVN. These programs are approved by the North Dakota University System Chancellor to be offered at locations away from the host campus.

While campuses can independently deliver degree programs the system also allows for campus collaboration in program delivery. NDSU and Tri-College University collaborated for years delivering the Education Specialist Degree in Educational Administration over the North Dakota IVN. NDSU had it first graduate over the North Dakota IVN in fall semester 1996.

Data Collection in Registrations

As the state network matured so did the process for collecting the data with student registrations. The initial process was cumbersome and required the students to call the video conference coordinator for registration information. From there, a three-part carbon form was sent to students. They returned it with the class information and the distant location that they would be attending. The original was sent to the registrar and entered into the IBM CICS® (Customer Information Control System) software system. The carbon copy was kept by the video conference coordinator and the location data were manually collected and recorded in a database.

In fall of 2004, NDSU implemented the Oracle© PeopleSoft software program. The implementation of this software dictated that all students would need to register on-line and it allowed the campus to assign a unique class number to each video location in the registration process. For the first time, data from video registrations along with the location could be electronically retrieved from one database.

Case Study

A case study can be the study of a person, a small group or a specific case. It involves extensive research, including documented evidence of a particular issue or situation. One type of case study is an intrinsic case study. In this particular type of case study, a researcher is primarily interested in understanding a specific situation (Fraenkel, Wallen & Hyun, 2012). Case studies can be qualitative or quantitative in nature, but this case study took a quantitative approach. Archival records from the North Dakota State University, Interactive Video Network site coordinator and the Registrar's Office were used.

CHAPTER 3. METHODOLOGY AND PROCEDURES

Purpose of the Study

The purpose of this case study is to examine and interpret data to determine what impact North Dakota State University's participation in delivering courses over the North Dakota Interactive Video Network had and if the expansion of video locations, beginning in 2001, had an influence on the overall number of North Dakota State University student enrollments.

Research Questions

This study addresses the following questions about North Dakota IVN and the role it had at NDSU.

1. Did North Dakota State University course and credit offerings utilizing the North Dakota Interactive Video Network, from academic years 1990-1991 through 2010-2011, have an impact on undergraduate and graduate student enrollments?
2. Did North Dakota State University course and credit offerings utilizing the North Dakota Interactive Video Network, from academic years 1992-1993 through 2010-2011, have an impact on revenue?
3. Did dramatic expansion of video locations, beginning in 2001, have an influence on the overall number of NDSU student enrollments?

Analysis and Hypothesis

Student registration numbers are compared and analyzed along with the number of Interactive Video Network delivered courses. The hypothesis was that student enrollment numbers would increase on a relative basis with the increased rate of video locations. The data

were entered into an Excel spreadsheet and graphed to compare if the trends matched, supporting the hypothesis.

This study addressed how NDSU collected and retrieved the registration data from a manual process to an electronic implementation. Using this data the researcher evaluated whether the expansion of the video network increased the number of NDSU registrants or if it had simply dispersed them across the many available locations by providing more convenient access.

Reliability and Validity

The reliability of the study remains consistent as long as there is access to the archived student data from the registrar's IBM CICS® software and Oracle© PeopleSoft. Two variables that may affect the validity of the study involve data that was collected prior to the Oracle© PeopleSoft implementation. First, only university credit classes (utilizing North Dakota IVN) had a procedure to record and report the data by the registrar. Second, this data was collected by various people and recording criteria may not have been consistent.

The first variable is that the registrar's report only contains student's registrations for university credit classes; it might not include continuing education courses or extension certificate courses. These courses may or may not be counted in the registration numbers, depending on the departmental recording process, but they may be counted in the NDSU Site Coordinator's report. The NDSU Site Coordinator included all of the student numbers for reporting purposes to the North Dakota IVN for state compilation.

The second variable is in the recording of the student registration data. For reporting purposes, NDSU has to report student enrollment numbers the third week of each semester.

Before the implementation of PeopleSoft, registration and reporting was manual. Even though NDSU reported student enrollment numbers the third week of each semester, late registrations were allowed. Off-campus students mailed in their registrations and often could register as late as six weeks into a semester, meaning any student who registered after the third week would not be reported in data recorded by the registrar. The data, however, would be recorded in a database kept by the NDSU Site Coordinator. All IVN locations and student enrollment had to be recorded and sent to the state of North Dakota for reporting. The data was sent from the NDSU IVN Site Coordinator rather than the registrar's office.

After the PeopleSoft implementation, student registration deadlines were enforced for all registrations (both on- and off-campus registrations). Therefore, if a comparison of registrations were made from the registrar data and the NDSU Site Coordinator data, the numbers should match up to the third week. After the third week, a slight variation in the student registration data could occur; this variation/discrepancy would only exist until Fall 2004. Implementation of the Oracle© PeopleSoft system in 2004 resolved this variable because students (both on and off-campus) were not allowed to register after the third reporting week in the semester. This ensured an accurate student enrollment report at the third week of each semester. For the purpose of this case study, the research includes data from the NDSU Site Coordinator and PeopleSoft.

Institutional Data

The registered students, retrieved from archived institutional data included: a) NDSU credit courses, b) Distance and Continuing education credits and certifications, or c) NDSU Extension credits and certificates, which were all instructed over the North Dakota IVN. For reporting purposes, the off-campus students who registered used a distant location course call

number that was kept separate from the on-campus registrations. The use of separate call numbers ensured that students and distance locations could be differentiated in the data.

Data Collection

This study used archived institutional data from the NDSU Office of Registration and Records, the NDSU Videoconferencing Coordinator's records, and the NDSU School of Education. The early registration data were retrieved from the Office of Registration and Records, which utilized the IBM CICS®; the site location data were tracked and recorded manually using Access and Excel both Microsoft® software programs. In Fall 2004, implementation of the new software Oracle© PeopleSoft allowed for the data to be recorded electronically.

The early North Dakota IVN registrations were mailed to the NDSU Video Conference Coordinator, and using the Access database, student, class, and site information were recorded and stored. The paper registrations were then sent to the registrar's office and entered into the IBM CICS® software using the distant class call number that was assigned for the distant IVN students. The Office of Registration and Records could create a report with all registered IVN students, but could not report the locations of students; only the NDSU Video Conference Coordinator was able to provide that data.

The reliability of the study is consistent as long as data can be retrieved from the NDSU Office of Registration and Records. Prior to the installation of Oracle© PeopleSoft, the registrations for students at the distant sites were collected on a manual basis. For the purpose of this study the data was entered into a Microsoft® Excel

spreadsheet for analysis to determine if there was an observable increase in student registrations attributable to increased accessibility provided by the North Dakota IVN or if enrollment stayed consistent with expectations, only distributing students throughout the access points.

CHAPTER 4. RESULTS

Data Analysis

The North Dakota IVN has been in existence since 1989, but there has been no investigation of NDSU data (courses, credits, enrollments, revenue) collected and the impact at NDSU. It has not been determined what impact NDSU's participation in delivering courses over the IVN had and if the expansion of video locations, beginning in 2001, had an influence on the overall number of NDSU student enrollments.

To analyze the impact of the North Dakota IVN at NDSU, the researcher evaluated the data for both undergraduate and graduate students, concentrating on the off-campus data, in the following areas:

1. Course offerings utilizing the North Dakota IVN
2. Course credits utilizing the North Dakota IVN
3. Number of video locations on the North Dakota IVN
4. Off-campus student enrollments at North Dakota State University
5. Financial impact from off-campus student enrollments utilizing the North Dakota IVN
6. Off-campus student enrollments compared to the increase in video locations

The data for this paper were retrieved from early archived paper registrations recorded in an Access database and electronic PeopleSoft records from the registrar's office at North Dakota State University. Data were then recorded in an Excel spreadsheet, summarized, and graphed by a consultant from NDSU's Statistical Consulting office for analysis.

NDSU IVN Delivered Courses and Credits

Data regarding the delivered courses and credits utilizing the IVN are presented (in Figures 1-8) and are used to compare courses and credits in each category (undergraduate and graduate). The off-campus course and credit data had to be plotted and analyzed in order to examine the financial impact which is described later in this chapter.

Figures 1 and 2 illustrate undergraduate courses and credits utilizing the IVN. Figure 1, undergraduate courses, shows that in academic year 1992-1993 three courses were offered over the IVN, in 1993-1994 the courses doubled to six, and in 1994-1995 courses offered spiked to an all-time high at fifteen. The courses remained somewhat linear during academic years 1995-2005 until a decline began and continued through academic years 2005-2008, then course numbers drop off completely in 2008-2009.

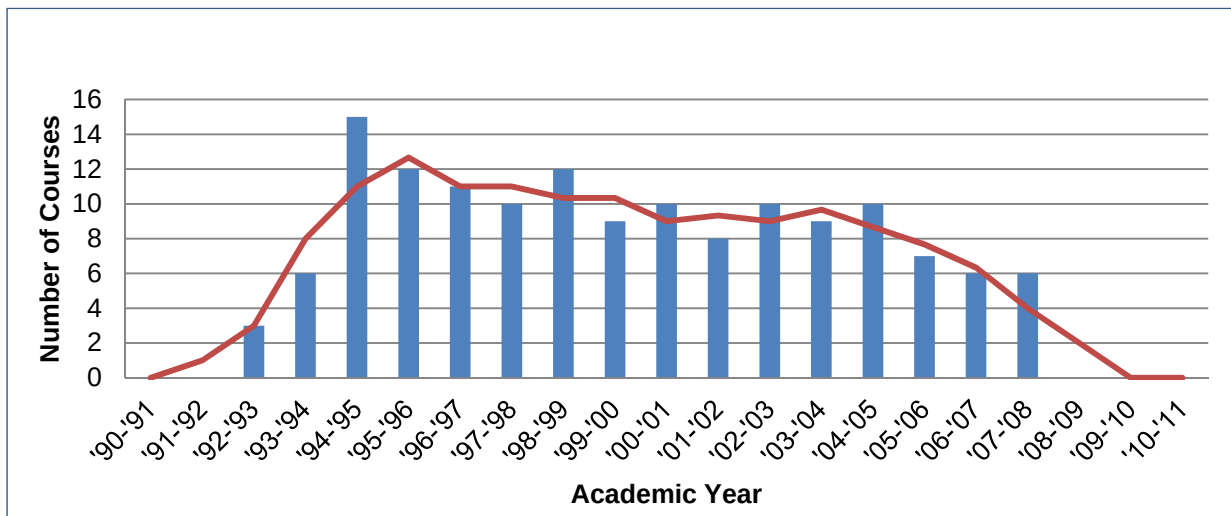


Figure 1. Undergraduate course numbers utilizing IVN. This figure illustrates the number of undergraduate courses delivered during academic years 1990-1991 through 2010-2011.

The undergraduate credits (Figure 2) did not follow the same pattern as undergraduate courses; there were sporadic spikes in the number of credits offered during academic years 1994-2003. In academic years 1992-1993 and 1993-1994, the credits were approximately ten each year. Credits spiked in academic years 1994-1995 to 40 credits; in academic year 1996-1997, to slightly over 45 credits; in academic year 1998-1999, 45 credits; and in 2002-2003, to just over 35 credits. A decline began in academic year 2003-2004 and continued through 2006-2007, and credits drop off completely in academic year 2008-2009. The drop in credits and courses was both consistent in year 2008-2009 and remained absent for the remaining period of this case study.

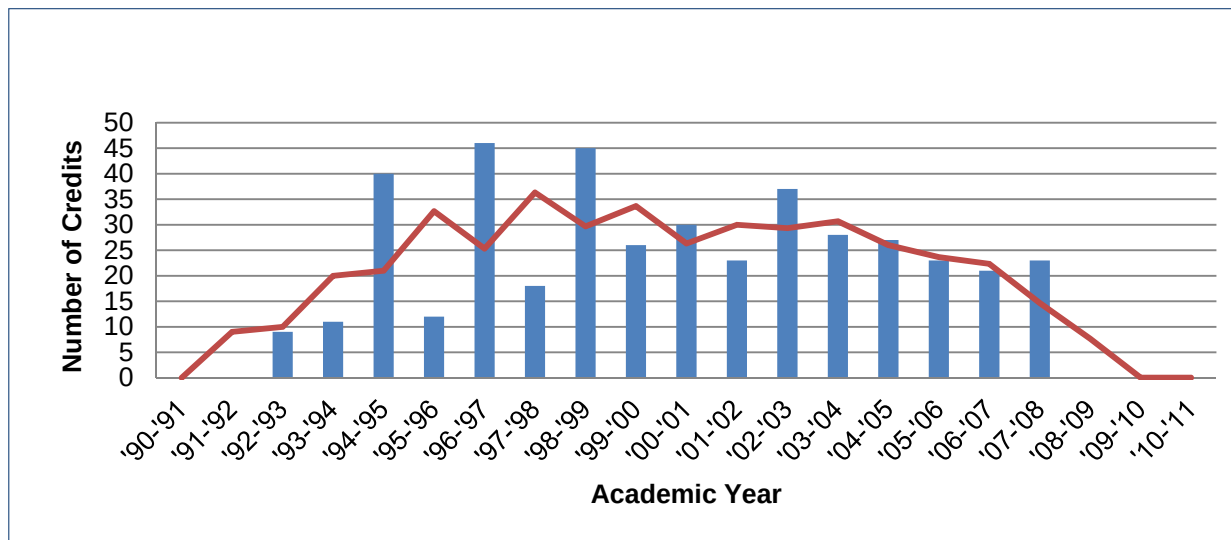


Figure 2. Undergraduate credit numbers utilizing IVN. This figure illustrates the number of undergraduate credits delivered during academic years 1990-1991 through 2010-2011.

Even though it appears the delivery of undergraduate courses remained somewhat steady, they remain a small percentage of the delivered courses (Figure 3) when compared to the overall courses delivered over the IVN.

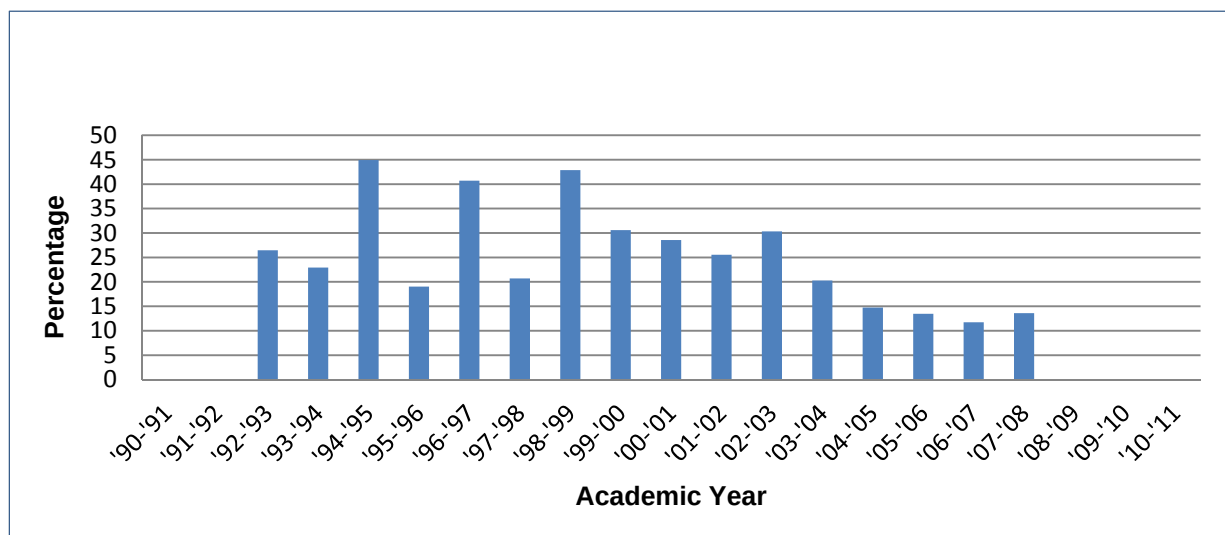


Figure 3. Percentage of undergraduate courses utilizing IVN. This figure illustrates the percentage of undergraduate courses delivered during academic years 1990-1991 through 2010-2011.

Examination of the graduate courses and credits (Figures 4 and 5) depict a more uniform picture as chart patterns are more consistent with one another. The graduate courses and credits both show an increase over time, peak in academic year 2004-2005, and then show a slow decline.

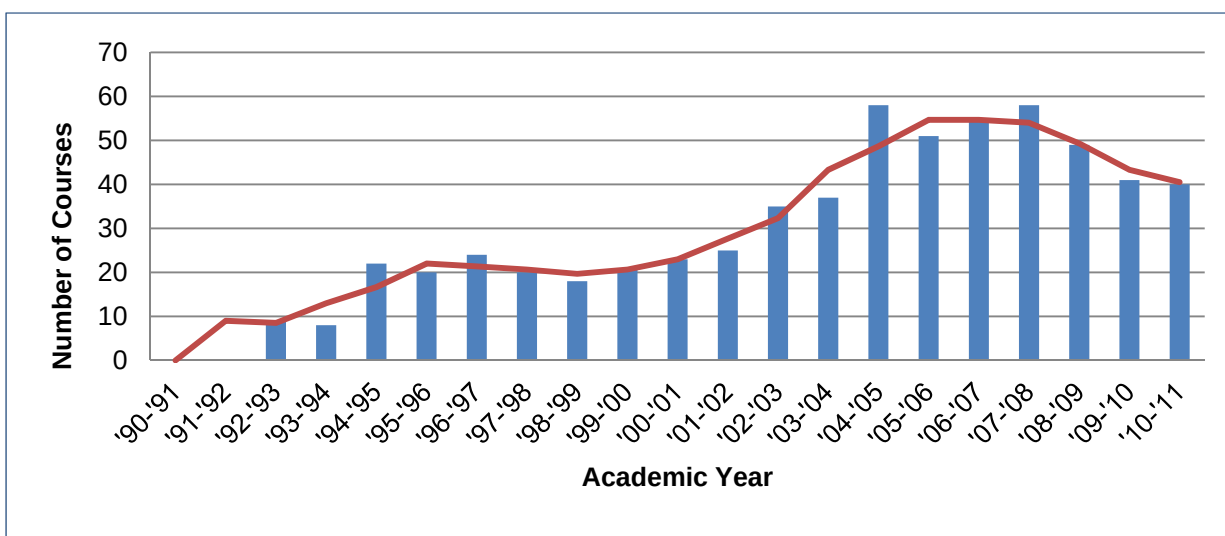


Figure 4. Graduate course numbers utilizing IVN. This figure illustrates the number of graduate courses delivered during academic years 1990-1991 through 2010-2011.

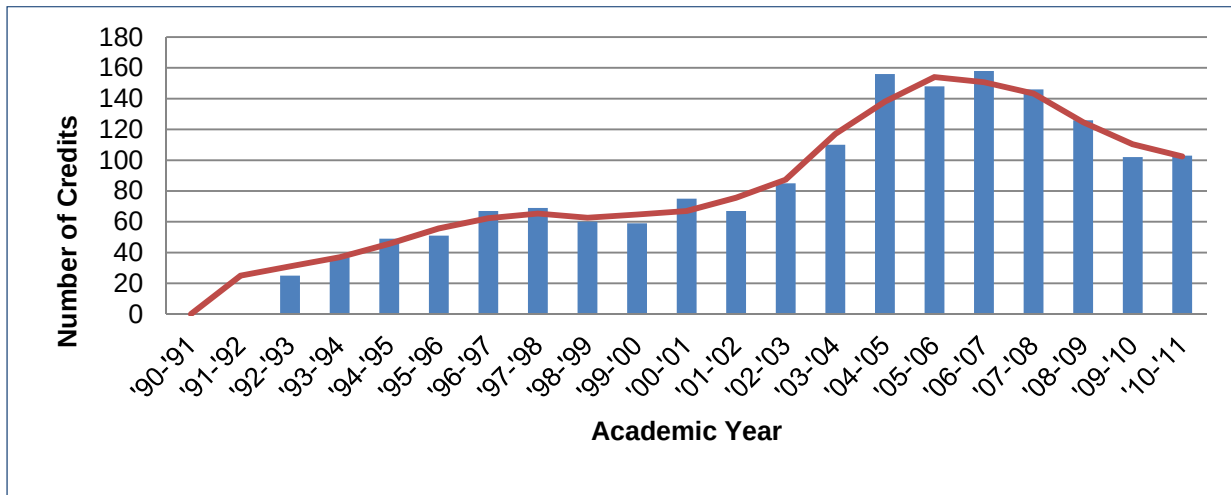


Figure 5. Graduate credit numbers utilizing IVN. This figure illustrates the number of graduate credits delivered during academic years 1990-1991 through 2010-2011

Data analyzed for this case study show that since the 1992-1993 academic year, graduate courses have comprised the greatest percentage of course offerings over IVN. Figure 6 illustrates an increase in graduate level courses from academic years 1993-1994 through 2010-2011 with the exception of one year, 1998-1999. The increase continued until eventually the graduate course data reached 100% of the delivered courses in academic year 2008-2009 and remained there throughout the period of this case study.

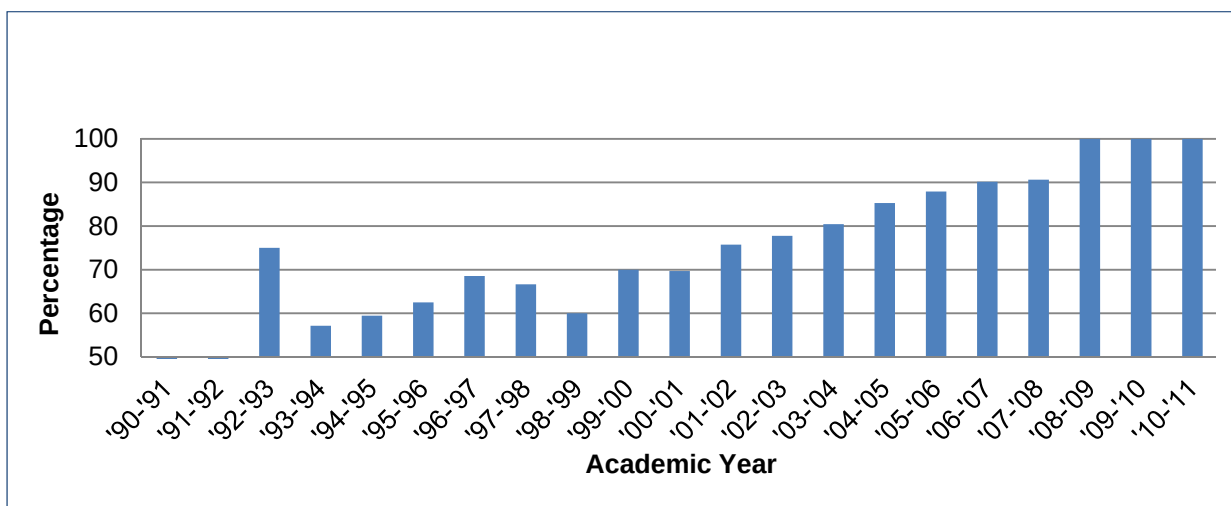


Figure 6. Percentage of graduate credits utilizing IVN. This figure illustrates the percentage of IVN courses that were graduate credits during academic years 1992-1993 through 2010-2011.

While the undergraduate course offerings remained somewhat consistent (Figure 1), the undergraduate credit offerings (Figure 2) were sporadic with several years of very low numbers to several years of spiked growth. Even though undergraduate credits had some spikes in growth, the percentage of delivered credits over the IVN was under 50% (Figure 7), while the percentage of graduate credits over the IVN was above 50% and eventually reached 100% (Figure 8).

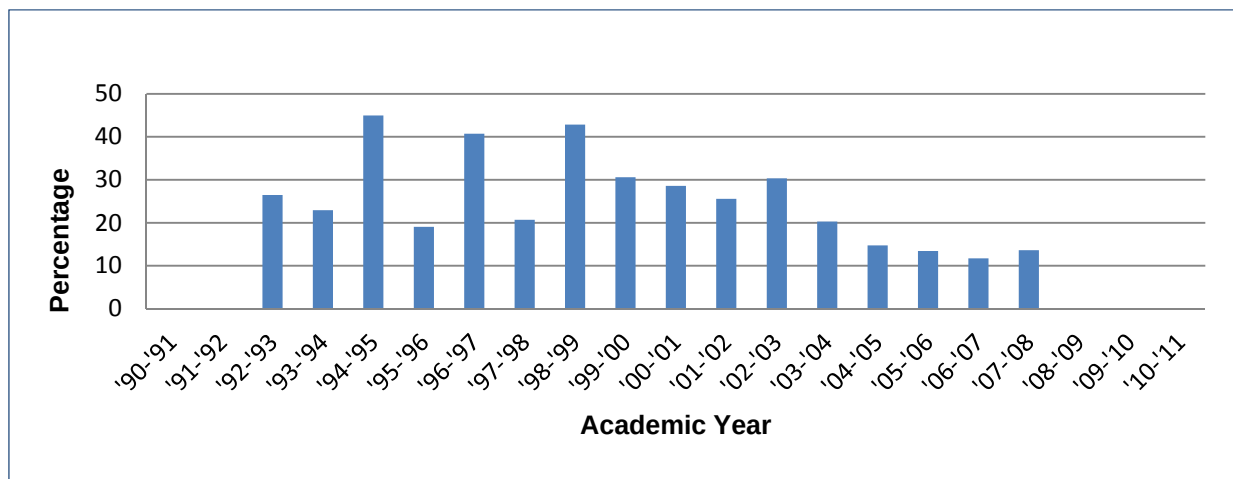


Figure 7. Percentage of undergraduate credits utilizing IVN. This figure illustrates the percentage of IVN courses that were undergraduate credits during academic years 1992-1993 through 2010-2011.

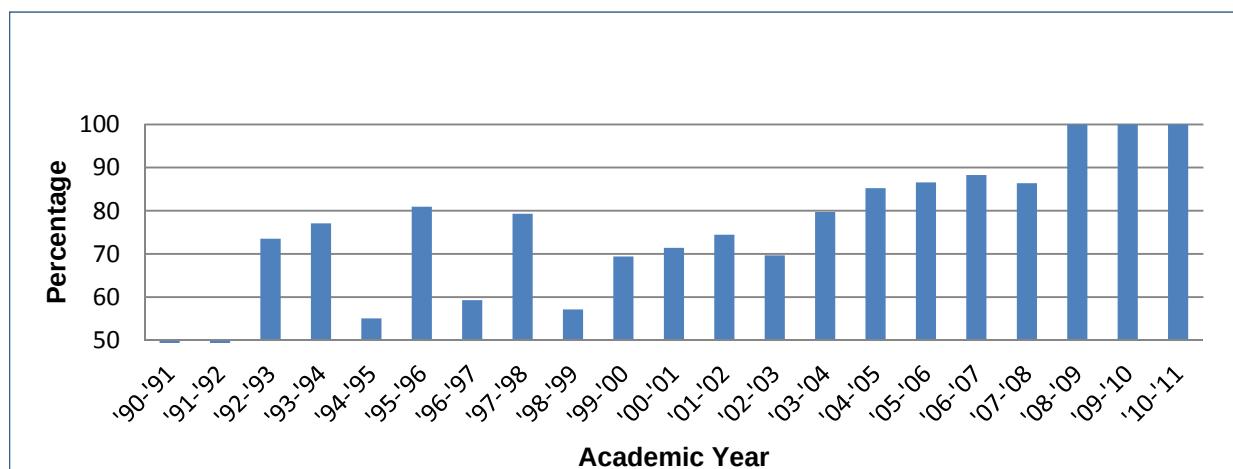


Figure 8. Percentage of graduate credits utilizing IVN. This figure illustrates the percentage of graduate credits delivered during academic years 1990-1991 through 2010-2011

The data reveal that the graduate courses and credits greatly outpaced those of the undergraduate courses and credits utilizing the IVN at NDSU. Figures 1 and 2 indicate that there were no undergraduate courses or credits offered over the IVN after academic year 2007-2008. After this period, all courses and credits delivered over the IVN were graduate level.

North Dakota Interactive Video Site Data

In 1989 the IVN started with only four video locations and over the next 20 years grew to almost 600 sites. Figure 9 illustrates the growth in locations, beginning with academic year 2001-2002 and through 2010-2011, in the case study.

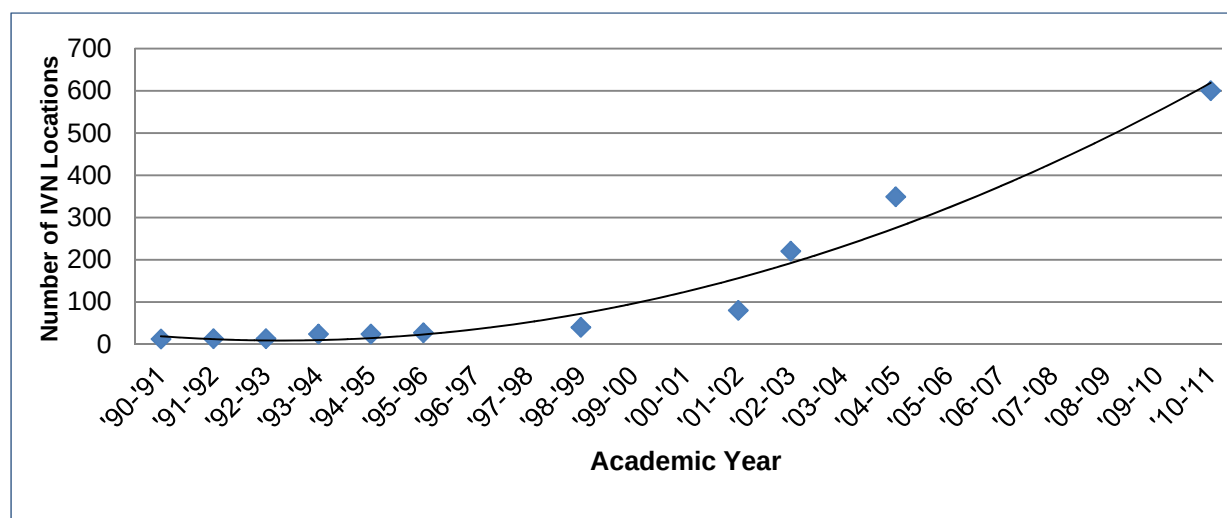


Figure 9. Approximate number of IVN locations. This figure illustrates the approximate number of IVN locations depicted during academic years 1990-1991 through 2010-2011.

Student Enrollments

To examine the NDSU undergraduate and graduate enrollment, the student enrollments had to be plotted and analyzed (Figures 10 and 11). The data depicts the enrollments by academic year for both the on and off-campus students.

When examining Figure 10, the off-campus undergraduate student enrollments were much lower when compared to the on-campus undergraduate student enrollments. Only one academic year, 1992-1993, had a slightly even ratio of on and off-campus enrollments, and the other academic years had very few off-campus enrollments or none at all. Eventually, in academic year 2008-2009, no undergraduate offerings were delivered over the IVN at all. Calculations conducted by the researcher indicate that approximately 10% of the total undergraduate registrants were attributed to off-campus student enrollments utilizing the IVN.

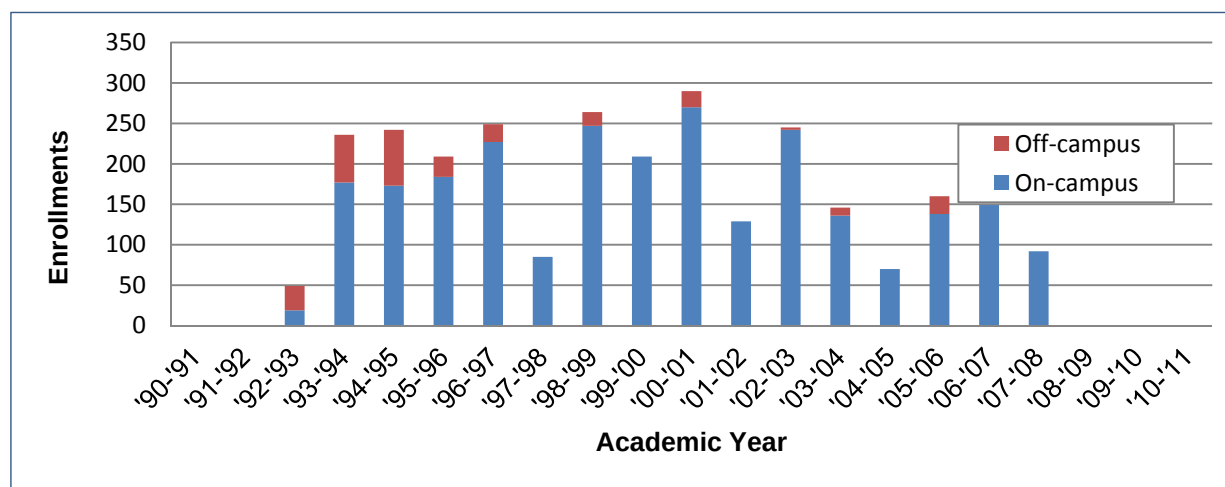


Figure 10. Undergraduate enrollments utilizing IVN. This figure illustrates the number of IVN undergraduate enrollments, both on and off-campus, during the academic years 1990-1991 through 2010-2011.

The graduate enrollment, illustrated in Figure 11, depicts a different scenario. The data indicate the off-campus student enrollments were more closely aligned with the on-campus enrollments. The enrollment data (Figure 11) is also somewhat representative of the course and credit figures (Figures 4 and 5), that courses and credits increased simultaneously; it appears the enrollment figures follow a similar pattern, increasing respectively. Calculations conducted by the researcher indicate that 40% of total graduate enrollments were attributed to off-campus student enrollments utilizing the IVN.

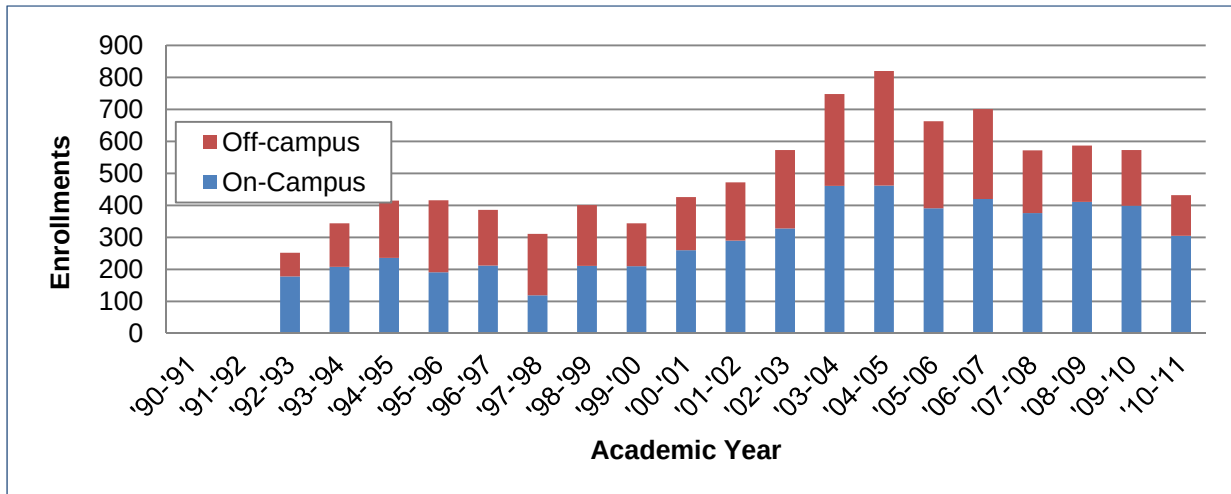


Figure 11. Graduate enrollments utilizing IVN. This figure illustrates the number of IVN graduate enrollments, both on and off-campus, during the academic years 1990-1991 through 2010-2011.

When the IVN off-campus enrollments are examined at the undergraduate and graduate levels, the graduate enrollment has always been above 50% whereas, undergraduate enrollment has always been below 50%. It was determined that the graduate delivered courses and student enrollments greatly outpaced the undergraduate courses and student enrollments until eventually the graduate off-campus enrollment reached 100% in academic year 2008-2009 and continued at 100% throughout the case study (Figure 12).

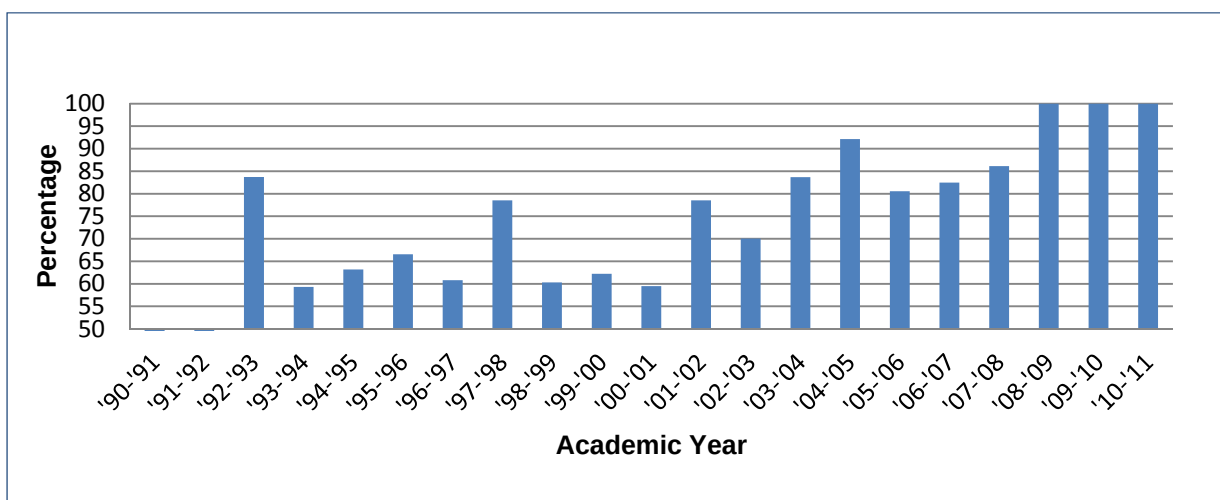


Figure 12. Percentage of graduate enrollments utilizing IVN. This figure illustrates the number of IVN graduate enrollments during the academic years 1990-1991 through 2010-2011.

Financial Impact

To understand the financial impact of distant students who utilized IVN at NDSU, tuition dollars per credit were multiplied by the number of credits taken for each off-campus student and summed for all the off-campus students for each semester during the case study period (academic year 1992-1993 through 2010-2011). To examine the financial impact of IVN, the off-campus course and credit data had to be plotted and analyzed. When examining the enrollment data, only off-campus IVN generated enrollments were collected and analyzed.

The undergraduate and graduate off-campus revenue for each academic year is shown in Figures 13 and 14. The data indicate that the highest revenue stream is at the graduate level for off-campus enrollments. Graduate enrollment peaks in academic year 2004-2005 and then slowly declines to the end of this case study period. This enrollment data compares to the data in the graduate course and credit figures (Figures 4 and 5). This data indicate that a relationship may exist between the increase of graduate courses and credits; student enrollments and tuition dollars. The figures show that courses at the graduate level generated more total tuition revenue than did undergraduate courses delivered over the North Dakota IVN.

When comparing the off-campus revenue for undergraduate and graduate enrollments, the figures are revealing. The undergraduate, off-campus revenue, illustrated in Figure 13 shows that in academic years 1994-1995 and 1995-1996, revenue peaked each year at approximately \$6,000 for an estimated total of \$12,000 for those two years. Off-campus graduate revenue, for academic years 1994-1995 and 1995-1996 (\$45,000 and \$55,000 respectively) is estimated at \$100,000 (Figure 14).

It should be noted that although Figure 13 shows very little undergraduate off-campus student revenue, during academic years 1998-1999 through 2007-2008, Figures 1 and 2 indicate undergraduate credits and courses were recorded. This may suggest an indirect impact on other areas but not a direct financial impact from any off-campus student enrollments.

This case study examines the financial impact recorded from only the off-campus student registrations. NDSU on-campus registered students may have taken an IVN course, but would not be counted in the financial data of this case study. The IVN provided access for NDSU on-campus students to register for cross-listed courses, even though they were offered from institutions other than NDSU. In these instances the cross-listed courses; the on-campus student registrations; and the student tuition were all recorded at NDSU as on-campus statistics.

Another factor why undergraduate credits and courses were recorded with little student revenue may be due to cross-listed courses sent to other institutions. NDSU would have on-campus students but there would have also been distant students, who registered at their respective campus. There also were NDSU departments that had separate financial agreements to instruct courses to other institutions. These NDSU departments were paid to supplement courses to enhance or complete other campuses degrees. Students at the distant campuses registered with their respective campuses (not NDSU), so no student data would be recorded at NDSU. The IVN allowed for this collaboration and revenue was generated for campuses but not recorded for this case study.

Recorded undergraduate courses and credit may have been delivered to other campus as cross-listed courses. In this instances there would have been distant students but not recorded at NDSU, they would have registered and been recorded at the perspective institution. In both these cases, there may have been an, there was financial impact due to IVN system but not examined in this case study.

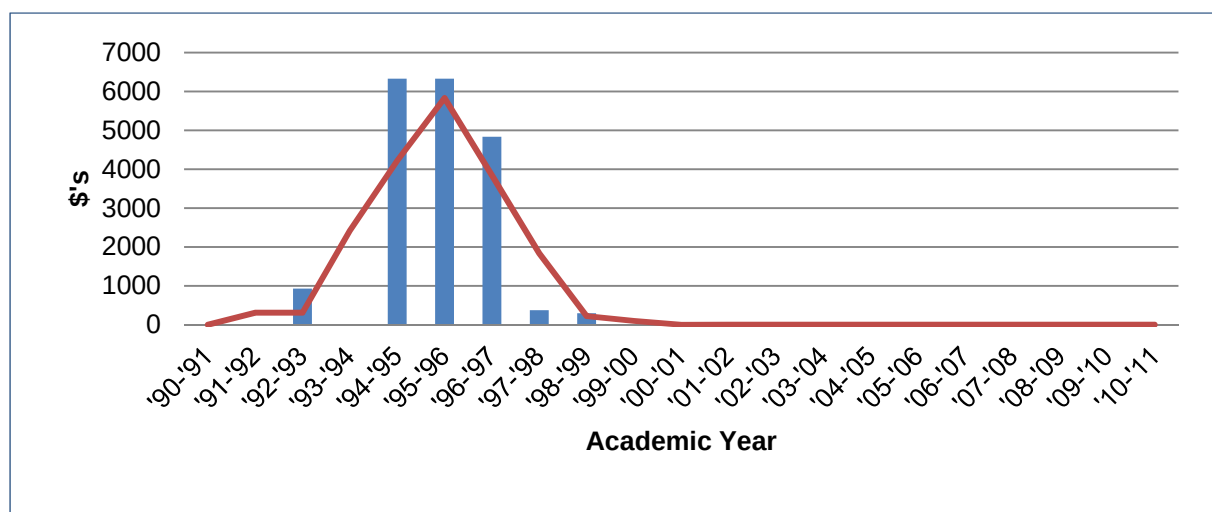


Figure 13. Undergraduate off-campus student revenue utilizing IVN. This figure illustrates the undergraduate revenue during the academic years 1990-1991 through 2010-2011.

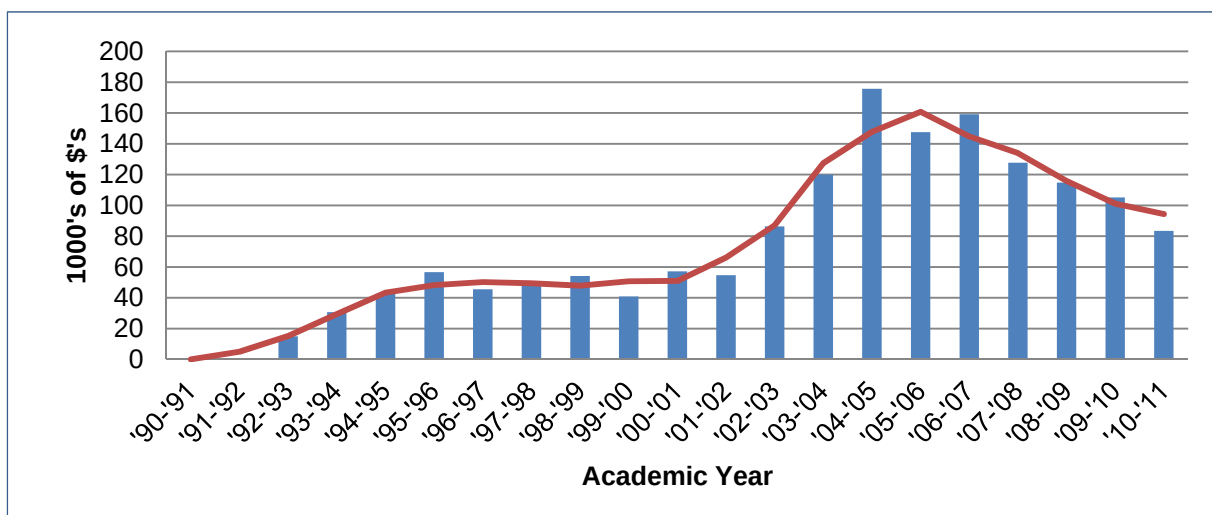


Figure 14. Graduate off-campus student revenue utilizing IVN. This figure illustrates the graduate revenue during the academic years 1990-1991 through 2010-2011.

NDSU Enrollments Compared with IVN Location Increases

Figure 15 depicts the undergraduate student enrollments and the dramatic increase in the IVN locations. As more locations become available, the undergraduate enrollments decline. The data for undergraduate enrollments, number of sites, and academic year indicate an enrollment decline, which remains consistent with the decline of undergraduate course and credit delivery utilizing the IVN (Figures 1 and 2).

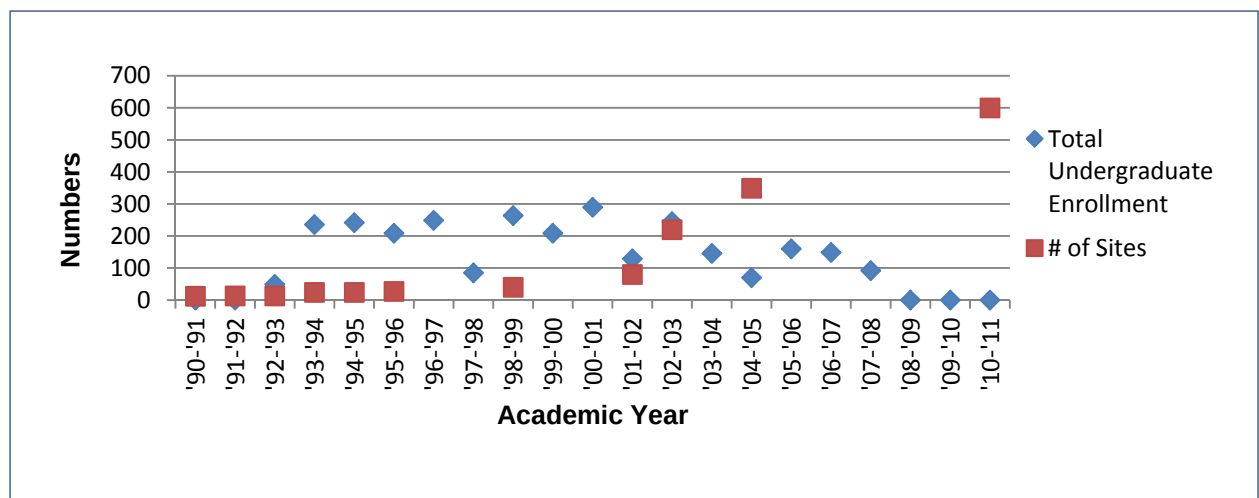


Figure 15. Undergraduate student enrollment compared to IVN sites by academic year. This figure illustrates the comparison of the undergraduate student enrollments to number of IVN site location during academic years 1990-1991 through 2010-2011.

The data for graduate students (Figure 16) indicate the enrollment increased as the number of video locations increased, but only to a point, after which enrollment decreased as site locations increased. NDSU graduate students were at an all-time high, at slightly over 800 in academic year 2004-2005, and IVN locations had roughly reached 400. When this case study ended in 2010-2011, off-campus student enrollments had decreased to approximately 400 while IVN locations exceeded 600 across North Dakota.

Figure 16 illustrates that this 50% reduction in graduate student IVN enrollment (from 800 to 400) contrasts with an approximate 71% increase in IVN locations (from 350 to 600) during the same period. This data show that location expansion did not lead to greater student enrollment.

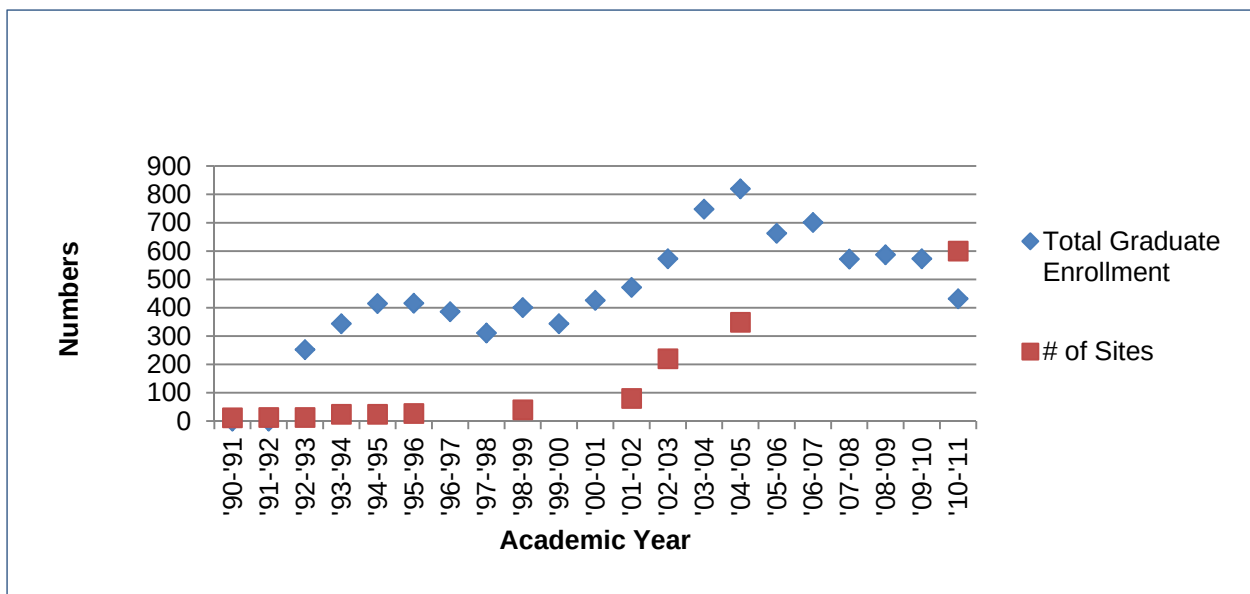


Figure 16. Graduate off-campus student enrollment compared to IVN sites by academic year. This figure illustrates the comparison of the graduate off-campus student enrollments to number of IVN locations during academic years 1990-1991 through 2010-2011.

CHAPTER 5. SUMMARY, CONCLUSION, DISCUSSION, AND RECOMMENDATIONS

Summary

Since its establishment as a land grant institution in 1890, distance delivery of educational services has always been an important component of the educational mission at North Dakota State University (NDSU). The history of distance education and delivery has more than one historical path and the evolution has been dramatic and ongoing.

Early in the history of NDSU, education was delivered to people across the state of North Dakota in varied forms; one of the earliest was face-to-face. As technology expanded, so did the methods of education delivery: there was radio in 1920; television in 1953; and a dedicated two-way state network in 1989. Today, connectivity is available to anyone, anywhere, anytime where there are Internet capabilities. The North Dakota IVN was the first of its kind and this case study examined the influence this delivery mechanism has had on NDSU and the state of North Dakota.

Beginning in 1989, NDSU offered credit courses utilizing the North Dakota IVN. Data compiled for this case study revealed that during the time period under study, courses and credits offered over the IVN were approximately 20% undergraduate and 80% graduate. The data indicate that for off-campus students; the enrollments were approximately 10% undergraduate, and 90% graduate, and the tuition revenue was 98% graduate (Table 1).

In 1989, the North Dakota Interactive Video Network began with four locations. The NDSU campus (Fargo, ND) and NDSU Research Extension (Carrington, ND) were two of those four locations. Those initial locations grew to almost 600 by the time this case study ended in academic year 2010-2011. The data indicate that graduate student enrollment increased as the

number of video locations increased, but only to a point (year 2004-2005), after which enrollment decreased as site locations increased. This indicates that the increase in locations did not correspond to an increase in student numbers.

Table 1

NDSU Courses, Credits, Off-Campus Enrollments and Revenue

NDSU Courses Utilizing IVN	% Undergraduate	% Graduate
Course percentage delivered over IVN	19	81
Credit percentage delivered over IVN	20	80
Off-campus student enrollment percentage	7	93
Off-campus tuition revenue percentage	2	98

Conclusion

The first research question this case study addressed was; did North Dakota State University course and credit offerings, utilizing the North Dakota Interactive Video Network, from academic years 1990-1991 through 2010-2011, have an impact on undergraduate and graduate student enrollments? The data indicate that the North Dakota Interactive Video Network has had a positive influence on North Dakota State University. The influence was in both the undergraduate and graduate areas examined; courses, credits, enrollments and tuition. It appears that graduate level enrollment had a greater impact than undergraduate enrollment.

The next research question that was addressed was; did North Dakota State University course and credit offerings, utilizing the North Dakota Interactive Video Network, from

academic years 1992-1993 through 2010-2011, impact revenue at NDSU? The data indicates a financial impact of more than \$1.5 million. Because graduate level participation was greatest, its revenue impact was larger than that of undergraduates during the period of the case study.

In 1989 the North Dakota Interactive Video Network began and grew moderately over the years, until the dramatic increase in IVN locations beginning fall of 2001. The data indicate the enrollment increased as the number of video locations increased, but only to a point (year 2004-2005), after which enrollment decreased as site locations increased. An examination of the video locations and students enrollments found:

- Academic year 2004-2005
 - student enrollment slightly over 800, video locations slightly under 400
- Academic year 2010-2011
 - student enrollment approximately 400, video locations near 600

These findings answer the third research question; did dramatic expansion of video locations, beginning in 2001, have an influence on the overall number of NDSU student enrollments? It can be concluded that the dramatic increase in video locations did not increase student enrollments at the same rate. It may have dispersed the students because of easier and closer access to the courses but there was not an increase.

Discussion

There is no denying that the North Dakota IVN has been an influence at North Dakota State University and its land-grant mission by allowing learners to take advantage of enhancing and furthering their education at their convenience. The data show the direct influence in the

areas of courses, student enrollments, and revenue. The recorded results indicate the off-campus enrollment revenue alone generated more than 1.5 million dollars over the span of the study (tuition dollars per credit were multiplied by the number of credits taken for each off-campus student and summed for all the off-campus students for each semester during the case study period).

So far, this discussion has focused on the retrievable data and its findings; however, what is not investigated is the indirect influence the IVN has had for NDSU. A couple of examples might be: NDSU departments may have had contractual agreements to teach courses to other institutions for a fee, or sharing faculty to instruct cross-listed courses with other institutions.

The undergraduate data reflect minimal off-campus tuition revenue but it still could have had a positive financial influence. The undergraduate revenue in Figure 11 shows no off-campus revenue (utilizing the IVN) after the academic year 1998-1999 but Figures 1 and 5 reflect that the undergraduate courses and credits were offered utilizing the IVN until academic year 2007-2008. NDSU departments may have had independent financial agreements with other institutions to instruct undergraduate courses to supplement a degree on another campus. These possible revenue dollars were not factored in for this study, but may have had a positive contribution to NDSU as a whole.

NDSU and other academic institutions may have collaborated in offering courses for each other; cross-listed courses. NDSU on-campus enrollments may or may not have had an instructor physically present. In a scenario like this, the students are enrolled and calculated as NDSU on-campus student enrollment (because they are at NDSU); technically they may be distant students

(the students and instructor are separated by space and time) and should have been recorded as distance students. But for this case study only archived off-campus data were recorded and analyzed. This student revenue is not calculated as off-campus revenue, but is a direct result of utilizing the North Dakota IVN. Both of these scenarios could result in low student enrollments on the undergraduate enrollment figures because they would not have been recorded. The courses are recorded but no off-campus student enrollments are indicated for data collection and analysis purposes.

The influence of the North Dakota Interactive Video Network at NDSU can be seen by the examination of the data. The North Dakota Interactive Video Network began small, with only four locations. Then in a relatively short time the system grew so that availability of educational programming was within one hour of wherever a person was located in North Dakota. Today NDSU can virtually deliver education anywhere across the world where there is Internet capability and high speed equipment.

NDSU has delivered courses over the IVN for over 20 years. Student enrollment utilizing the video network peaked in academic years 2004-2005. Since then, NDSU has experienced a slight downward trend in student enrollments over the IVN until 2011 when this case study ends. The decrease in student enrollments could be due to technological advances, which now allow students to use their personal computers from their homes rather than the traditional state system with dedicated equipment and specific locations that they had to drive to. Certainly time will tell but the North Dakota IVN platform may have reached maturity in the technology arena at NDSU. With increased Internet accessibility and new instrument capability we have even greater educational availability than in any other time in history.

In 1889 during the North Dakota Constitutional Convention, it was decided that the Agricultural College and State Agricultural Experimental Station (later to be renamed as North Dakota State University) would be housed in Fargo, North Dakota. The bill creating the North Dakota Agricultural College (NDAC) was passed and signed into law on March 8, 1890 by Governor John Miller. At that time NDSU delivered information using face-to-face instructional methods and as early technology evolved, so did delivery methods. In 1989, almost one hundred years later, a dedicated network called North Dakota Interactive Video Network began and elevated NDSU's education delivery to new heights across the state. Today, in 2013, the Internet allows NDSU to deliver education anytime, anywhere, to anyone in the world who has Internet capability and equipment, thus fulfilling an important commitment as a land-grant institution.

In "The World is flat" Friedman (2005) stated that one of Bill Gates' early mottoes for Microsoft was to give every person "IAYF" information at your fingertips. In 2013 we have reached that pinnacle. Today, we can deliver and receive course content synchronously or asynchronously and it is at our fingertips. Our portable electronic devices (smartphones, iPads, etc.) allow us this anytime anywhere opportunity.

Recommendations

Data on the registration and site locations can be used for analysis with this report but further investigation could take place on factors such as: was there an increase in campus programs at NDSU and if so did they take advantage of North Dakota IVN, and what influence that may have had on the registrations.

Further study could be done in the area of student enrollments and its effect on tuition revenue. This paper documents the influence of the North Dakota Interactive Video Network and the credit courses delivered until 2011. It does not evaluate course or student enrollment utilizing other technologies: on-line, desk-top video, or blended. A review of other delivery mechanism may show an even greater impact in all areas.

Further study could be done within other units delivering educational programming; NDSU Extension Service, NDSU Distance and Continuing Education, and other departments that may have contractual agreements to collaboratively deliver courses with other North Dakota University partners. This could have a positive influence on how the state constituents perceive the Higher Education System.

REFERENCES

- Association of Public and Land-grant Universities, Washington DC (2012). *The Land-Grant Tradition*. Retrieved from <http://www.aplu.org/document.doc?id=780>
- Bale, S. W. (1989). *Hired hand and volunteers. A History of the North Dakota State University Extension Service*. Fargo, ND: North Dakota State University Extension Service.
- Brunner, H. S. (1966). *Land-grant colleges and universities, 1862-1962*. Retrieved from <http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED167027>
- Culp, P. W., & Conradi, D. B., & Tuell, C. C. (2005). *Trust Lands in the American West: A Legal Overview and Policy Assessment*. Lincoln Institute of Land Policy. Retrieved from <http://www.lincolninst.edu/subcenters/managing-state-trust-lands/publications/trustlands-report.pdf>
- Draves, W. A., & Coates, J. (2007). *Nine shift: work, life and education in the 21st century*. River Falls, WI: LERN Books
- Finding Aid to the North Dakota Division of Independent Study Records*. (1999, September). North Dakota Division of Independent Study Records (MS344). Institute for Regional Studies, North Dakota State University, Fargo. Retrieved from: <http://library.ndsu.edu/tools/dspace/load/?file=/repository/bitstream/handle/10365/9638/Mss0344.pdf?sequence=3>

Fischer, J. R. (2000). The idea of the university: Where have we been? Where are we going? Fall

2000 “the idea of a land grant university”. Retrieved from

www.clemson.edu/cedp/cudp/colloq/pres/00fall/fischer.html

Fraenkel, J. R., Wallen, N. E., & Hyun, H.H. (2012). How to design and evaluate research in education. New York, NY: McGraw-Hill Companies, Inc.

Friedman, T. L. (2005). *The world is flat: A brief history of the twenty-first century*. New York:

Farrar, Straus and Giroux.

Mitchell, B. (n.d.). H.323 Protocol. *Wireless/Networking Guide*. Retrieved from:

http://compnetworking.about.com/cs/voicefaxoverip/g/bldef_h323.htm

Mitchell, B. (n.d.). IP-Internet Protocol. *Wireless/Networking Guide*. Retrieved from:

http://compnetworking.about.com/od/networkprotocolsip/g/ip_protocol.htm

North Dakota State University Archives, (n.d.a). Mission. Retrieved from

<http://library.ndsu.edu/ndsuarchives/mission>

North Dakota State University Archives, (n.d.b). NDSU History. Retrieved from

<http://library.ndsu.edu/ndsuarchives/ndsu-history>

Networking - Computer and Wireless Networking Basics - Home Networks Tutorials. (n.d.).

Retrieved from <http://compnetworking.about.com/>

North Dakota Advanced Learning Technology. (n.d.). *Degree programs*. Retrieved from http://alt.ndus.edu/altwebsite/Videoconferencing/NDUS_Info/ProgramsAndClasses.aspx?&id=3&subid=7

North Dakota Information Technology Department, (n.d.) *History*. Retrieved from <http://www.nd.gov/itd/about-us/history>

North Dakota Interactive Video Network, (1993, September). [Presentation presented to the north dakota state board of higher education]. Bismarck, ND: North Dakota University System

North Dakota Interactive Video Network, (2000, September). *Bismarck State University System. Overview*. Bismarck, ND: North Dakota University System

North Dakota STAGEnet. (n.d.). *STAGEnet*. Retrieved from <http://www.stagenet.nd.gov/>

North Dakota State University, Undergraduate Bulletin 2012-2013 (n.d.). *NDSU overview*. Retrieved from <http://www.ndsu.edu/bulletin/overview/>

North Dakota State University, (2006). *Mission, vision, core values and campus themes statements*. Retrieved from <http://www.ndsu.edu/ndsu/about/mission/>

North Dakota University System. (2012). *Services provided by SITS*. Retrieved from <http://www.ndus.nodak.edu/system/sits/sits-services/>

Pates, (n.d.). *The 20th century in review – extension service still vital: Remains agent for change, farmers’ adviser*. Retrieved from <http://legacy.inforum.com/specials/century/jan3/week13.htm>

PeopleSoft, (n.d.). In *Wikipedia*. Retrieved from <http://en.wikipedia.org/wiki/PeopleSoft>

Poulin, R. (n.d.). *LinkedIn*. Retrieved from <http://www.linkedin.com/in/russellpoulin>

Rasmussen, W.A. (1989). *Taking the university to the people: seventy-five years of cooperative extension*. Ames, IA: Iowa State University Press

Safransky, R. J. (2011, January 11). Education Law. *Morrill acts: law and higher education*. Retrieved from <http://lawhighereducation.com/90-morrill-acts.html>

Shum, C., & Chan, K. C. (2000). The effectiveness of interactive television distance learning in principles of finance. *Financial Practice & Education*, 10 (1), 175-183.

STAGE Net. (2001, December 20). *STAGE Net management committee meeting minutes*. <http://www.stagenet.nd.gov/organization/meetings/12-20-01minutes.pdf>

Tykwinski, J. R., & Poullin, R. C. (1991). *North Dakota Interactive Video Network, A practical guide to teleconferencing and distance education*. (Available at North Dakota University System Office, 10th Floor, State Capital, 600 E. Boulevard Avenue, Bismarck, ND, 58505).

APPENDIX. UNDERGRADUATE/GRADUATE ENROLLMENT, COURSES, SITES,
CREDITS & TUITION

Year	Semester	Academic Year	Ugraduate Course	Graduate Course	Ugraduate Credits	Graduate Credits	Ugraduate On-Campus Enrollment	Ugraduate Off-Campus Enrollment	Graduate On-Campus Enrollment	Graduate Off-Campus Enrollment	Approx # Sites
1990	Fall	'90-'91	***								4
1991	Spring	'90-'91	***								4
1991	Summer	'90-'91	***								12
1991	Fall	'91-'92	***								13
1992	Spring	'91-'92	***								13
1992	Summer	'91-'92	***								13
1992	Fall 1992	'92-'93	1	6	3	16	15	14	75	38	13
1993	Spring 1993	'92-'93	1	2	3	6	0	12	58	30	13
1993	Summer 1993	'92-'93	1	1	3	3	4	4	45	6	13
1993	Fall 1993	'93-'94	2	2	6	18	87	18	110	61	24
1994	Spring 1994	'93-'94	4	6	5	19	90	41	98	75	24
1994	Summer 1994	'93-'94									24
1994	Fall 1994	'94-'95	4	8	9	21	63	40	109	102	24
1995	Spring 1995	'94-'95	5	11	16	22	65	27	114	77	24
1995	Summer 1995	'94-'95	6	3	15	6	45	2	13	0	24
1995	Fall 1995	'95-'96	4	10	9	28	44	11	88	82	27
1996	Spring 1996	'95-'96	1	8	3	23	24	11	94	92	
1996	Summer 1996	'95-'96	7	2	0	0	116	3	9	51	
1996	Fall 1996	'96-'97	1	10	8	29	19	0	100	75	
1997	Spring 1997	'96-'97	4	11	23	29	110	21	87	77	
1997	Summer 1997	'96-'97	6	3	15	9	98	1	25	22	
1997	Fall 1997	'97-'98	2	10	8	27	17	0	63	91	
1998	Spring 1998	'97-'98	2	8	5	21	34	0	28	98	
1998	Summer 1998	'97-'98	6	2	5	21	34	0	28	3	
1998	Fall 1998	'98-'99	0	8	11	30	16	0	111	80	40
1999	Spring 1999	'98-'99	4	8	14	23	70	17	70	80	
1999	Summer 1999	'98-'99	8	2	20	7	161	0	30	30	
1999	Fall 1999	'99-'00	3	12	9	34	79	0	110	79	
2000	Spring 2000	'99-'00	3	8	9	22	52	0	64	50	
2000	Summer 2000	'99-'00	3	1	8	3	78	0	36	5	
2000	Fall 2000	'00-'01	4	11	12	30	95	11	77	69	

Year	Semester	Academic Year	Ugraduate Course	Graduate Course	Ugraduate Credits	Graduate Credits	Ugraduate On-Campus Enrollment	Ugraduate Off-Campus Enrollment	Graduate On-Campus Enrollment	Graduate Off-Campus Enrollment	Approx # Sites
2001	Spring 2001	'00-'01	4	10	13	39	92	9	134	70	
2001	Summer 2001	'00-'01	2	2	5	6	83	0	49	27	
2001	Fall 2001	'01-'02	3	12	9	30	39	0	173	89	80
2002	Spring2002	'01-'02	4	11	11	31	64	0	88	83	
2002	Summer 2002	'01-'02	1	2	3	6	26	0	29	10	
2002	Fall 2002	'02-'03	4	16	16	39	88	3	167	104	140
2003	Spring2003	'02-'03	5	13	18	34	79	0	84	91	
2003	Summer 2003	'02-'03	1	6	3	12	75	0	77	50	220
2003	Fall 2003	'03-'04	3	15	9	44	58	10	150	124	
2004	Spring 2004	'03-'04	6	17	19	51	78	0	235	125	
2004	Summer 2004	'03-'04	0	5	0	15		0	76	38	
2004	Fall 2004	'04-'05	6	22	14	45	8	0	162	169	
2005	Spring 2005	'04-'05	4	21	13	68	62	0	208	149	349
2005	Summer 2005	'04-'05	0	15	0	43	0	0	92	40	
2005	Fall 2005	'05-'06	2	22	6	61	67	22	172	149	
2006	Spring 2006	'05-'06	5	20	17	62	71	0	128	99	
2006	Summer 2006	'05-'06	0	9	0	25	0	0	91	24	
2006	Fall 2006	'06-'07	2	22	8	61	35	0	192	106	
2007	Spring 2007	'06-'07	4	24	13	71	114	0	151	118	
2007	Summer 2007	'06-'07	0	9	0	26	0	0	77	57	
2007	Fall 2007	'07-'08	2	22	8	53	30	0	154	97	
2008	Spring 2008	'07-'08	4	26	15	63	62	0	166	59	
2008	Summer 2008	'07-'08	0	10	0	30	0	0	56	40	
2008	Fall 2008	'08-'09	0	22	0	56	0	0	197	82	
2009	Spring 2009	'08-'09	0	20	0	53	0	0	152	70	
2009	Summer 2009	'08-'09	0	7	0	17	0	0	62	24	
2009	fall 2009	'09-'10	0	18	0	48	0	0	179	83	
2010	Spring 2010	'09-'10	0	18	0	42	0	0	177	73	
2010	Summer 2010	'09-'10	0	5	0	12	0	0	43	18	
2010	Fall 2010	'10-'11	0	13	0	34	0	0	105	41	
2011	Spring 2011	'10-'11	0	19	0	49	0	0	150	65	
2011	Summer	'10-'11	0	8	0	20	0	0	50	21	600
		Total	144	614	419	1693	2547	277	5668	3768	

***Before 1992 NDSU was on quarter basis not semester

** credits = students taking them

Year	Semester	Academic Year	Undergraduate Tuition per credit	2 credit students UnderGrad	3 credit students UnderGrad	Undergrad \$\$	Graduate Tuition per credit	1 credit students Grad	2 credit students Grad	3 credit students Grad	4 credit students Grad	Grad \$\$
1990	Fall	'90-'91										
1991	Spring	'90-'91										
1991	Summer	'90-'91										
1991	Fall	'91-'92										
1992	Spring	'91-'92										
1992	Summer	'91-'92										
1992	Fall 1992	'92-'93	\$77.50	0	0	\$0.00	\$83.14	0	15	14	3	\$6,983.76
1993	Spring 1993	'92-'93	\$77.50	0	0	\$0.00	\$83.14	0	11	14	5	\$6,983.76
1993	Summer 1993	'92-'93	\$77.50	0	4	\$930.00	\$83.14	0	6	0	0	\$997.68
1993	Fall 1993	'93-'94	\$82.75	0	0	\$0.00	\$88.77	0	40	8	13	\$13,848.12
1994	Spring 1994	'93-'94	\$82.75	0	0	\$0.00	\$88.77	0	45	21	9	\$16,777.53
1994	Summer 1994	'93-'94	\$82.75			\$0.00	\$88.77					\$0.00
1994	Fall 1994	'94-'95	\$87.92	0	0	\$0.00	\$94.31	9	54	11	23	\$22,823.02
1995	Spring 1995	'94-'95	\$87.92	9	18	\$6,330.24	\$94.31	0	30	38	9	\$19,805.10
1995	Summer 1995	'94-'95	\$87.92	0	0	\$0.00	\$94.31	0	0	0	0	\$0.00
1995	Fall 1995	'95-'96	\$87.92	0	11	\$2,901.36	\$94.32	0	56	14	12	\$19,052.64
1996	Spring 1996	'95-'96	\$87.92	0	11	\$2,901.36	\$94.32	0	35	46	11	\$23,768.64
1996	Summer 1996	'95-'96	\$87.92	3	0	\$527.52	\$94.32	0	7	44	0	\$13,770.72
1996	Fall 1996	'96-'97	\$87.92	0	0	\$0.00	\$94.32	0	27	33	15	\$20,090.16
1997	Spring 1997	'96-'97	\$87.92	8	13	\$4,835.60	\$94.32	0	49	18	10	\$18,109.44
1997	Summer 1997	'96-'97	\$87.92	0	0	\$0.00	\$94.32	0	0	10	12	\$7,356.96
1997	Fall 1997	'97-'98	\$93.17	0	0	\$0.00	\$99.95	0	37	54	0	\$23,588.20
1998	Spring 1998	'97-'98	\$93.17	0	0	\$0.00	\$99.95	0	68	16	14	\$23,988.00
1998	Summer 1998	'97-'98	\$93.00	2	0	\$372.00	\$99.95	0	0	3	0	\$899.55
1998	Fall 1998	'98-'99	\$98.42	0	0	\$0.00	\$105.58	0	37	43	0	\$21,432.74
1999	Spring 1999	'98-'99	\$98.42	0	1	\$295.26	\$105.58	0	21	44	15	\$24,705.72
1999	Summer 1999	'98-'99	\$98.42	0	0	\$0.00	\$105.58	12	0	8	10	\$8,024.08
1999	Fall 1999	'99-'00	\$103.33	0	0	\$0.00	\$110.86	0	23	54	2	\$23,945.76
2000	Spring 2000	'99-'00	\$103.33	0	0	\$0.00	\$110.86	0	30	7	14	\$15,187.82
2000	Summer 2000	'99-'00	\$103.33	0	0	\$0.00	\$110.86	0	0	5	0	\$1,662.90
2000	Fall 2000	'00-'01	\$108.50	0	0	\$0.00	\$116.40	0	27	26	16	\$22,814.40
2001	Spring 2001	'00-'01	\$108.50	0	0	\$0.00	\$116.40	0	25	32	13	\$23,047.20
2001	Summer 2001	'00-'01	\$108.50	0	0	\$0.00	\$116.40	0	0	11	16	\$11,290.80

Year	Semester	Academic Year	Undergraduate Tuition per credit	2 credit students UnderGrad	3 credit students UnderGrad	Undergrad \$\$	Graduate Tuition per credit	1 credit students Grad	2 credit students Grad	3 credit students Grad	4 credit students Grad	Grad \$\$
2001	Fall 2001	'01-'02	\$114.75	0	0	\$0.00	\$123.15	0	48	41	0	\$26,969.85
2002	Spring2002	'01-'02	\$114.75	0	0	\$0.00	\$123.15	0	61	15	7	\$24,014.25
2002	Summer 2002	'01-'02	\$114.75	0	0	\$0.00	\$123.15	0	0	10	0	\$3,694.50
2002	Fall 2002	'02-'03	\$121.00	0	0	\$0.00	\$129.92	0	38	61	5	\$36,247.68
2003	Spring2003	'02-'03	\$121.00	0	0	\$0.00	\$129.92	0	48	30	13	\$30,920.96
2003	Summer 2003	'02-'03	\$121.00	0	0	\$0.00	\$129.92	0	2	48	0	\$19,228.16
2003	Fall 2003	'03-'04	\$140.58	0	0	\$0.00	\$150.84	0	55	45	24	\$51,436.44
2004	Spring 2004	'03-'04	\$140.58	0	0	\$0.00	\$150.84	4	44	52	25	\$52,492.32
2004	Summer 2004	'03-'04	\$140.58	0	0	\$0.00	\$150.84	0	7	31	0	\$16,139.88
2004	Fall 2004	'04-'05	\$165.88	0	0	\$0.00	\$177.99	0	70	99	0	\$77,781.63
2005	Spring 2005	'04-'05	\$165.88	0	0	\$0.00	\$177.99	0	46	74	29	\$76,535.70
2005	Summer 2005	'04-'05	\$165.88	0	0	\$0.00	\$177.99	0	0	40	0	\$21,358.80
2005	Fall 2005	'05-'06	\$181.67	22	0	\$7,993.48	\$194.86	0	78	46	25	\$76,774.84
2006	Spring 2006	'05-'06	\$181.67	0	0	\$0.00	\$194.86	0	31	35	33	\$58,263.14
2006	Summer 2006	'05-'06	\$181.67	0	0	\$0.00	\$194.86	0	8	16	0	\$12,471.04
2006	Fall 2006	'06-'07	\$198.92	0	0	\$0.00	\$213.37	0	49	52	5	\$58,463.38
2007	Spring 2007	'06-'07	\$198.92	0	0	\$0.00	\$213.37	0	48	62	8	\$66,998.18
2007	Summer 2007	'06-'07	\$198.92	0	0	\$0.00	\$213.37	0	13	44	0	\$33,712.46
2007	Fall 2007	'07-'08	\$208.88	0	0	\$0.00	\$224.07	0	25	62	10	\$61,843.32
2008	Spring 2008	'07-'08	\$208.88	0	0	\$0.00	\$224.07	0	8	51	0	\$37,867.83
2008	Summer 2008	'07-'08	\$208.88	0	0	\$0.00	\$224.07	0	3	29	8	\$28,008.75
2008	Fall 2008	'08-'09	\$219.33	0	0	\$0.00	\$235.27	13	33	41	8	\$55,053.18
2009	Spring 2009	'08-'09	\$219.33	0	0	\$0.00	\$235.27	0	27	36	7	\$44,701.30
2009	Summer 2009	'08-'09	\$219.33	0	0	\$0.00	\$235.27	3	2	19	0	\$15,057.28
2009	fall 2009	'09-'10	\$227.00	0	0	\$0.00	\$243.54	20	13	46	4	\$48,708.00
2010	Spring 2010	'09-'10	\$227.00	0	0	\$0.00	\$243.54	10	23	38	2	\$43,350.12
2010	Summer 2010	'09-'10	\$227.00	0	0	\$0.00	\$243.54	0	0	18	0	\$13,151.16
2010	Fall 2010	'10-'11	\$234.96	0	0	\$0.00	\$252.06	9	13	15	4	\$24,197.76
2011	Spring 2011	'10-'11	\$234.96	0	0	\$0.00	\$252.06	10	1	50	4	\$44,866.68
2011	Summer	'10-'11	\$234.96	0	0	\$0.00	\$252.06	3	0	18	0	\$14,367.42
		Total				27086.82						1565631

***Before 1992 NDSU was on quarter basis not semester

** credits = students taking them