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The Diffusion of Iowa Communications Network Two Decades Latter: Opinion Leaders and Innovation

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Approval Page

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Statement of Original Work

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Abstract

The Diffusion of Iowa Communications Network Two Decades Latter: Opinion Leaders and Innovation. Ali S. Mirmehdi, 2016: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. Keywords: distance education, opinion leader, diffusion, instructional technology, mediatized communication, virtual vs. actual, opinion seeker, futuristic education

This study originally pursues determining how widely diffused Iowa Communications Network (ICN) is as a technology of distance education. To be clear, the question to be answered is: How do representative adopters of the ICN feel about using this technology? Theoretically, positive opinions of these adopters regarding the ICN as a technology of distance learning are viewed as indicating that the technology is fairly diffused. The representative adopters in this study are selected from among experts and educational leaders.

Further in the study, it is also sought to explore how distance education might progress in the future. A major point of departure for the study is that favorable opinions toward an innovation help influence its diffusion. Extensive information is thus provided regarding theories of opinion leadership from late 19th century to present. Three different lines of thought are identified among these theories: imitation and modeling, influence from mass media, and influence from the Internet.

The study has used these theories to develop three research tools. Two of these tools are used to measure the diffusion of the ICN. The last one is used to make predictions about the future of distance education. The story of the ICN is closely related to what distance education might be like in the coming times. Distance-learning tools would of course grow increasingly advanced. But virtual education that became refined through using the ICN seems to hardly go through drastic change in the foreseeable future.

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Chapter 1: Introduction

Opinions determine actions. This is a concept central to Greek political thought before Plato. The Greek word *logos* (plural *logoi*) has multiple meanings including opinion, perception, thought, and speech. The sophist Gorgias referred to *logoi* as having great powers. Logoi are like drugs, "some distress, others delight, some cause fear, others make hearers bold, and some drugs bewitch the soul with great persuasion" (as cited in Ballif & Morgan, 2005, p. 171). This study is about opinions, more specifically, about perceptions surrounding a distance education innovation, the Iowa Communications Network (ICN).

Statement of the Problem

Research has found that the diffusion of an innovation is dependent on whether it is perceived as useful (Rogers, 2003, p. 4). It is not uncommon for a distance education technology to decline in popularity or become obsolete. Many distance education technologies are attractive at first. However, over time, many face setbacks. Erroneous or biased perceptions regarding an innovation can bar it from being properly utilized. When individuals consider an innovation ineffective, they refuse to adopt it. This is regardless of whether the innovation is actually effective. Rogers (2003) mentioned that in a Peruvian village called Los Molinas, villagers were more trustful of their cultural beliefs than the rules of hygiene (p. 2). The villagers considered cooked food dangerous to health. Consequently, they refused to adopt the idea of boiling drinking water before consumption. In a like way, perceptions are major factors that determine the diffusion of the ICN. Performing research on these factors is crucial because the ICN is the precursor of online schooling (Gillispie, Cassis, Fujinaka, & McMahon, 2013). In its early phases,

the ICN used optical fiber to transmit audios and videos. Now it is a network using web-mediated learning technologies. Both types of technology are effective. However, technological capabilities are not so effective as favorable thinking. In response to this problem, this study proposes to describe perceptions that have contributed to the diffusion of the ICN.

Phenomenon of Interest

Where there is communication, there is learning. According to Clark (2001), media do not influence learning (p. 2). However, technology has the capability to produce substantial effects on educational prospects and perspectives. The ICN is an example of a technology that has helped develop distance education. It represents the stage before online and virtual schooling.

The idea of establishing the ICN primarily came from a law established to promote educational programs in Iowa. After several years of implementation, people began to discover that the ICN was an effective technological tool for distance education. The ICN grew more usable over time. Scholars, educational leaders, teachers, and students learned to use it effectively (Simonson, 1997). The ICN is a success story. Factors that contributed to the success of the ICN include the insight of a law, the sophistication of a means, and the plan of feeding the right materials into the network.

The Insight of a Law

Reflecting on the origin of the ICN, Gillispie, Cassis, Fujinaka, and McMahon (2013) mentioned a crucial point: The ICN was established at a time when few people had heard about the possibility of technologies later called Web technologies. In 1989,

Iowa Governor Terry Branstad passed a bill that called for the construction of a shared, statewide telecommunication network, later referred to as ICN.

In 1994, the general assembly of Iowa passed the law of Iowa Communications Network. The Iowa Telecommunications and Technology Commission was required to ensure that (1) the educational use of the network would be given the highest priority and (2) users in rural Iowa would have adequate access to high quality network services, such as those that were available to users in the urban parts (Chapter 8D, Iowa Code). The ICN was found to give great assistance to distant learners. The ICN, using fiber optic cables, was able to transmit two-way audio/video communications. It was possible for the ICN to replicate features of traditional face-to-face classes.

The Sophistication of a Means

The ICN began as a network that used fiber-optic cables. Technically, the ICN was able to transmit and download data at high speeds. The communication systems of the ICN provided settings and features that were necessary for sending and receiving audios and videos. Theoretically, the ICN had the capability of simulating settings and features of face-to-face classes. By using the ICN, the teacher and students were able to see and hear each other and study as though they were in the same classroom.

In 1970, a group of scientists invented a fiber-optic wire that was able to carry great amounts of information. Specifically, the transmission capacity of the fiber-optic wire was 65,000 times more than that of a copper wire. The ICN was established in 1989. During this time, according to Alwayn (2004), most of the world's long distance data traffic was carried through optical fiber cables. Also, optical fiber technology was used to improve the quality of telephone conversations. For the ICN developers, the priority was

to use fiber-optic technology to promote distance education (Gillispie, Cassis, Fujinaka, & McMahon, 2013).

In 1993, the ICN created the first live classes (Simonson, Smaldino, Albright, & Zvacek, 2000). The ICN used an optical-fiber delivery system to deliver two-way audio and video communications. Six hundred classrooms across Iowa used ICN services. Statewide plans were established connecting school districts and public libraries to the network. Perhaps the greatest advantage of the ICN was its effect on the conditions of students living in rural parts (Simonson, Smaldino, Albright, & Zvacek, 2000). The ICN made it possible for rural students to obtain access to high-quality education, which was formerly only available in big cities. It was no longer necessary for rural students to travel to receive quality education.

Feeding the Right Material Into the Network

Thus, the ICN was similar to a simulation machine. It was able to transmit settings and features that were similar to the settings and features of face-to-face classes. It was assumed that students would thus be happy and distance would no longer pose a challenge. Perhaps, if it were not for the influence of the third factor, the ICN would never have grown a genuine tool of distance education. This third factor was the project called Iowa Distance Education Alliance (IDEA). The purpose of the IDEA was to infuse distance education in schools of Iowa (Simonson, 1997). The founders of the IDEA were aware that distance education was more complicated than expected. Distance education was not inferior to face-to-face education. They stated that the ICN would not succeed if it did not adopt the idea that distance education involves much more than the transmission of audio and video messages (Simonson, 1997).

During the early phases, ICN course designs were not different from those used in a traditional mode. Iowans did not consider the ICN useful. In 1993, Iowans who appreciated the ICN were small in number (Simonson, 1993). This was despite the fact that most Iowans were aware that immense funds were spent on constructing the ICN.

The IDEA project was formed as a response to resolve issues resulting from using the ICN. IDEA was composed of four components: (1) educational organizations established a structure of 15 partnerships. They followed the model used by the Education Department, State of Iowa. This model is comprised of 15 regional education districts. (2) IDEA created the Iowa Database. (3) IDEA assigned a group (the Teacher Education Alliance) to develop programs for teacher education. (4) IDEA established a management structure.

IDEA was also focused on performing research regarding distance education. It was impractical to use the ICN effectively without first understanding features and potentials of distance education. Research completed by IDEA resulted in the publication of *Encyclopedia of Distance Education Research in Iowa* including articles regarding theories and practices of distance education. The results of the IDEA project were helpful in diffusing the ICN as a means of distance education. By assigning new tasks to the ICN, Iowans created a new innovation, a technology capable of performing distance education. Iowans "reinvented" the ICN, to use Rogers' term (p. 180).

Background and Justification

Advancement in web technologies brought great changes in attitudes toward distance education. Now, there is emphasis on developing the future Internet (Barnaghi, Wang, Henson, & Taylor, 2012). While the current Internet connects users only in a

network, the future Internet connects networks to each other. That is, by the future Internet, communication occurs not only between people, but also between buildings and houses that these people use. The implication for education is that it will be wholly based on virtual environments. Students will study in smart classes at home.

More important, increasing numbers of students register for online programs every year. According to *Projections of Education Statistics to 2020*, total online enrollment has increased from 9.6% in 2002 to 32% in 2011 (Allen & Seaman, 2015). The annual growth rate of students enrolled in online courses between 2002 and 2011 was considerably higher than the annual growth rate of the overall student body. Additionally, there are more educational institutions that consider online education strategic to their plans for the future. In 2012, 69.1% of higher education institutions confirmed that online education was already a part of their strategic plan (Allen & Seaman, 2015). For comparison, in 2002, less than 50% of higher education institutions offered online courses.

Nevertheless, such growth might not be sustainable over a long period. This is because distance education cannot survive without telecommunications technology. As indicated by Wedemeyer (as cited in Simonson, 1999), in distance education, the teacher and learner are separated. For education at a distance to occur, something must fill the spatial gap between the teacher and the student. Distance education technology is necessary, but it cannot alone solve the problem of adoption because the decision to adopt an innovation is often made slowly (Rogers, p. 182). It takes time before an individual or organization is able to adopt an innovation. This slow pace of decision-making is considered to cause distance education to suffer setbacks, particularly in a

world in which technological advances occur rapidly (Karp & Fletcher, 2014). In contrast to this view, research has suggested that technology readiness is increasing among clients (Son & Han, 2011; Fozdar & Kumar, 2007). The propensity to adopt an innovation is now much higher than before.

As such, there is a need to conduct research regarding factors that influence the diffusion of distance education innovations, including the diffusion of the ICN. The story of the ICN well shows how complex factors of diffusion can be. In its early stages, the ICN was not successful despite its advanced technology, which was used to transmit audios and videos designed to imitate face-to-face courses (Simonson, 1997). But the ICN grew successful when educational organizations used it. As Simonson and Schlosser (1995) suggested, the success of the ICN did not result from its optical fiber abilities, but rather from the fact that the users were able to share classes. By forming a partnership offered by the IDEA, the educational organizations made it easy for students to come in close contact with opinion leaders from whom they learned to consider the ICN useful.

With regard to the background of research on factors that influence the diffusion of the ICN, it falls under the broader tradition of conducting research on the diffusion of innovation. Emerging in the early 20th century, this broader tradition can be classified into three time periods: (1) research until the 1940s, (2) research from this time until the advent of the Internet, (3) and research during the past two decades. In terms of trends, research is focused on imitation and models of behavior in the first period, on factors of diffusion in the second period, and on a pattern of opinion seeking, rather than opinion leading, in the third. Three leading theorists in these periods are Tarde, Rogers, and Hjarvard, respectively. The sociologist Tarde (1903) placed emphasis on imitation. In his

view, individuals tend to imitate a person whom they think is superior. As an example, individuals speaking certain accents or using certain fashions are followed as models. Rogers (2003) argued that the diffusion of an innovation is dependent on five factors or characteristics, including relative advantage, compatibility, complexity, trialability, and observability. These characteristics represent an extent to which an adopter is impressed by the innovation. To illustrate, an innovation that is perceived as advantageous is adopted fairly rapidly. In a similar way, adopters tend to adopt an innovation that is compatible with their cultural or moral values. Hjarvard (2013) observed that there is a substantial difference between past and modern games. A past gamer was a mere imitator of characters and heroes in the game, while modern gamers are involved in creating their heroes. More tangibly, an individual's technology readiness is much higher that the technology readiness of previous generations.

Deficiencies in Evidence

Studies concerned with the diffusion of the ICN are rather scarce despite the fact that the ICN was the first to use two-way audio/video communication in distance education. The synchronous and asynchronous classes that used the ICN are representative of a model that is now adopted in online education. There are large numbers of studies whose focus is on the diffusion of communication innovations, most of which are used in distance education. Studies concerned with technology in distance education have been conducted since the middle of the 20th century (Threlkeld & Brzoska, 1994; Gagne, 2013). Anderson and Simpson (2012) categorized three groups of distance learners: (1) individuals learning through correspondence; (2) individuals dependent on radio and television for learning; and (3) individuals using computer and

web technologies. All three groups are defined based on the types of the technology that they utilize—print technology, broadcast technology, and computer-mediated technology. In terms of function, the optical fiber ICN is similar to the third type, although it is not computer-mediated. The ICN is the precursor of web-based distance education technologies. However, few studies have examined this subject or focused on measuring levels of the diffusion of the ICN. Such paucity of information represents a gap in the evidence on the origin of using interactive communication technologies in distance education.

Audience

The results of this research will be helpful to educational leaders and administrators concerned with controlling attrition among online students. Although distance education is on increasing as a method of learning, each year more than 30% of online students opt out or are dropped out of their programs (Haydarov, Moxley, & Anderson, 2013). The analysis of an individual's decision to adopt distance education can give insight about improving conditions in which the individual's decision is made. This research will also be useful to technology developers, including individuals developing communication technologies. Such developers have the philosophy that positive attitudes help diffuse a technology (Pantano & Di Pietro, 2012). Online students will benefit from the results of this study indirectly.

Definitions of Terms

The following definitions represent an audience orientation to specific terminology used within the research study.

Compatibility proposes that for an innovation to be diffused, it should be compatible with the existing values of the society (Rogers, 2003)

Complexity refers to whether an innovation is perceived to be easy enough to be used (Rogers, 2003). For example, clients often have the perception that it is easier to drive an automobile with automatic transmission than one with manual transmission.

Diffusion describes the process by which an innovation is adopted. In Rogers' words, "diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003).

Distance education is defined as "the institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (Simonson, 2012)

Innovation refers to something (an object, idea, or practice) perceived as new (Rogers, 2003).

Online learning is described as learning through the use of some online technology (Benson, 2002).

Observability is the degree to which an innovation's results are visible to clients (Rogers, 2003). Rogers referred to residents in a neighborhood in California who installed solar water-heating systems on the roofs of their houses. That made it possible for all neighbors to observe that the solar devices were effective. Soon, many began to adopt the solar innovation.

Opinion leadership is "the degree to which an individual is able to influence other individuals' attitudes" (Rogers, 2003).

Opinion seeker is used to describe online users (Gurr, 2004).

Perception is “the process of selecting, organizing, and interpreting sensations into a meaningful whole” (Hanna & Wozniak, 2013). Perception is subject to extreme change and to distortion. For this reason, individuals develop different interpretations of the same object or event.

Reinvention refers to an act of assigning new tasks to an innovation (Rogers, 2003, p. 98).

Relative advantage is meant to show that an innovation is perceived as better than those in use (Rogers, 2003).

Strong-tie describes ties between members of a group (Granovertter, 1973).

Trialability is defined as the degree to which an innovation is perceived as divisible. This means that it is possible for a client to test an innovation on a small scale. For example, as Rogers suggested, bank innovations that use installment plans are popular.

Virtual School is defined as "an educational organization that offers K-12 courses through Internet- or Web-based methods” (Clark, 2001, p. 1).

Weak-tie refers to ties between groups in a society (Granovertter, 1973)

Statement of Purpose

The purpose of this study is to describe the role that perceptions of educational leaders in Iowa have played in the diffusion of the ICN. The way in which an individual perceives an innovation determines whether the individual adopts the innovation. A qualitative methodology is used that combines data from in-depth interviews, data from the IDEA’s reports, data from the ICN annual reports, and blogs. The participants in this study are about 15 leaders who also qualify as opinion leaders. An opinion leader is any

person who can influence a decision to adopt an innovation. The participants include teachers, administrators, and leaders familiar with the ICN. Broadly, this study is designed to discover the pattern by which the diffusion of the ICN occurs. In this study, an attempt will be made to obtain clues that help predict what distance education will be like in the future.

Summary of the Chapter

The ICN is important in terms of providing high-quality education to distant learners through asynchronous live classes. This chapter is focused on introducing two points. First, the ICN represents a crucial phase that links old-styled distance education (correspondence and TV) to web-based education. Second, the ICN was instrumental in discovering major differences that exist between traditional face-to-face education and distance education.

Chapter 2: Literature Review

This chapter includes reviews of the literature surrounding the diffusion of innovation and the ICN. In terms of clarifying the literature map of this study, two points must be considered. First, the purpose of this study is to describe aspects of opinion leadership in the diffusion of the ICN. This chapter contains topics covered in the literature review: opinion leadership, diffusion, and the diffusion of the ICN. Secondly, studies reviewed in this section can be classified into the following categories: studies concerned with theories of the diffusion of innovation, models of diffusion, theories of opinion leadership, methods of identifying opinion leaders, measuring diffusion, and the background and characteristics of the ICN.

Theories of the Diffusion of Innovation

Numerous research studies have examined theories of the diffusion of innovation. Tarde (1903), Ryan and Gross (1943), and Rogers are pioneer theorists in this field. Rogers' theory is considered the classical approach to evaluating prospects of innovations (Wishwanath, 2015). Newer approaches to the diffusion of innovation include the theory of technology acceptance and the theory of cognitive perspectives approach.

The Origin of the Thought of Innovation

The history of the thought of the diffusion of innovation can be traced back to the first decade of the 20th century, to Tarde's (1903) *Laws of Imitation*. In Tarde's view, desire and belief are two important factors that shape social relations. Tarde (1903) noted that desire and belief are represented through invention and imitation. An invention involves following strict logic, but this does not matter much. An invention is not adopted based on how useful or logical it is. An invention is adopted because it can be imitated.

Tarde distinguished between two phases of society: the inventive phase and the uninventive phase. When a society is in its uninventive phase, it is uncritical of inventions. For example, near the end of the Middle Ages, pious Christians adopted inventions that originated in the "licentious taste" of Pagans (Tarde, 1903). The pious Christians accepted Pagan inventions regardless of the contradiction to their values.

Tarde (1903) suggested there is always competition between inventions that have similar purposes. For example, cuneiform writing was popular for many centuries in Central Asia. During the same time period, Phoenician writing was used in the Mediterranean region. Eventually, the Phoenician alphabet became the more prevalent form of writing. Finally, Latin letters developed from the Phoenician alphabet. Tarde emphasized that old inventions are replaced with new inventions. The replacement process occurs because of imitation.

The replacement process leads to another important concept: extra-logical influences. In Tarde's view, imitation is not deliberated in most cases. Members of a society do not have voluntary manners of imitating. For example, individuals living in the same geographic region imitate the same accent or fashions. Also, individuals perceived as superior are imitated as role models. Tarde's view on role modeling anticipates modern views on opinion leadership. Katz (2006) argued that Tarde failed to make a deep impression upon sociological trends because he used the term "imitation." According to Katz (2006), the problem with the term, "imitation" is that it traditionally signified some unthinking and mechanistic action. Katz suggested that Tarde's viewpoints might have gained more popularity if he had chosen the term "influence."

Ryan and Gross' Theory

One study that illustrates Tarde's theory of imitation was a research study conducted by Ryan and Gross (1950). The study examined factors that caused Iowan farmers to adopt hybrid corn. Originally, Iowan farmers used the traditional method of planting open pollinated corn, setting aside a portion of the yield for next planning season. Although it would have been more advantageous for the Iowan farmers to plant hybrid corn, which was more resistant to pests and produced more yield, farmers did not adopt the idea for ten years. Ryan and Gross (1950) investigated the reasons leading the farmers to adopt the hybrid corn. Results indicated a majority of the farmers adopted hybrid corn because of social relations, rather than the advantages of planting hybrid corn over open pollinated corn. Early adopters obtained knowledge of the hybrid corn from salesmen. However, two-thirds of farmers who adopted the hybrid planting method at a later time referred to their neighbors as source of influence. The diffusion occurred during the period from 1927 to 1941. Most of the farmers adopted the hybrid planting method between 1934 and 1939. Ryan and Gross' (1950) study supports Tarde's theory of imitation. Farmers adopted a better method of planting by imitating role models.

Rogers' Theory of the Diffusion of Innovation

Rogers' theory of the diffusion of innovation is described as a middle-range theory (Wishwanath, 2015). Based on Robert Merton's (1968) definition, a middle range theory is a theory that produces its statements after examining all available empirical facts. Rogers (2003) linked the factors of time and cultural characteristics to the diffusion of innovation. Rogers illustrates the factor of time to implement an innovation. For example, although an English captain found that citrus juice was effective in preventing

scurvy in 1601, citrus juice was not prescribed to patients until the late 18th century. It took more than a century for the innovation to be adopted. To demonstrate how cultural characteristics may influence the diffusion of innovation, Rogers described how the traditional beliefs of Peruvian villagers prevented them from adopting new scientific evidence demonstrating boiling water killed germs. In terms of a middle-range theory, Rogers' examples demonstrate scientific statements about the diffusion of innovation. Based on such empirical facts, Rogers (2003) argued that the success of an innovation is dependent on whether it is perceived as useful.

The Technology Acceptance Approach

The technology acceptance approach is based on whether an individual considers an innovation easy to use. In Rogers' (2003) theory, emphasis is placed on whether an individual is encouraged to adopt an innovation, rather than on whether the individual has the skills of using the innovation. However, an innovation is not always an easy object or idea. Several decades ago, computers were introduced into business and into homes. Computers are advanced technologies. Users must first learn how to use them. In terms of the diffusion of innovation, thus, focus shifted from the question of whether an individual perceives an innovation as useful to whether an individual perceives an innovation as easy. Bagozzi, Davis, and Warshaw (1989) argued that individuals adopt a technology that they think is easy to use. In contrast, individuals refuse to adopt a complicated innovation. According to the authors, individuals develop the attitude that they can obtain certain levels of the skill required for using technology. The former method of measuring adoption rates that is based on whether an individual responds favorably to an innovation

is not applicable to an advanced innovation. This is because individuals sometimes admire innovation objects that they do not know well or have no skills of using them.

Thus, according to Bagozzi, Davis, and Warshaw (2003), attitudes toward a technology fall in three categories: attitudes suggesting success, attitudes suggesting failure, and attitudes suggesting an individual can obtain the required level of skill proficiency. Adopting a technology requires an attitude of success and confidence in obtaining skill proficiency. Individuals fearing failure of learning refuse to adopt a technology.

Davis' (1989) theory of reasoned action is based on the concept of perceived ease of use. Davis distinguished between two concepts: perceived usefulness and perceived ease of use. Perceived usefulness refers to the usefulness of a certain technology, while perceived ease of use refers to how easy it is to use a technology. Central to the theory of technology acceptance approach is the concept of trying to use the technology. Adopting a technology involves trying to use the technology effectively. An individual who fails to learn how to use a technology will stop trying. But a successful individual will eventually adopt the technology.

Cognitive Perspective Approach

Social cognitive learning can be traced back to the first quarter of the 20th century to Vygotsky (1930) who argued that language makes learning possible. During the 1980s, theories were developed to explain the relationship between social cognitive learning and the diffusion of innovation. Bandura (2001) proposed that modeling and symbolizing are sources of cognitive learning. In Bandura's view, individuals are inherently self-organizing and self-regulating. When learning, an individual does not react to stimuli

passively, but rather reflects on reactions by using symbols—language. In this respect, learning achievements are mostly cognitive and intellectual. Bandura argued that behaviorism is unable to explain human learning adequately. If learning were to only result from reinforcement, civilizations would have never formed in the first place. Bandura further added that language consists mostly of old concepts that new generations use without bothering that the reinforcement factors that caused them in the first place do not exist anymore.

Bandura sought to show that learning occurs in the absence of reinforcement (Hurst, 2014). During an experiment, a group of children watched a video showing a woman beating a doll while using a language of anger and violence. When the children saw the actual doll, they behaved like the angry woman, attacking the doll and using harsh words. The children learned the rough behavior through imitating and observing the model (the angry woman). Based on this experiment, Bandura proposed that social relations are major factors that allow for the adoption of an innovation to occur.

Models of the Diffusion of Innovation

Some of the theories mentioned in the previous sections sought to produce models of the diffusion of an innovation. In Tarde's view, people imitate human models even after they have disappeared from life (Toews, 2003), including historical figures. This implies that the adoption of an innovation (imitation of a model in Tarde's terminology) sometimes takes place over a long period of time. Researchers Ryan and Gross (1950) and Rogers (2003) were interested in a S-shaped model. The purpose of the S-shaped model is to show the trajectory of the diffusion of an innovation. The S-shaped model is also used in theories focused on predicting sale success of a new product. These theories

use product, rather than technology, to refer to innovation (Meade & Islam, 2006). Product involves the need to predict marketing prospects of an innovative product. An example of an innovative product is Diet Pepsi in the 1960s.

Ryan/Gross and Rogers' Model

Ryan and Gross (1950) noted that the graph of the diffusion of an innovation is S-shaped. In their research, from 1927 to 1933, adopters of the hybrid corn grew from roughly one-percent to ten-percent. From 1933 to 1939, the graph rose to 90%. Ninety percent of the farmers adopted the hybrid corn during the period lasting six years. During the next two years (1939-1941), the graph advanced almost horizontally. The remaining ten percent of the farmers adopted the hybrid corn from 1939 to 1941.

Rogers' (2003) model is also S-shaped. Rogers used such terms as innovators, early adopters, early majority, late majority, and laggards to describe phases of the S-shaped model. These adopters respectively constitute 2.5, 13.5, 34, 34, and 16 percent of the population of the adopters. In Rogers' view, the S-shaped model is applicable to all innovations. However, while some innovations are adopted within a short period of time, others cannot leave the early stages fast enough. They remain unappealing to potential adopters for decades or even centuries. It took several centuries for limejuice to be adopted as a cure for scurvy.

Fourt and Woodlock's Model

Fourt and Woodlock (1960) reported that a great number of American grocery products produced in the 1960s did not exist prior to the Second World War. However, immediately after they were introduced into the market, most of these products failed, or purchasers did not purchase half to two-third of the products. The authors noted that these

products were actually innovations whose success or failure was dependent on whether they were in the market long enough. Claims of a new product's success or failure are valid after it is in the market for an average period of 24 months.

Fourt and Woodlock (1960) developed a model with two variables: penetration and repeat ratio. Penetration referred to number of households (purchasers) and repeat ratio referred to number of purchases. The graph rises to 30 households who purchase products once or twice. But from 30 to 40 households, the repeat ratio increases to 12 times and remains constant at this point.

Mansfield's Model

Mansfield's (1961) model is S-shaped. Experimenting with heavy industrial innovations including mining machines, shuttle cars, car retarders, and by-product coke ovens, Mansfield began by asking how long it might take for an industrial innovation to be adopted. The results suggested that the adoption of these innovations occurred rather slowly. It took 20 years for firms to adopt car retarders and by-product coke ovens. Further, Mansfield observed that firms adopted some machines faster than others. It took 15 years for half of the pig-iron producers to adopt by-product coke ovens. But half of the coal producers adopted mining machines over a period of 3 years. Mansfield explained the difference in adoption time occurred because the coal producers were quick to realize the mining machines were profitable. Mansfield's graph of centralized control traffic rises to about seven percent of the firms during the first 4 years (from 1924 to 1928). But between1928 to 1934, it goes upward from seven percent to ninety percent, and continues slowly to one hundred percent from 1934 to 1936.

Bass' Model of New Product Growth

Base's model (1969) shows that the diffusion of an innovation rises slowly. Then, at some point it begins to increase quickly. Within a relatively short period from this point, the number of customers increases exponentially. But before reaching the peak, the diffusion rate begins to slow down again. As Bass examined data from color television sales in the period 1964-1970, he noted how the S-shaped curve could be used to predict product sales. Bass emphasized that it was possible to predict rates of the diffusion of the color TV because the number of purchases at a time is related to the number of previous purchases.

The Substitution Model

All of the diffusion models are based on the assumption that an innovation remains unchanged during the diffusion period. However, technology changes quickly, and intervals between old and new generations of innovations become increasingly small. For example, current generations of computers rapidly replaced computers from several years ago, or digital telephone superseded analogue telephone. According to Meade & Islam (2006), the single-technology model is not suitable to explain the substitution of new generations of an innovation. Norton and Bass (1987) suggested a model that allows for predicting the diffusion of successive generations of high-tech innovations. Norton and Bass' model includes S-shaped curves that overlap in some sections. Norton and Bass observed that an old innovation never stops being adopted. Some adopters may, however, decide to substitute a new technology. These adopters form the innovators in the diffusion of the new innovation. Mahajan, Muller, and Bass (1995) called this model "multi-diffusion patterns."

Skepticism About the S-Shaped Model

Van den Bulte and Stremersch (2004) suggested that the S-shaped model assumes variations based on two factors: contagion and heterogeneity. Contagion refers to exposure to knowledge surrounding an innovation. Social mechanisms such as social learning and social-normative pressures can cause contagion to occur. Heterogeneity refers to individuals having an intrinsic need to adopt an innovation. Individuals adopt an innovation based on their inherent characteristics. For example, an innovative individual is among the first to adopt an innovation. According to the authors, the S-shaped model results from heterogeneity, rather than from contagion. The curve of contagion is flatter, implying that intrinsic factors can affect the shape and timing of the diffusion of an innovation.

Multinational Diffusion

Gatignon, Eliashberg, and Robertson (1989) proposed a model of diffusion that can be used to explain the diffusion of an innovation across nations. The authors identified variables including cosmopolitanism, mobility, and sex roles. Their research focused on European countries. The authors found a positive relationship between cosmopolitanism and the diffusion of innovation. By cosmopolitanism, it is meant that individuals show interest in adopting an innovation that comes from outside their social systems. The opposite of cosmopolitanism is the orientation by which an individual is devoted to local values. The authors also found that mobility is positively related to the diffusion of innovation. Where services, markets, and transportation are available, the diffusion of an innovation occurs widely enough. As for sex roles, the authors proposed that the percentage of women working outside their homes is negatively related to the

diffusion of time-consuming innovations, but positively related to the diffusion of imitating and simulating innovations.

Pattern, Characteristic, and Prediction

The S-shaped model represents the pattern by which the diffusion of an innovation occurs. In terms of the curve, time periods are placed on the x-axis. The y-axis includes the percentage of adopters. These variables are dependent on characteristics mentioned by Rogers and multi-national diffusion identified by Gatignon, Eliashberg, and Robertson (1989). Theoretically, based on understanding these factors, it is possible to predict the future behavior of an innovation. Nevertheless, Robinson and Lakhani (1975) proposed that technology advancement removes the optimism that such prediction is accurate. Nowadays, innovations grow outdated fast. Also, it becomes increasingly easy to operate innovations. New generations of innovations are also less costly and more effective than previous ones. Consequently, factors that influence the trajectory of an innovation are more complex and more numerous. The S-shaped curve is helpful in predicting the future of the diffusion of an innovation only if factors influencing this graph remain stable.

Theories of Opinion Leadership

Rogers suggested that diffusion is dependent on perceptions, which forms in the mind of an individual while interacting with peers or responding to various aspects of social life. In this section, studies concerned with theories of opinion leadership are reviewed. Opinion leadership involves understanding the role that an opinion leader plays in the diffusion of an innovation. The history of theorizing about opinion leadership is rather old. John Stuart Mill (as cited in Weimann, Tustin, van Vuuren, & Joubert, 2007)

noted that the masses take influence from peers, rather than from church or state leaders. The more recent history of the thought of opinion leadership goes back to the 1940s to the theory called the two-step flow model. The origin of this model is seen in Lazarsfeld, Berelson, and Gaudet's (1944) research, *The People's Choice*. The authors argued that a voter's decision is not dependent on personality types or levels of exposure to the mass media Further, they noted that a voter takes influence from influential friends and opinion leaders who are experienced in interpreting the information that comes from the mass media. The two-step flow model is based on the idea that information flows from media to opinion leaders and from opinion leaders to voters. The theory of the two-step model is a source of inspiration for other theories, while it is also criticized as somewhat simplistic.

A Similar Approach

A source of support for the two-step flow model is Kats' (1957) review of several key studies, including *The People's Choice* (Lazarsfeld, Berelson, & Gaudet, 1944), *The Rovere Study* (Merton, 1949), *The Decatur Study* (Lazarsfeld & Kats, 1955), and *The Drug Study* (Menzel & Kats, 1955). The People's Choice study was focused on describing how the model worked and how the three components of the model (opinion leader, follower, and media) were related to each other. The Rovere study determined how to identify opinion leaders. The authors found that individuals whose names were mentioned on surveys four times or more were considered opinion leaders. The Decatur study focused on obtaining information about whether opinion leaders and their followers come from different social classes. The authors found that in fashion, young women followed other young women. In marketing, older women sought advice from women

with large families. In public affairs, people of higher socio-economic ranks influenced people of lower socio-economic ranks. The Drug study explored what influenced doctors' decisions to adopt a medicine. The authors concluded that doctors followed doctors who were readers of professional journals. Doctors were obviously influenced by knowledgeable colleagues. According to Kats (1957), these studies show that personal influence is more effective than influence coming from the mass media.

Opposition to the Two-Step Flow Model

A major theme of the two-step flow model (Lazarsfeld et al.'s model) is that opinion leaders influence voters more widely than the mass media. An individual tends to accept viewpoints from influential friends. Klapper (1957) challenged the two-step flow model by saying that the approach in this model is a phenomenistic approach; that is, the results extracted by these authors are only applicable to the communities specified in their study—small towns in Ohio and New Jersey. Klapper emphasized that attitudes mentioned by Lazarsfeld and others only become reinforced in small communities. This is because members of such communities have a predisposition to adopt certain attitudes. In these communities, persuasion is effective, and certain attitudes become reinforced fairly rapidly. Further, Klapper argued that mass communication influences voters through converting influential friends, who use persuasion to reinforce attitudes. In other words, mass communication is both an agent of persuasion and an agent of change.

A Successful Information Campaign

The experiment conducted by Douglas, Westley, and Chaffee (1970) cast further doubt on Lazarsfeld et al.'s concept that the elite, rather than mass communication, are responsible for changing attitudes. Douglas, Westley, and Chaffee (1970) sought to

explore effects of a media information campaign on attitudes. The researchers sought to explore effects of a media campaign on attitudes toward people with intellectual disabilities. The authors used research instruments to measure levels of respondents' awareness regarding people with intellectual disabilities before and after the campaign. The results indicated most of the respondents in the community obtained satisfactory levels of knowledge regarding people with intellectual disabilities. According to the authors, this is contrary to the concept of "chronic know-nothings" suggesting there are always people who do not care to obtain knowledge. Secondly, the study found that gaining information is positively related to adopting attitudes. More importantly, the study found no evidence that respondents were predisposed to gain information or adopt attitudes. Based on this research, the spread of information does not occur according to the two-step model. Respondents developed positive attitudes after receiving positive information from mass communication, and the elite played no role in the processes.

Integration

The opposition between mass communication views is resolved in Rogers' (2003) theory. Rogers' (2003) argued that an opinion leader obtains knowledge of an innovation from media. Information flows from the mass media to opinion leaders and from opinion leaders to the whole community. In Rogers' view, before adopting an innovation, an individual passes through several stages: knowledge of the innovation, persuasion, making a decision, implementing the decision, and confirming the decision. An opinion leader provides knowledge of an innovation and is persuasive to non-leaders (p. 273).

According to Rogers (2003), however, an opinion leader is not always successful in influencing non-leaders. The success of an opinion leader is dependent on whether the

opinion leader belongs to a homophilous or heterophilous group. Homophily in a group is responsible for effective communication among members of the group. Individuals who are alike can communicate their ideas to each other rather successfully, but homophilous communication prevents an innovation from being adopted. An individual in a homophilous group resists taking influence from outside. As opposed to homophilous communication, heterophilous communication helps an innovation grow popular. According to Rogers, a heterophilous group includes two sets of socially dissimilar individuals: those who have the potential of obtaining knowledge about innovations and those who look to these enlightened individuals as role models. This concept is also reflected from Rogers' example of two villages, one innovative and the other traditional. The traditional villagers, representing a homophilous group, refused to adopt the innovation.

Weak Ties vs. Strong Ties

As is implied in Klapper's (1957) view on the two-step flow model, it is assumed in the two-step flow model that voters are like-minded individuals. Some of these individuals are more influential than others. Individuals who are influential form an elite group. Granovertter's (1973) views on weak ties vs. strong ties include criticism of this assumption. By strong ties, Granovertter means ties between opinions of the members of such an elite group. Granovertter argued that strong ties do not play a major role in the diffusion of innovation. Granovertter uses two models to demonstrate this concept: a single triad and a set of triads placed near each other. The triad consists of three individuals, A, B, and C. A is friend to B and to C, but B is not friend to C. This might

seem as though B and C do not influence each other, but B and C are connected through A. Basically, as Granovertter emphasized, a triad is not possible without B-C.

Granovertter's second model involves a set of triads, ABC and DEF, placed near each other. A is related to B, and B is connected to C. Granovertter suggested that B is also connected to D, which is connected to E and F. The line between B and D is invisible, but it is present. Granovertter calls this invisible line a weak tie or bridge.

Given Granovertter's models, opinion leaders and their followers in Lazarsfeld et al.'s (1944) model are considered members of the same group who are connected to each other through strong ties. From Granovertter's perspective, influence cannot flow out from this group into the society at large. Rogers (2003) uses a different method to explain this problem. Rogers' view, for diffusion to occur, both homophilous communication and heterophilous communication must be present. A heterophilous group has diverse members. When two members and an innovative member come in contact with each other, they form a triad that is connected to other triads through bridges. Such triads can multiply based on Granovertter's model of diffusion, covering the whole society.

Support for the Strength of Weak Ties

Weimann (1982) found more support for Granovertter's view on the strength of weak ties. The participants in his research were 270 members of a community. Weimann asked participants to discuss conversations that they had during a certain period. The purpose was to explore how ideas spread from individuals to the entire community. The results led to discovering a pattern involving sources, dyads, and groups. The primary conversation occurred in a dyad. Then, members of a group picked up the conversation from the individuals in the dyad. In the next phase, groups picked up the conversation

from each other. Weimann noted that weak ties connected groups together. Strong ties formed in three situations: between a source of information and an individual, between the individuals in a dyad, and between members in a group.

Theory of Balance

The theory of balance is applicable to opinion leadership and the diffusion of innovation. The concept of social balance originates from Heider's (1946) theory. Heider is focused on situations in which two individuals have attitudes toward an object. Several configurations can occur. First, both individuals may have positive attitudes toward the object; or, both individuals may have negative attitudes toward the object. Both individuals may have different attitudes; or, perhaps, the two individuals have positive or negative attitudes toward each other.

According to Heider, there are balanced configurations and imbalanced configurations. In the balanced configurations, all of the three attitudes are positive; or two are negative, but the third is positive. In the imbalanced ones, all of the three attitudes are negative; or one is negative, but the other two are positive. Heider's example of a balanced unit configuration includes a person who admires another person who likes an object. All attitudes in this unit configuration are positive.

The opposite of this unit is also a balanced unit. Heider's example is a person who does not admire the person who does not admire the object. Heider noted that attitudes are of two kinds: liking and disliking. The first example involves liking, the second disliking. However, according to Heider, when a unit configuration loses its dynamism, it begins to experience crisis. Pressure mounts up from outside to ruin the unit. If no change

happens in the meantime, the end result is always an imbalanced state. Heider declared that these cognitive configurations help understand behavior in social contexts.

Generalization of Balance Theory

Heider's model of cognition organizations is only applicable to interrelations between two individuals and an object or between three individuals. The question for Cartwright and Harry (1958) was whether Heider's triad could be used as the elemental unit to produce a model of the structure of social life. To answer this question, these authors created a theory that is a generalization of Heider's balance theory. Cartwright and Harry's theory, also known as structural balance theory, consists of two components. First, Heider's triads are put side by side in a design, which represents a clique. Next, Heider's statements of the interrelations are translated into a language of mathematics. Thus, graphs, diagraphs, and s-graphs are drawn to explain the structure. In the design, the configurations are all balanced. The authors demonstrated that the design as a whole is also balanced. According to Cartwright and Harry, structural balance theory can be used to explain the way in which mass communication influences the audience. Attitudes toward individuals constitute cognitive organizations that are either balanced or imbalanced. The balanced units combine to form cliques that constitute the entire society. According to Cartwright and Harry, for mass communication to be effective, it must attempt to influence cliques.

Generalization of the Theory of Interpersonal Relations

Structural balance theory is used as a generalization of Newcomb's (1953) theory. Newcomb (1953) introduced a theory of interpersonal relations. The tenets in Newcomb's theory are similar to those postulated by Heider. Newcomb proposed that a

triad is a system in which the individuals are interdependent on each other. For this system to survive, it should not be "strained." The relations in the triad must be "symmetrical." Strain and symmetry are similar to forces toward the unit and balance in Heider's theory.

Criticism of Structural Balance Theory

Structural balance theory is criticized on three points: division of labor, social interaction factors, and relative values of "likes" and "dislikes." Davis (1963) argued that forces that can cause a cognitive organization to shift from balance to imbalance arise from conflict inside the triad. That is, attitudes in the triad begin to oppose each other after the division of labor has brought different levels of benefit to the individuals. Secondly, interaction should be represented as a variable in the theory of structural balance. Liking and disliking assume various degrees during interaction. In a triad, the formations are dependent on how intense each individual's attitudes are. Third, the theory of structural balance involves opposing attitudes: liking and disliking. There is no reference to states that exist between these two. This is crucial because individuals sometimes only pretend that they like or dislike something.

Agenda-Setting

The theories of opinion leadership refer to the influence of an opinion leader. No reference is made to question why opinion leaders are only sometimes successful. For example, while opinion leaders who were interested in Dvorak's keyboard failed to popularize this keyboard, the farmers in Iowa (Ryan & Gross, 1950) managed to convince their friends and other farmers of the advantages of hybrid corn. The theory of agenda setting provides insight regarding how opinion leaders can enhance their

influence. McComb and Shaw (1972) argued that mass media set the agenda for a political campaign. Mass media lead opinions. Through the influence of the mass media, an audience can be led to believe what is and what is not worthwhile to consider. McComb and Shaw's research focused on Chapel Hill voters in the 1968 presidential campaign. The results indicated that the majority of the respondents were interested in discussing comments offered by journalists and analysts, rather than discussing the political issues for which the campaign was formed. These findings suggested to the authors that the audience was interested in what opinion leaders regarded as interesting. Thus, opinion leaders can increase their influence by using appropriate communication strategies.

Mass Communication and the Two-Step Flow Model

In line with the agenda setting model is Brosius and Weimann's (1996) view that opinion leaders obtain the information from the mass media. The process is similar to the process occuring in the two-step flow model. The mass media introduce topics. In the next step, opinion leaders present their interpretations of the topics to the audience. Brosius and Weimann suggested that communication among individuals occurs through networks of opinions. Each of these networks includes small-scaled networks. Each small-scaled network contains opinion leaders and non-leaders. The small-scaled networks exist because diverse opinions exist. In each small network, opinions of an opinion leader act as a nexus on which others' opinions are built. Opinion leadership and interpersonal relations are factors that determine the degree to which an agenda is adopted. In the agenda-setting model, adopters of an agenda are classified as opinion leaders, early organizers, and late organizers.

Measuring Opinion Leadership

This section includes reviews of the literature regarding the measurement of opinion leadership. The idea of measuring opinion leadership dates back to the 1940s, most notably to the publication of *The People's Choice* by Lazarsfeld et al. (1944), mentioned earlier. Related to measuring opinion leadership are topics including characteristics of opinion leaders, models of identifying them, and scales of measuring their influence. Later studies concerned with measuring opinion leadership are formed around a debate over which source is more influential: opinion leaders or mass media.

Characteristics of Opinion Leaders: The Pioneer Approach

To measure opinion leadership, it must be known what opinion leaders are like. This theme is reflected from older studies. First, the two-step flow model (Lazarsfeld et al.) postulates that opinion leaders obtain their information from radio and print. Influence flows from these opinion leaders to non-leaders. A conclusion of the two-step flow model is that voters' choice and opinion leaders' choice are alike. The two-step flow model regards opinion leaders as more influential and more knowledgeable than non-leaders.

Second, Wilkening (1952) suggested that opinion leaders are conservative in attitudes and taste. They follow social norms devotedly. Respondents in Wilkening's research were farmers in a community in North Carolina. Wilkening asked respondents to name farmers to whom they went for advice regarding farm equipment and farm practices. The participants mentioned 10 farmers by name. Wilkening interviewed the 10 farmers, and found that each farmer attended church regularly and was committed to social codes and the values of the majority. Wilkening's study also showed that the

farmers had a reputation as being dependable. Participants indicated that they were able to trust the farmers.

Third, Rogers and Cartano (1962) reaffirmed that opinion leaders are committed to group norms and beliefs. Opinion leaders support their followers' values, but opinion leaders are not necessarily more innovative than non-leaders. According to the authors, opinion leaders in a traditional society are sometimes "polymorphic," implying that they can influence members of other social groups. Also, opinion leaders are more knowledgeable and more cosmopolitan, and their social statuses are higher than non-leaders. Rogers and Cartano also found that opinion leaders participated in social activities more often than the followers.

Characteristics of Opinion Leaders: A Different Approach

The two-step flow model is criticized as unrealistic. Based on this model, high levels of interaction do not occur between mass media and non-leaders. The mass media do not generate influence. Nor do non-leaders use analyses of their own to decide whether they should accept or reject solutions offered by mass media. As Klapper (1958) mentioned, the two-step flow model is applicable only to small communities. For instance, in Wilkening's study of farmers, communication occurs through interrelations among the farmer friends. Influential individuals in Wilkening's research act as peer educators. More clearly, the purpose of the two-step flow model was to explain voters' behavior in electoral campaigns, which involves large amounts of interaction with mass media, while it was suggested in the model that voters made decisions solely based on the influence of opinion leaders.

In response to such inconsistency, Kingdon (1970) proposed that the electorates in a campaign are of four types: activists, passive leaders, talkers, and non-leaders. Kingdon reviewed a study conducted by the University of Michigan about the 1996 election. The study asked the respondents to address two questions: (1) whether someone came to them for advice and (2) whether they went to someone for advice. Results showed that 29% of the respondents provided a positive answer to one or the other question. Kingdon concluded that 29% of the population consisted of opinion leaders.

Of the four types of voters mentioned, the activists, passive leaders and talkers considered opinion leaders. Activists are advice givers and consultants. Passive leaders' influence is dependent on positions they hold in society, such as a father's influence over his family. Talkers are individuals talking to others and seeking advice from them. Convincing arguments are influential; so are the individuals conducting the arguments. Kingdon denies that opinion leaders are an elite group. As mentioned, based on Kingdon's one-third of the population is composed of opinion leaders. As well, opinion leaders are more likely seen in academic environments. There are more males than females and more whites than blacks among opinion leaders. This implies that opinion leaders are seen more often among disadvantaged groups than among wealthy and highly educated groups.

Similar to Kingdon's study is Myers and Thomas' (1972) study of the characteristics of opinion leaders. Myers and Thomas focused on the question of opinion leaders' characteristics. Myers and Thomas initially criticized opinion leadership studies as being based on conflicting results. One contradiction is, for example, that while some studies consider the concept of "generalized opinion leadership" valid, others reject this

concept totally. The problem with these studies, Myers and Thomas stated, is that they span a wide range of respondents and use different methodologies. Myers and Thomas emphasized that their study is designed to solve the problem by using a "single methodology, at single point in time, and among a single population."

Myers and Thomas focused on several hypotheses: (1) there is a positive relationship between opinion leadership and the degree to which opinion leaders are dedicated to their topic of interest; (2) opinion leaders both give and receive influence; (3) opinion leaders have a high degree of innovativeness; (4) the relationship between opinion leadership and social leadership is positive; (5) opinion leaders are socially active; (6) opinion leaders are fewer than those following them; and (7) the concept of generalized opinion leadership is incorrect. The results of this study showed that opinion leaders are more knowledgeable than their followers. However, the authors found no evidence to show that the other hypotheses are valid. Opinion leaders are not fewer than those following them, bearing additional support to the idea that opinion leaders do not constitute an elite in a community. They are mostly seen among opinion receivers.

Criticizing the two-step flow model, Robinson (1976) argued that the model fails to see that opinion leaders and non-leaders are actors within a network. The two-step model would be credible only if opinion leaders were to have no communication with each other. Opinion leaders are both givers and receivers of opinions. Opinion leaders interact with each other. Interaction occurs among non-leaders too. Robinson's model consists of several types of links: between media and opinion leaders, media and the less attentive, opinion leaders themselves, opinion leaders and the less attentive, and finally between the less attentive themselves.

Further, Robinson suggested that information and influence must be understood as meaning "old information" and "new information," respectively. Mass media are providers of information to both opinion leaders and the less attentive. Opinion leaders spend more time focusing on media than do non-leaders. The result is new information. Opinion leaders use information from media to create new information. The less attentive are receivers of the new information. The story behind opinion leaders' influence is that the less attentive need to have the new information, but they cannot create it themselves because their use of media is limited.

In addition, Robinson replaced the terms "opinion leader" and "follower" with "opinion giver" and "opinion receiver." Using data on mass media from the Center for Political Studies (CPS), Robinson discovered that the sample also included non-discussants, individuals who do not attempt to take influence from or give influence to any person. Opinion givers, opinion receivers, and non-discussants constituted 43%, 39%, and 39% of the sample, respectively. Robinson concluded that 68 % of opinion givers were thus also opinion receivers. The author emphasized that most of opinion receivers receive opinions through interpersonal communication, family relations, for example. Robinson noted that the statistics show the two-step flow model may only be helpful in explaining interpersonal communication among family members and acquaintances.

The concept that opinion leaders are also opinion receivers receives support from Black's (1982) study, which investigates whether some individuals adopt change sooner than others. Black asked two questions of the respondents: (1) are they more likely or less likely to turn to someone for advice and (2) whether someone comes to them for advice.

The results showed that individuals who change their opinions earlier influence non-advisors. This seems as though non-advisors respond to mass media at a later time. Accordingly, Black noted, the role of the mass media in disseminating opinions is not as essential as suspected.

However, Brady (1985) argued that the knowledge of the audience concerning a political issue does not all come from opinion leaders. Citizens can discover what political groups stand for without taking assistance from opinion leaders. A good number of citizens do not understand political abstraction. For example, they are not familiar with philosophies that originally produced conservatives, liberals, democrats, or republicans. However, they can tell with accuracy what issues each group is sensitive to and what side of a debate it stands on. Brady's methodology compares the actual positions of a political group with the attributes that the respondents assign to the group. The results showed that the gap between the actual positions and the assigned attributes is insignificant. Brady emphasized that the reason is not that the respondents included only those who supported democrats and republicans. Many respondents had sufficient knowledge of the positions of the other parties, but those who had little or no knowledge were also able to estimate conservative and liberal positions accurately.

Brady argued that such accuracy results from an affective calculus, a "likability heuristic" that is based on two premises: (1) a respondent's philosophy and values, and (2) the respondent's feelings toward competitive parties. Brady suggested that opinion leadership consists in talking about opinions received. The less attentive individuals receive information from mass communication and opinion leaders. This information is processed through rational processes and through affective processes. The result includes

feelings, beliefs, and attitudes. Influence originates from opinion receivers rather than from opinion leaders. Opinion leadership is no more than giving expression to influence, but this appears as though influence comes from opinion leaders. It may seem unrealistic that feelings—rather than knowledge—are responsible for the correct estimations mentioned by Brady, but Brady's argument is built on data extracted from hundreds of respondents.

In line with Brady's view on opinion leadership is Zaller's (1992) theory about the origin of mass opinion. Zaller argued that given a subject, opinion receivers are those who possess a moderate amount of knowledge about the subject. Opinion leaders are more informed than those who have little knowledge, but they are less informed than those who have high knowledge. Zaller introduced a model of the ways in which individuals respond to opinions. The model anticipates four processes. First, an individual who has high knowledge about an opinion shows positive attitudes toward that opinion. Second, some individuals tend to resist opinions. Third, it is easy for an individual to retrieve recent opinions. The more recent an opinion is, the easier it is for an individual to retrieve the opinion. Fourth, individuals respond to survey questions by focusing on opinions that they can gain access to immediately. The purpose of Zallers' model is to discover factors that contribute to an opinion leader's success. The main question in this model is what opinion leaders should do or say to attract the less attentive. Opinion leaders must go to the right audience, Zaller noted. It is difficult for an opinion leader to influence people who have high or little knowledge of a subject, but it is not difficult to influence people who have moderate amounts of knowledge. This implies that for an opinion leader to influence others, the opinion leader must be knowledgeable about the

subject and must try to evoke from the audience ideas that it can retrieve easily. In other words, a successful opinion leader is an individual who can relate to non-leaders.

Mondak's (1995) study is also a study that places emphasis on the idea that opinion leaders are a source of influence for non-leaders. This study was conducted under unique conditions. In 1992, in Pittsburgh, newspapers went on strike, lasting eight months. As a result, no dailies were made available during the election season. Given these circumstances, the author sought to explore how the unavailability of the mass media influenced voters' decisions. Mondak attempted to find answers for three questions. First, does access to media increase interpersonal discussions in terms of quantity? Second, do discussions offered via media influence voters' perceptions of those conducting the discussions? Last, does media coverage influence discussions among acquaintances? Mondak found that the Pittsburgh newspaper strike worked toward reducing discussion subjects in interpersonal communication. However, the author concluded, the reduction of the discussion subjects did not cause interpersonal discussions to occur any less than before. According to Mondak, the primary goal of media coverage is to generate discussion subjects. When voters are exposed to various discussions, the result is often a decline in support for a candidate. In Pittsburgh, in 1992, in the absence of media coverage, interpersonal communication was able to influence the vote results highly. This means that it would be unrealistic to think, "persuasive campaigns launched by a few active citizens can sway large numbers of uninformed or apathetic voters."

Another approach toward defining opinion leaders' characteristics is the approach of considering them "opinion brokers." Burt (1999) suggested that society consists of

groups. Members of each group are “equivalent” to each other. But they are nonequivalent to members of other groups. This does not mean that some groups are superior or inferior to other groups. Only, the nature of society is such that its members differentiate into types and groups. According to the author, contagion occurs when two nonequivalent members come in close contact with one another. The result is that influence begins to flow from one to the other. The person with a new idea begins to convert the second person. An opinion leader is like the one carrying a contagious factor. Broadly, opinion leaders’ conversations spread across society through contagion. Opinion leaders act as brokers, transmitting opinions across society. They receive opinions from members of one group and deliver them to members of the other groups.

The controversy surrounding opinion leadership has two strands: (1) opinion leaders’ characteristics as sources of influence and (2) opinion leaders as opinions receivers who replicate influence. Roch (2005) argued that both sides of the argument are correct. Opinion leaders’ characteristics are helpful in disseminating opinions, but such characteristics are not inherent in an opinion leader. Opinion leaders develop these characteristics through interacting with non-leaders. Non-leaders take influence from opinion leaders when they are engaged in mutual understanding with them.

Roch developed several hypotheses to explain opinion leaders’ characteristics. First, opinion leaders’ sources of knowledge are more reliable than those used by non-leaders. Second, opinion leaders have access to larger amounts of interpersonal communication than non-leaders. Third, opinion leaders are more experienced than non-leaders in the area of interest. Fourth, opinion leaders are better problem solvers than non-leaders. Using survey data from Plyometrics Laboratory for Political and Social

Research at the Ohio University, Roch found that all of these hypotheses are applicable. Roch concluded that opinion leaders' characteristics are such as to enable them to adopt change earlier than non-leaders.

Methods of Identifying Opinion Leaders

Methods of identifying opinion leaders can be classified as pioneer methods and modern methods. Both types of methods are based on finding individuals who have characteristics assigned to opinion leaders. For example, opinion leaders are individuals who have knowledge in the subject area. Moreover, opinion leaders have high social statuses. Individuals who have a reputation of being committed to group values are also among opinion leaders. Furthermore, opinion leaders include individuals who participate in social activities devotedly.

Pioneer Methods

Rogers and Cartano (1962) discussed three methods of measuring opinion leadership: sociometric, key informants, and self-designating. The sociometric method consists of obtaining information from group members. The question is whom do they turn to for advice**?** According to the authors, this method is useful in measuring opinion leadership in homogenous groups. The sociometric method is used where the sample is representative of the entire group.

Lionbergert's (1953) study is a pioneer study that uses the sociometric method. The setting is a community in Missouri, a homogenous group. The researcher asked the respondents (farmers) to identify their source of information. The respondents mentioned 10 farm operators by name. Based on interview responses, Lionbergert learned the farmers identified as opinion leaders owned large farms; received higher prestige ratings;

were active in formal and informal organizations; were broadly orientated; and had a good deal of familiarity with technologies used in farming.

The key informant method consists of asking individuals familiar with a group to show identify opinion leaders among its members. According to Rogers and Cartano (1962), this method has limited applicability. The sampling seldom covers the whole group. The self-designating method asks respondents whether they consider themselves opinion leaders. This can be conducted by asking respondents whether others seek their advice, or whether they seek to convince others of something. Abelson and Rugg (1959) proposed that respondents should be asked how likely they are consulted to share their views regarding issues in their circle of business

Modern Methods

As mentioned earlier, modern methods of identifying opinion leaders are dependent on the pioneer methods. Valente and Pumpuang (2007) introduced ten techniques of identifying opinion leaders. Among them is the technique of identifying celebrities. According to the authors, celebrities can help promote sales of products by recommending them to customers. Also, celebrities are influential in terms of persuading their admirers to adopt certain attitudes toward certain social or environmental issues. O'Mahony and Meenaghan (1998) suggested that only celebrities who are committed to virtues are helpful. A major aspect of this method is to look for celebrities whose lifestyles do not evoke objection from the audience. This method is similar to the informant method. Informants can help identify celebrities who qualify as opinion leaders.

The second method mentioned by Valente and Pumpuang consists of recruiting volunteers as opinion leaders. These opinion leaders are chosen from among peers in a community or group. The concept of peer as opinion leader is found in contexts in which learners are also educators. The philosophy of peer learning includes the Piagetian idea that learning occurs where there is mutuality of power and influence (Hoffman, 2002). Some individuals are more influential than others. According to Klein, Nicola, and Sondag (1994), factors that motivated individuals to volunteer for a peer educator program included family background, personal experiences, friends, and other peer educators. Some respondents mentioned problems in their family backgrounds. For example, some peer educators had siblings who suffered from depressive disorder or parents who were alcoholic. Participants' motivation for joining the program was searching for a solution to such problems. Some peer educators indicated that their friends were sources of inspiration. A few peer educators had a personal belief that they should be helpful to other individuals. Several peer educators indicated that other peer educators influenced them.

Opinion leaders possess more knowledge, a deeper interest and an awareness regarding issues and problems in the community. To this rule, peer educators in Klein, Nicola, and Sondag's (1994) study were no exception. Peer educators developed an interest in helping other individuals while seeking solutions to the problems their families were facing. Their knowledge regarding issues and solutions reached a high level. This particular piece of information regarding volunteers' awareness of issues and problems is helpful in determining whether they qualify as opinion leader.

Valente and Pumpuang's third method of identifying opinion leaders is the self-identification method, similar to Rogers and Cartano's self-designating method. This method is based on asking individuals whether they perceive themselves as opinion leaders. Weimann (1991) confirmed the self-identification method is effective. Weimann's study evaluated the Strength of Personality Scale developed by Allensbach Survey Center in Germany. The measure was first administered to 650 participants. Another time, it was administered to 270 participants. The findings showed that the measure was helpful. It is possible to identify influential individuals based on responses to questions about their personality traits.

The fourth method of identifying opinion leaders is the staff selection method, which consists of selecting opinion leaders from among authorities. According to the authors, the method is particularly useful when a program is implemented to create awareness or address a relevant problem. Such opinion leaders often possess specialty knowledge about the subject of interest. Therefore, they can offer feasible solutions to the problems that the audience is facing.

The positional approach method for identifying opinion leaders seeks leaders on the basis of their occupational positions in a community or group, such as church leaders or government officials. Howard et al. (2000) explored the support received from leaders of health and educational organizations in smoking intervention programs. The findings demonstrated that occupational leaders supported health programs.

Similar to Rogers and Cartano's informant method, the judges' rating method and the expert identification method require experienced individuals and experts to identify opinion leaders. Kelly (1992) used this method to encourage members of a group at risk

for HIV to adopt safe sex practices. Group members identified popular individuals who were at risk for the disease. In the end, the authors were able to document that awareness regarding safe practices spread into the group through these individuals.

Valente and Pumpuang also discussed the snowball method, sample sociometric method, and sociometric method. These three methods are variations of Rogers and Cartano's sociometric method. The snowball method involves the collection of three or more samples. The snowball method is based on developing each sample from the previous samples. Respondents are randomly selected to nominate individuals who are opinion leaders. In turn, these opinion leaders are asked to nominate influential individuals.

Latkin (1992) used the snowball method to identify opinion leaders. Latkin's research involved protecting drug users against HIV. The author recruited opinion leaders and trained them in cleaning used needles. The goal was that drug users would receive clean needles from their peer educators. Results indicated that the peer educators succeeded in preventing over 2000 HIV interactions within the time period of a year started in 1994 and finishing in 1995.

The sample sociometric method is used when interviewing representatives of a group. Members are asked to identify whom they go to for advice. Opinion leaders who are identified are viewed as a source of influence for the rest of the group. The sociometric method is effective only when it is possible to interview all members of a group. The sociometric method is helpful**,** particularly when it is applied to small homogenous groups.

Opinion Leaders and the Internet

In the examples above, it is implied that opinion leaders communicate their opinions through face-to-face methods. They are often portrayed as talking to the audience in actual forums. For example, opinion leaders in Wilkening's study talk to other farmers directly, or a father in Lazarsfeld et al.'s study discusses political issues with his family. By interpersonal communication, these authors mean face-to-face communication. The Internet has significantly changed the concept of interpersonal communication. Interpersonal communication can now occur through using the Internet. Users can participate in blogs or other online forums. The question to be considered in this section is to what extent has the web environment influenced theories of opinion leadership? Studies concerned with this issue are: (1) studies focused on the different nature of a web community, (2) studies that emphasize an opinion leader in the online environment possesses different characteristics, and (3) studies that regard characteristics of an online opinion leader as similar to those of an opinion leader in a traditional theory of opinion leadership.

Mediatized Communication

In the two-step flow model, opinion leaders stand between mass media and non-leaders. As mentioned, this model is not applicable to all examples of opinion leadership because many non-leaders consult sources of information directly. However, primarily, the two-step flow model brought much optimism, convincing theorists that the theory of setting the agenda and priming information is really effective. Setting the agenda implies that mass media can influence the target audience by emphasizing some information

more intensely. Nevertheless, with the Internet available across the globe, it seems unrealistic that mass media can succeed in obtaining the goal assigned to priming.

Reflecting on the influence of the Internet on media theories, Bennett and Manheim (2006) noted that the mass media is now widely fragmented. Individuals have access to myriads of sources of information. This is a phenomenon that lies beyond the scope of previous mass communication theories. The authors suggested that influence no longer flows from an opinion leader to a non-leader, but from a source of information to the audience. In other words, influence does not occur through a model that is two-step, but one that is one-step. In the one-step model, opinion leaders cannot play a pivotal role because information is transferred directly from virtually limitless sources to the target audience. In the two-step-flow model, opinion leaders are influential because of their knowledge or high social statuses. On the other hand, in the web environment, there is no restriction to publish opinions. The potential audience includes all users across the globe. In the web environment, every user can be an opinion leader. It would thus be ineffective to use priming techniques or setting-the-agenda techniques to attract users because it is impossible to control the flow of information.

Hjarvard's Theory

Reflecting on the role of media in modern industrialized society, Hjarvard (2013) argued that media now forms a "virtual social geography." In an actual geography, it is impossible for an individual to avoid being influenced by weather conditions. Some individuals are more talented than others in describing weather conditions, but their talent will not add to the intensiveness of the weather conditions. In a similar way, in Hjarvard's virtual social geography, individuals cannot be classified as opinion leaders

and non-leaders. Individuals in this geography are not interested in influencing each other, but in sharing experiences with each other.

Hjarvard's analogy comparing the change in modern-day toys casts light on the concept of virtual social geography. Toys today are media-directed. In the past, toys reflected ideas rooted in cultural, moral, or religious traditions. For example, in the old times, a favorite pastime for children was to play with toy swords and shields. Gamers would pretend as though they were warriors and knights. Since the mid-20th century, LEGO toys have grown more and more popular. LEGO toys were once used as building blocks of toy houses, but they also formed the foundation for imaginary worlds of modern online games.

Clearly, there is a big gap between attitudes of old-day gamers and attitudes of modern gamers. The former group took inspiration from characters and heroes of old traditions. Old gamers wanted to be like these heroes, whose attributes were dependent on cultural values, but modern gamers are the new creators of characters in these games. The two-step flow model is representative of following traditional characters in the old day games. Previous generations identified themselves as opinion leaders or non-leaders. They grew up with the concept of living in a polarized world—superiors and inferiors. But modern day gamers do not follow the leader-follower pattern anymore. They are creators of both leader characters and non-leader characters in their games. In Hjarvard's view, modern individuals are attached to a different kind of individualism, which Hjarvard calls "soft individualism." These individuals identify themselves as main characters in media-directed environments, and want to be recognized as such too. They have the attitude that they should write their biographies themselves. Their self-esteem is

high. They consider themselves opinion creators. They think that they should not actually wait until such a time when they are selected as individuals whose life stories are worthy to be written. This old institution of distinguishing between high ranks and low ranks is obsolete in their virtual social geography.

The Internet as the Best Source of Information

A decade before Hjarvard, Case (2004) observed that online users hold a different approach to the question of opinion leadership. Case argued that the public has a tendency to consider the Internet the best source of information. The sample in this study included 900 participants, who were asked what sources they would consult to obtain advice regarding cancer genetics. The choices were: public libraries, medical professionals, and the Internet. The majority responded by saying that they would turn to the Internet for advice. Respondents in this study preferred the Internet to medical professionals. This supports the idea that a new pattern of opinion leadership began to occur at the advent of the Internet. In the web environment, opinion leaders no longer consist of individuals who have high knowledge, prestige, and social statuses. Turning to Hjarvard's concept regarding toys before the Internet, gamers' creative powers were of little help in playing games. Old gamers only needed to follow rules set by the tradition. Similar rules existed in the society. Individuals rarely attempted to solve problems themselves. Rather, they consulted opinion leaders, who were familiar with solutions and experienced in the tradition. The Internet overturned such rules.

Characteristics of Opinion Leaders in the Web Environment: Similarities to the Traditional Model

Numerous studies have found that opinion leaders in the web environment are more knowledgeable, more innovative, and more skilled in using computers than non-leaders. Lyons and Henderson (2005) found that opinion leadership is positively related to perceived knowledge of the Internet. Also, opinion leaders in the web environment have exploratory behavior, and they are innovative. Moreover, opinion leaders in the web environment are skillful in using computer technologies. It is also important that such opinion leaders have used the Internet for a long period of time. Lyons and Henderson used a sample including 206 students. In the end, they were able to determine that 74 percent of them were non-leaders, and 26 percent were opinion leaders. Some results of this study are similar to results of traditional studies of opinion leadership. For example, opinion leaders in the web environment are more knowledgeable, more innovative, and more computer savvy than non-leaders. However, the authors noted that nearly one-third of Internet users consist of opinion leaders.

The idea that an Internet opinion leader's characteristics are similar to the characteristics of an opinion leader in traditional studies received support from Schafer and Taddichen's (2015) study. Schafer and Taddichen sought to explore (1) what characteristics distinguish opinion leaders in the web environment and (2) whether an Internet opinion leader's characteristics are similar to the characteristics of an opinion leader in the two-step flow model. Schafer and Taddichen identified four clusters of users in the online environment: opinion leaders, followers, inactive users, and mediatized opinion leaders. The random sample included 641 opinion leaders, 248 followers, 561

inactive users, and 112 mediatized opinion leaders. The opinion leaders were only slightly fewer than the non-leaders and inactive users combined. The mediatized opinion leaders included individuals with higher levels of knowledge, and spent much time studying media online. The online opinion leaders had stronger personalities than the followers and inactive users. Schafer and Taddichen found that three-fourths of online users constitute opinion leaders who possess more knowledge about the subject area than non-leaders. The researchers concluded that traditional opinion leadership does not exist in the online environment.

Segev, Villar, and Fiske (2012) arrived at a similar conclusion. The authors used a sample of 552 online participants. The results indicated that 71% of the online participants were bloggers and the rest were only readers. The bloggers spent more time online and had higher levels of education. Also, factors shaping their motivation for blogging included communication for leadership and entertainment. The authors emphasized that bloggers are in fact opinion leaders in the online environment.

In line with these studies is the research conducted by Wang, Jia, and Zhang (2013), referring to the online environment as consisting of online communities that pass through a process of "evolution." This study used a method based on counting the number of Internet users: those who join and those who leave a specific blog during a specific period of time. The authors found that only a small number of the communities remained "stable." Most of the communities disappeared after a short period. The difference between the two types of the communities was that while the stable communities were extremely large, the communities that disappeared were extremely small, including 2-3 members. The authors concluded that the large communities

consisted of opinion leaders. This study adds support to the concept that online communities include many more opinion leaders than non-leaders. In the two-step flow model, opinion leaders are portrayed as leading many followers. However, in online communities, followers do not often exist or are extremely small in number. According to the authors, users who disappeared from the blogs were casual visitors of the blogs. Thus, to distinguish between opinion leaders and non-leaders, focus must be placed on the large online communities. In fact, the results of the study indicate that the overwhelming majority of members in a large online community are opinion leaders.

Characteristics of Opinion Leaders in the Web Environment: Opinion Leaders vs. Opinion Seekers

According to researchers, opinion leaders exist in the online environment, and have been identified as more knowledgeable and innovative than non-leaders. Leadership in its traditional sense implies that leaders are far fewer than the followers. This contradiction that questions how opinion leadership occurs in the web environment is addressed in this section.

With communication technologies becoming more advanced, online opinion leaders are becoming less distinguishable from non-leaders. According to Gurr (2004), leading an online environment is different from leading a traditional environment. Online leaders need to have high levels of interpersonal skills. Online leadership is more dispersed than traditional leadership, and many online users are interested in being involved in online opinion leadership. Online users spend much time focusing on the information posted on the Internet regarding their subjects of interest. This poses a great challenge to individuals who wish to influence online users.

Referencing Sessa and Malloy, Gurr mentioned five important aspects of e-leadership: first, e-leaders can make decisions quite fast because of email, which allows for fast communication between users. Second, email provides individuals with a great deal of autonomy. E-leaders cannot influence online users unless they can give them a sense of community. Third, in online communities, influence flows from lower levels to higher levels. Fourth, there is much detailed information transferred in online environments. Fifth, much change occurs in online environments every moment.

Gurr's (2004) study focused on e-leadership, rather than on opinion leadership. According to Gurr (2004), traditional models of opinion leadership are based on a hierarchical structure. Influence flows from opinion leaders to their followers. Opinion leaders are knowledgeable about their subject of interest. They can understand their subject of interest as a whole. As well, they are familiar with the ways in which the details are related to each other. Moreover, opinion leaders in the traditional environment set goals or give these goals direction. On the other hand, in the online environment, there is no such hierarchical structure. Online users can each be a source of influence. Only, there are individuals among these users who can produce solutions to challenges. These individuals are opinion leaders in the online environment. More clearly, in the online environment, in a specific subject area, an online opinion leader is a user who has the ability to give other users a sense of community, give direction to goals, form detailed information into a comprehensive whole, and use elaborate language in email.

In Acar and Polonsky's (2007) study on marketing communication, the researchers identified half of their sample consisted of online opinion leaders. The researchers sought to explore two questions: (1) in the online environment, what is an

opinion leader like and (2) what is an opinion seeker like? The results indicated that both opinion leaders and opinion seekers had extrovert personalities. However, opinion seekers spent more time online than opinion leaders. Female participants were more responsive to online communication than male participants. Opinion leaders shared more brand information than opinion seekers. The authors emphasized that extroversion characterizes both opinion leaders and opinion seekers in the online environment. Individuals who have extrovert personalities are potential opinion leaders. The difference between an online opinion leader and online opinion seeker is that the former shares more information than the latter.

Clearly, there is not a hierarchical structure in Acar and Polonsky's model. Nor can it occur that influence easily flows from one user to other users. In the online model of opinion leadership, it is difficult for an opinion leader to influence opinion seekers. The number of online opinion leaders is large. As well, online opinion seekers can search the information posted by online opinion leaders fast. Opinion seekers can choose from among pieces of information those that suit their needs. In the online environment, traditional opinion leadership is either non-existent or minimal.

Tsang and Zhou (2005) reported similar conclusions. Analyzing online posts and messages, the authors suggested that in the online environment, opinion leaders and opinion seekers exchange opinions, rather than one group influencing the other. The authors emphasized that the two-step flow model is not applicable to opinion leaders in the online environment. To enhance sales, the authors suggest asking online opinion leaders to introduce products. However, more importantly, opinion seekers alone can obtain access to opinions. Opinion seekers are active participants in obtaining

information. In the online environment, the role that opinion leaders of traditional studies can play is insignificant in a majority of cases.

Tsang and Zhou's concluded that online opinion leader is a user who posts useful information on the Internet. However, this user may or may not be able to influence opinion seekers. This is because through using search capabilities of the Internet, opinion seekers can choose what blogs they want to read. In the online environment, opinion leaders are bloggers whose opinions are rated as useful. The authors suggested that bloggers are helpful in popularizing products.

Helm, Moller, Mauroner, and Conrad (2013) arrived at similar conclusions regarding opinion leaders in the online environment. This study uses a large sample, including 16,900 respondents. Questions are asked of respondents regarding their backgrounds, levels of familiarity with technology, and characteristic traits. The authors proposed that online opinion leaders should not be compared with opinion leaders in the traditional model. Online opinion leaders are often little-known individuals, but they are active participants in providing information. This concept adds support to the idea that online opinion leadership is less dependent on online opinion leaders than on opinion seekers. Online opinion leaders are often little-known bloggers who have introverted personalities. As such, these online opinion leaders spend a great deal of time online. On the other hand, online seekers are mostly interested in searching information, rather than in searching persons providing information.

According to Helm, Moller, Mauroner, and Conrad (2013), opinion seekers focus on blog content rather than blog authors. Thus, opinion leadership in its traditional sense is non-existent in the online environment. Rather, in the online environment, opinion

seekers are always in a position of exchanging opinions with bloggers. Depending on whether bloggers are responsive to opinion seekers' trends, such opinions can grow more attractive or lose their attraction. Bloggers are not opinion leaders in the sense of having dedicated followers. Basically, opinions are in a state of constant change in the online environment. Therefore, there can be no such followers as identified in the traditional model of opinion leadership. Rather, while searching information, opinion seekers might discover bloggers' informative blogs. Opinion seekers in the online environment may be influenced by many sources at once. Informative blogs can help enhance opinion seekers' conversations, but it is unlikely that they can also remain influential for a long period.

The ICN

The history of the ICN can be classified into two eras, before and after the introduction of user-generated interactive sites like Web 2.0. The idea of creating such sites was frequently discussed during the period from 2002 to 2004, but it took some time before users were able to generate Internet content. Earlier, users were only able to receive Internet content. By 2006, the Internet offered features similar to those offered now. In a similar way, studies concerned with the ICN can be categorized into two groups: studies conducted before and studies conducted after the introduction of Web 2.0. This classification is helpful because conditions of the ICN have changed over the past decade. There are now two innovations: the ICN prior to Web 2.0 and the ICN after Web 2.0. Opinion leaders promoting the first-generation the ICN were similar to opinion leaders in the two-step flow model. They had dominant personalities. Their knowledge regarding the ICN was higher than that of their followers. But opinion leaders during the

diffusion of the second-generation ICN are Internet opinion leaders, indistinguishable from Internet opinion seekers.

Studies Prior to the Introduction of the User-Generated Content

Before Web 2.0, studies concerned with the ICN are mostly focused on two topics: (1) the background of the ICN and (2) whether the ICN was effective. Regarding the background of the ICN, information comes from Simonson's (1997) overview of Teacher Education Alliance. According to Simonson, the ICN started out as a statewide two-way audio-video network with 2800 miles of fiber optic cable and 99 sites. Each of Iowa's 99 counties was provided with an ICN site.

Caristi (1998) emphasized that the ICN was created solely to promote education. When the ICN was established, telecommunication companies considered extending networks to rural parts of Iowa. However, financial risks prevented the ICN extension to rural areas. A financially ambitious and innovative project, the goal of the ICN developers was to advance education for disadvantaged students. There were 430 ICN sites by 1998. During 1996, more than 106,000 hours of video were broadcast over the network. By 1997, the transmitting rate doubled, providing over 200,000 hours of video. By 1998, ICN sites were established in 430 locations.

Researchers sought to determine the effectiveness of the ICN on distance learning. Rees and Downs (1995) demonstrated the positive impact of the ICN on student motivation and participation in distance education. Results indicated that students enrolled in ICN online classes enjoyed visual and audio interaction with instructors and peers. In addition, rural music educators expressed positive emotions about having access to greater levels of music knowledge and expertise.

The Iowa Distance Education Alliance (IDEA) questioned the effectiveness of the ICN on distance learning. Simonson (1997) expressed doubt that mere simulation of face-to-face classes was is effective. IDEA suggested that focus must be placed on ways in which the ICN can be utilized the best. Authors who contributed to IDEA researchers analyzed ICN user motivation and attitude, as well as teacher qualifications. Able's (1997) research supported ICN user satisfaction in a study analyzing qualitative data from 64 high school principals. Participants indicated a high degree of network knowledge and satisfaction with the innovative structure of the ICN.

IDEA researchers questioned ICN teacher qualifications. Abou-Dagga and Herring (1997) explored factors contributing to teachers implementing ICN. In the study involving 280 teachers, the researchers concluded that teachers' professional development is a crucial factor in teacher motivation to implement distance education technology. The results indicated that teachers who completed in-service training in distance education showed more interest in the ICN. Among the participants, there were also teachers who attended in-service trainings about distance education because of personal reasons. These teachers showed more interest in using the ICN than the other participants. The authors concluded that teachers' knowledge about distance education determines their willingness to use distance education technology.

Fagan's (1997) study analyzed the concerns of 75 mathematics teachers following ICN teacher training. Fagan's model, the Concerns-Based Adoption Model, analyzed teacher concerns regarding the adoption of innovations. Results indicated 50% of participants expressed negative concerns about implementing the ICN innovation. Fagan

concluded the 50% of participants were pressured to adopt the ICN, and participants expressing negative concerns did not possess adequate knowledge about the ICN.

The traditional face-to-face model is considered the standard type of education. Distance education is a subtype of face-to-face education. The validity of this subtype is dependent on how closely it can resemble face-to-face education. This notion triggered studies regarding whether the ICN was effective in terms of enabling distant learners to achieve goals assigned to face-to-face education. Johnson, Lohman, Sharp, and Krenz (2000) examined the practicality of offering continued dental education courses through ICN. Eighty-eight percent of the 68 ICN students competing dental education courses at University of Iowa College of Dentistry indicated satisfaction.

Contrary to Johnson et al.'s (2000) results, Miller and Miller (2000) found that agricultural teachers did not have positive attitudes toward ICN use. The researchers primarily sought to discover what discouraged the 216 secondary agricultural teachers in the study from using the ICN and what curricular areas in agricultural programs the participant thought should be taught over the ICN. The participants were asked to respond to how highly significant they thought the obstacles (mentioned in the questionnaire) to using the ICN were. The mean score for the answers was 4.47, indicating that the majority of the participants held the attitude that the obstacles were somewhat significant. Interestingly, according to the author, this finding did not change much from 1994 to 1997.

Miller and Kessell's (2002) study examined learners' perceived usefulness of the ICN. Participants included agricultural student teachers, cooperating teachers and university supervisors exposed to on-site supervision and supervision facilitated through

ICN. The participants were allowed to make direct inquiries to the instructors through the ICN. As such, the participants were able to follow more effectively the instructional design created to be used exclusively in distance education. Results indicated positive student attitudes toward ICN use. Particularly, participants who had previous experience with the ICN expressed confidence that the network was useful as a means of distance education. Most participants revealed that because the ICN was a two-way audio and video system, they felt no transactional distance difficulty during the course of study.

Studies After the Introduction of Web 2.0

Studies concerned with the ICN are almost non-existent after the introduction of Web 2.0. Over the past decade, the ICN has evolved from an optical fiber into a web-based technology of distance education. The former ICN has become a chapter of the history of distance education. The new ICN is a part of World Wide Web.

The first-generation ICN was a local communication innovation. ICN network was exclusive to the counties of Iowa. Educational organizations were required to adopt the ICN network. Theoretically, ICN distant students were given access to features similar to a live class, with the ability to receive a high quality education.

Use of the ICN for learning triggered two interrelated types of studies: (1) studies focused on student and teacher perceptions of the ICN and (2) studies focused on designing lessons suitable for distance education. Designing lessons suitable for distance education is now related to using email and e-learning. Representative studies of student and teacher perceptions of the ICN were discussed. Regarding the design of lessons suitable for distance education, most studies are concerned with instructional design and distance education through the Web, rather than with the ICN as a technology of distance

education. An early example of the second type of studies is Mary Herring's (1997) study, focused on discovering principles for creating constructivist-based distance education environments. The interactive technology considered in this study is email.

Summary of the Chapter

The ICN is an innovation in distance learning. Prominent theories of the diffusion of innovation primarily emerged in the early 20th century, including Tarde's (1903) theory of imitation that regards the diffusion of innovation as resulting from an intrinsic inclination in individuals to imitate their superior friends. Later theories, including Rogers' theory, sought to explore conditions under which the diffusion of an innovation occurs. From the time when the Internet was introduced, theories of the diffusion of innovation have evolved from being based on opinion leaders to being based on bloggers and opinion seekers. The ICN includes two generations of distance education technology. Opinion leaders including instructors, administrators, and officials made a decision to adopt the first-generation ICN, the optical fiber ICN. However, bloggers and opinion seekers play a major role in encouraging students to adopt web-based innovations including the second-generation ICN.

Research Questions

The following questions will be addressed in the study:

1. What are the key opinions that have influenced individuals' decision to adopt the ICN?

2. Regarding the use of the ICN, what are the differences between views of the current generation of leaders and those of a decade ago?

3. What positions do opinion leaders have regarding the future use of the ICN?

Chapter 3: Methodology

Post-positivism maintains that knowledge is obtained not only through "correct techniques of collecting information," but also through interpreting actions, relations, and experiences. Post-positivism is not the opposite of positivism. Nor is it correct to say that post-positivism is a less accurate approach than positivism. Schratz and Walker (2005) argued that each of these approaches is only a worldview by which a researcher judges research findings. Post-positivism is suitable to contexts involving social science research and analysis. Positivism is appropriate for studies involving natural sciences. This study uses post-positivist paradigm, the epistemology of qualitative research.

The Purpose of the Study

The aim of this study was to explore the role of opinion in the diffusion of the ICN. The diffusion of the ICN occurred over a period of two and half decades. There were several generations of leaders involved in the diffusion of the ICN. This study sought to describe the diffusion of the ICN not only through the eyes of the current generation, but also through the eyes of the past generations.

Design

A grounded theory design was used to address the research questions. In social sciences, increasing awareness of ways of thinking about experiences increases knowledge (Ryan, 2006). The grounded theory design suits this study, which is focused on opinion leadership over a long period, more than two and half decades. A central theme in this study is the idea that an opinion leader can influence the diffusion of an innovation. Statements given in support of the theme include (1) clients learn from opinion leaders to think about an innovation in certain ways and (2) opinion leaders'

views regarding an innovation are predictive of how it will progress in the future. A qualitative approach will be used to validate these statements.

Rationale for Grounded Theory Study

Charmaz (2007) noted that grounded theory research involves inductive reasoning. That is, the researcher draws conclusions based on collecting and interpreting evidence. While a quantitative study uses findings to show the generalizability of a theory, a grounded theory study uses findings to build a theoretical perspective that is generalizable (Lawrence et al., 2015). Creswell (2002) defined grounded theory as a qualitative procedure used to explain events, actions, and interactions that occur over time. The grounded theory approach involves comparative analysis (Lawrence et al., 2015). Focus in a grounded theory study is on exploring similarities and differences in the phenomenon of interest. More clearly, the pattern by which a process occurs is discovered through comparing changes within the process or through comparing them with changes in other processes.

This study was focused on analyzing the diffusion of the ICN, a process that has taken place over a period of time, beginning with the early 1990s. The diffusion of the ICN was not dependent on its ability as a tool, but rather on how useful it seemed. This involved drawing comparisons between opinions. The grounded theory approach in this study reflects changes that occurred in the opinion leadership in the diffusion of the ICN since the beginning. By applying the grounded theory approach, an attempt was made to draw conclusions regarding the way in which distance education (rather the ICN) will progress in the future.

Thus, in addition to in-depth interviews, the researcher examined three additional data sources: (1) Sorensen and Sweeney's (1994) and Sorensen and Maushak's (1996) reports, (2) the ICN's annual reports and surveys, and (3) blogs regarding technologies and methods to enhance distance education. In 1993, the Iowa Distance Education Alliance (IDEA) was funded to conduct research regarding the effectiveness of the ICN. The results were included in Sorensen's reports. The annual reports are dated from 2005 to 2015. Blogs used in this study are found in sites including The Rapid e-learning Blog, Assistive Technology, Derek's Blog, and Learnlets.

Participants

Creswell's views on qualitative research and concept sampling provide the basis for selecting participants for this study. The sampling method selected for this study was purposeful sampling because of the availability of a group of individuals who can provide reliable information regarding the subject. Purposeful sampling was used because the researcher wanted to gain an in-depth understanding about the diffusion of the ICN (Creswell & Plano-Clark, 2011). The participants were identified as opinion leaders, individuals capable of influencing others' attitudes (Rogers, 2003). The 12 participants included educational leaders, teachers, and administrators. Additional criteria for participants' selection included knowledge about the ICN and about distance education. Interviews were conducted through social media and through phone.

Research Tools

Two sets of research tools were developed. For extracting and measuring data regarding opinion leadership in the diffusion of the ICN, the researcher will use (1) the informant method, (2) the self-designating method, and (3) a method that allows for

identifying opinion leaders in the web environment. A combination of methods including Rogers' method and Moore and Benbast's method were used for extracting and measuring data regarding its diffusion. The diffusion of the ICN occurred over two phases. The first diffusion took place between 1993 and 2004. The second diffusion occurred from 2005 to 2015. The year 2004 is the date when user-generated content sites like Web 2.0 were introduced into the online environment (Combinator, 2005).

Measure of Opinion Leadership (Individuals)

The theoretical grounds for this measure are (1) Rogers' theory and (2) views presented by Heider (1946), Granovertter (1973), and Weimann (1991). Opinion leaders were identified using questions representative of the sociometric method, key informant method, and self-designating method, respectively (Rogers, 2003). Questions include: (1) who is the leader? (2) Who are the leaders in distance education? (3) Are you a leader in distance education? According to Rogers (2003), opinion leaders are dispersed across the society. They are found in small groups, families, and among peers.

Rogers' view of opinion leadership is similar to Granovertter's concept that opinion leaders exist in every clique, which is connected to the rest of the society through "bridges" or "weak ties." In line with this theoretical perspective is Weimann's (1991) idea that in a dyad, triad, or clique, influence results from personality traits. Moreover, the Strength of Personality Scale includes questions regarding an individuals' perceived social status is based on this theoretical perspective. A major question in this scale is whether the respondent likes to lead or assume responsibility. According to Weimann, individuals holding positions such as teachers, administrators, and officials score high on the Strength of Personality Scale.

The measure of opinion leadership consists of simple questions (Table 1): The first question is based on the concept that in a subject area, a leader is more knowledgeable than the non-leaders. The second and third questions are dependent on the idea that individuals holding official positions are opinion leaders. The fourth question is used to verify whether a respondent considers himself or herself an educational leader.

Table 1

Identifying Opinion Leaders in the Diffusion of the ICN Before 2004

Item	Yes/No
1. The respondent has a good deal of knowledge about the ICN.	
2. The respondent holds an official position in Iowa.	
3. The respondent holds a teaching position in Iowa.	
4. The respondent makes decisions about educational programs.	

Note. Answering "yes" to 1 and to any of the other questions shows that the respondent is an opinion leader.

Measure of Opinion Leadership (Blog)

Opinion leaders after 2004 can be classified into two groups: The first group consists of individuals holding teaching or official positions. The second group includes individuals who write blogs about distance education. The opinion leadership measure that is based on Rogers and Granovertter's views can be used to measure opinion leadership among teachers and administrators. Researchers have found that online opinion leaders are also opinion seekers (Hjarvard, 2013; Case et al., 2004; Bennett & Manheim, 2006; Segev, Villar, & Fiske, 2012; Gurr, 2004; Acar and & Polansky, 2007). In the online environment, an opinion seeker tends to take influence from blogs, rather than from bloggers. Emphasis is placed on the information, rather than on its provider. This new pattern of influence is the basis on which the second measure is made. Two questions are asked (Table 2).

Table 2

Identifying Popular Blogs

Item	Yes/No
1. The blog is focused on distance education through the Web.	
2. The blog is popular.	

Note. Answering "yes" to both shows opinion leadership.

Tools of Measuring Diffusion

Three research tools measure the diffusion of the ICN: The purpose of the first data-collection tool (Table 3) was to extract and measure data regarding the diffusion of the ICN before 2004. The second measurement tool (Table 4) consisted of a set of interview questions. The third measure (Table 5) examined individuals' perceptions of

distance education through the collection of Blog postings. According to Rogers (2003), the key component to measuring the diffusion of an innovation is the concept of popularity.

The theoretical framework of these research tools is based on Rogers' concept of the five characteristics—relative advantage, compatibility, complexity, observability, and trialability. Davis (1986) proposed two additional factors: perceived usefulness and perceived ease of use. Davis' concept of perceived usefulness is similar to Rogers' idea of relative advantage. Also, Davis' concept of ease of use is similar to Rogers' concept of complexity how difficult an adopter thinks it is to learn to use an innovation.

Moore and Benbast (2013) added "voluntariness of use" as a measure of the popularity of an innovation. The authors defined the term as the degree to which the adoption of an innovation is perceived as voluntary. When adopters are led to adopt an innovation, their adoption is not voluntary. Further, Moore and Benbast argued that observability and trialability are similar constructs. The authors pointed out that no reliable scale is available to measure observability or trialability.

The research tools for the diffusion of the ICN have adopted the first three characteristics—relative advantage, compatibility, and complexity. In addition, Moore and Benbast's concept of exposure, representing observability and trialability was used. Moreover, the tools use Moore and Benbast's concept of voluntariness of use.

Table 3

Instrument of the Diffusion of the ICN Before 2004

Item
1. What benefits does the respondent think can be derived from the ICN?
2. What does the respondent think can be done to improve a distant class?
3. What does the respondent think about using the ICN?
4. What does the respondent think about the future of the ICN?
5. How does the respondent feel about learning over the ICN?

Note. Comments comprise data.

Table 4 contains 5 interview questions. Responses given by opinion leaders to these questions can help determine key opinions that contributed to the diffusion of the ICN. Table 5 contains questions to be asked regarding ways in which blogs evaluate distance learning. Data obtained through this instrument can help understand perceptions of generations that grew up with the Internet regarding distance learning.

Table 4

Interview Questions

Item
1. What do you think about the role of the ICN in distance education?
2. What do you think encourage people to study in distance education? What discourage them from studying in distance education?
3. What do you think about using distance-education technologies including the ICN?
4. What do you think about the future of the ICN?
5. How do you feel about studying in distance education vs. studying in face-to-face education?

Note. Responses from the participants comprise data.

Table 5

Instrument of the Diffusion of Distance-education Technologies (Blogs)

Item
1. What changes do bloggers think e-learning can bring about in education?
2. What do they think about the compatibility of e-learning with current trends in promoting education?
3. What do bloggers think about using advanced educational technologies?
4. What do bloggers think about the future of distance education?
5. How do bloggers feel about studying is distance education vs. face-to-face education?

Note. Comments from the blogs comprise data.

Procedure

This study was carried out in several stages. First, using human subjects, this study will seek to obtain IRB approval. Next, the measure of opinion leadership (Table 1) was used to find participants who qualify as opinion leaders in the 1994 and 1996 IDEA reports. Several documents were selected from the 1994 and from the 1996 report. Answers were sought to the questions in the diffusion measure (Table 3). In the third stage, the measure of opinion leadership (Table 1) was used to find participants. The option of requesting informants to help find participants was utilized. The sample was proposed to include about 15 educational leaders. The researcher emailed to possible participants, inviting them to interview. But the researcher received only 12 favorable replies. Interviews were conducted thereafter. The diffusion instrument (Table 4) was used to collect data. Moreover, the measure of online opinion leadership (Table 2) was used to identify popular blogs regarding e-learning. The research tool (Table 5) was used to collect data regarding the diffusion of distance-education technologies including the ICN.

Broadly, after obtaining an IRB approval, the procedure involved two types of activities: (1) identifying opinion leaders during the period 1990 to present and (2) determining how they have perceived the ICN as an innovation and technology of distance learning. The measures of opinion leadership were used to identify opinion leaders. The research was at this point focused on documents prepared by the IDEA during the period 1992-1996. These documents include teachers and students' opinions about the use of the ICN. Opinion leaders also include educational leaders, administrators, and bloggers. The participants in this study were educational leaders and

experts familiar with the ICN. The researcher sought to determine what opinions they held of the ICN as a technology of distance learning. The goal of these two types of activities was to obtain information necessary to answer the three research questions, including the key opinions question, the comparison question, and the question about the future of the ICN. Generally, reviewing opinions regarding the ICN, based on how frequently each opinion occurs, it is possible to determine how important it is. Also, by comparing opinions presented over a period of time, it can be verified whether they follow a pattern, which can further be used to make predictions about the future of distance learning.

Analysis Method

Data analysis was based on the idea that pieces of information can be constructed into bodies of knowledge through analysis. This is a process that occurs in a qualitative study. Walker and Myrick (2006) noted that the need for creating a coding process governs the way in which data analysis is performed. Comparisons among ideas revealed from documents or interviews were drawn. Similar pieces of information were put in categories. Themes were derived from the interrelations among these categories. The end result of this process was a theory or hypothesis.

More clearly, the descriptive data analysis method was followed in the study. As the name implies, descriptive analysis is used to describe the data obtained. In this study, cases are selected, and the results will be interpreted. Opinions presented regarding the use of the ICN were compared with each other, coded, and put in appropriate categories. This study was a study of the evolution of the ICN as a distance-learning tool. The number of cases to be studied was small. However, a holistic perspective was used to

interpret changes occuring in clients' perceptions regarding the use of the ICN. In this study, three types of information were analyzed, including (1) verbal information, (2) information from classifications, and (3) information resulting from measurements. Specifically, five predetermined categories, representing codes, were used, including the five characteristics or degrees introduced by Rogers (2003). The participants' reflections along with the data extracted from the documents and blogs were put into the categories. The results in each category were examined to discover how they had changed over time. New categories were created, each of which contained pieces of information belonging to the same period of time. The categories were examined to determine whether they would represent a pattern of diffusion applicable to the ICN and to distance education.

The five predetermined categories were also used to process data revealed from the documents. During the period from 1992 to 1996, the IDEA conducted surveys to determine how effective the ICN was. Participants in these surveys included students and teachers. By applying the appropriate measure of opinion leadership, the researcher sought to identify opinion leaders from among these students and teachers. Further, the researcher put these opinion leaders' opinions into the five categories. A similar procedure was used to analyze data from other documents. These categories, including data from different time periods, were compared and contrasted. The purpose was to discover how opinions have changed regarding the use of the ICN over the past two and half decades.

Ethical Considerations

This study used a grounded theory design and involved adult participants. It might thus seem at first that observing ethical considerations is not widely applicable to this

study. Particularly, as Creswell (2002) stated, in the grounded study literature, there is not much discussion regarding ethical considerations. However, this study involved recording interviews. The researcher sought to obtain permission from every participant before recording. The participants in this study were expected to discuss both positive and negative experiences. Care will of course be taken to keep their information confidential and report their views meticulously and without using any indicator. Furthermore, because the study used theories from the literature to analyze data, the researcher made every effort to ensure that analyses offered by these theories are properly acknowledged in the study, being clearly distinguished from analyses presented by the researcher.

Trustworthiness

Qualitative research is defined as inquiry based on interpretation of feelings, assumptions, and experiences (Strauss & Corbin, 1990). Creswell and Miller (2000) mentioned three paradigms by which validity in qualitative research is established: post-positivism, constructivist approach, and critical approach. The post-positivist approach places emphasis on interpretation as a valid way of increasing knowledge. The constructivist perspective considers knowledge as personal construction. The critical approach refers to validity in research as a concept dependent on the researcher's time in history. Validity is established through social norms and interactional processes, which vary from era to era and from region to region. On the other hand, the term validity does not adequately describe the sense of relativity that these epistemological perspectives attribute to social sciences (Smith & McKeever, 2015). The preferred terms are "trustworthiness" and "dependability." According to Creswell and Miller (2000), these

perspectives often lead a researcher to fall into a trap of self-confirming. That is, the researcher is focused on finding evidence to justify assumptions and hypotheses of the study. The authors suggested a few strategies to avoid such an error of methodology, including triangulation, prolonged observations in the field, and using rich descriptions. Triangulation refers to using several sources of data. Using rich descriptions refers to using detailed descriptions of events and situations. This allows the reader to appreciate the experiences discussed in a study more fully. The present study used the triangulation strategy. A study about the history of a distance education technology, this study is not for the most part dependent on observational data, but using rich descriptions is considered in this study.

Potential Research Bias

This study used meta-analysis to synthesize data from the IDEA reports. The evaluations provided by the IDEA researchers could lead to a potential research bias because the participants did not necessarily voluntarily participated in the IDEA surveys. As Simonson (1997) indicated, the ICN was a "top-down" innovation. Educational organizations considered it to be a convenience. There was no better option at the time. According to Moore and Benbast (2013), diffusion occurs fast when individuals voluntarily make a decision to adopt an innovation.

Limitations

The main limitations in performing this study are (1) paucity of research regarding the diffusion of the ICN and (2) the shift of the ICN from an optical fiber to a web-based technology of distance education. The paucity problem can prevent seeing the background clearly. The knowledge of he background is crucial because this study is a

study about an evolution, the evolution of the ICN as a distance-learning technology. The shift of the ICN from optical fiber into web-based began to occur when Worldwide Web was introduced in the 1990s. The two-way audio/video delivery system of the ICN was rather outmoded by 2000. Particularly, students had to go to ICN rooms to attend classes. This gave more reason to clients to turn to web-based education. In terms of limitations, opinion leaders involved in the optical fiber ICN did not include younger generations. This also made it somewhat complex to provide reliable evaluations regarding the influence of opinion leaders on the diffusion of the ICN in its early phases.

Summary of the Chapter

Opinion leaders are influential individuals who can help measure the diffusion of a technology. The diffusion of the ICN occurred during the period from 1989 to present. Two sets of measures were developed, one for measuring opinion leadership and the other for measuring diffusion. The results were analyzed qualitatively. An attempt was made to find the pattern by which distance education technologies are diffused.

Chapter 4: Findings

The purpose of this study was to explore opinions that contributed to the diffusion of the ICN. Three research questions were developed to attain this goal, including: (1) what are the key opinions that have influenced individuals' decision to adopt the ICN, (2) regarding the use of the ICN, what are the differences between views of the current generation of leaders and those of a decade ago, and (3) what positions do opinion leaders have regarding the future use of the ICN?

The diffusion of the ICN has occurred over the period from 1989 to present. Therefore, it was sought to find answers to the questions based on (1) examining documents produced during the period 1994-1998, (2) conducting interviews with participants familiar with ICN, and (3) examining blogs discussing distance learning. The results are presented in a similar order: findings based on the documents, based on the interviews, and based on the blogs.

Data From Documents

Here two points must be considered. First, this study examined documents from Iowa Distance Education Alliance Final Evaluation Reports, including the 1994 report prepared by Sorensen and Sweeney (1994) and the 1996 report prepared by Sorensen, Maushak, and Lozada (1996). These reports contain results regarding opinions that students and teachers developed of the ICN. The purpose was to discover how effective these learning groups thought the ICN was during the period 1992-1996. Second, this study used a measure of opinion leadership to identify opinion leaders in these reports, and another measure to determine how these opinion leaders evaluated the ICN as an innovation and technology of distance learning.

More specifically, the measure of opinion leadership was based on the idea that individuals familiar with the ICN were potential opinion leaders in its diffusion. Based on this theoretical perspective, thus, all teachers, administrators, and officials who used the ICN would qualify as opinion leaders. Such teachers, administrators, and officials were able to influence students and peers. Also, in terms of giving suggestions and expressing positive ideas regarding using the ICN, some students would also qualify as opinion leaders.

The 1994 report includes surveys given to teachers having taught over the ICN. The surveys were conducted during the period 1992-1994. Based on the criteria mentioned, these teachers can well be viewed as opinion leaders. Participants in these surveys were 8 individuals, 5 females and 3 males. They had had no previous experience with respect to teaching in distance education. Their age ranged from 25 to 55 years. Fifty percent of them were aged 46 to 55 years. The measure of the diffusion of innovation was applied to these participants. Their opinions regarding the use of the ICN are presented in Figure 1.

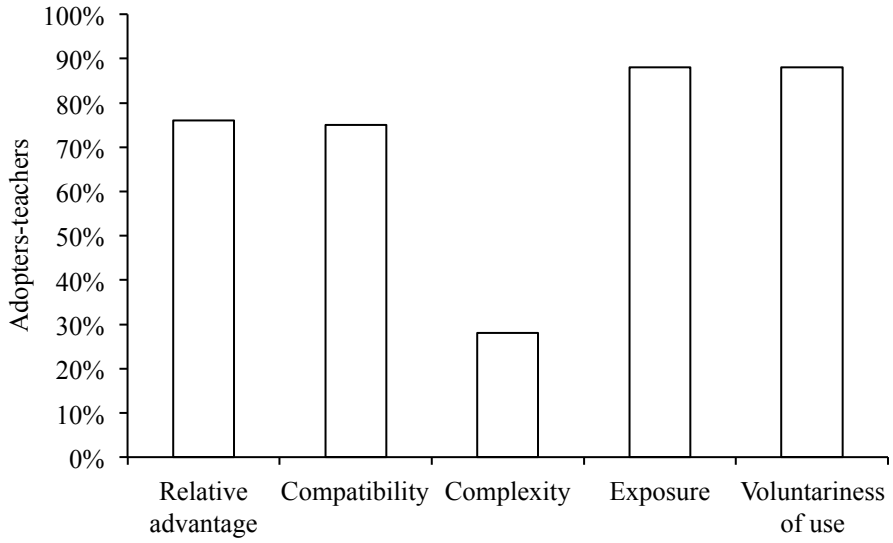

Figure 1. The diffusion of the ICN based on Sorensen and Sweeney's surveys of teachers (1992-1994).

Selecting opinion leaders from among students is somewhat complicated. While all teachers are potential opinion leaders, only students who are popular among their peers can be considered opinion leaders. The 1994 report includes 177 students, being surveyed on what they thought about the ICN. Ninety-three percent of these students were Caucasian, and 73% were located at remote sites. In terms of satisfaction, 75% of these participants said that they would recommend their friends to take an interactive television class, indicating that most of the participants were potential opinion leaders. The opinions of these opinion leaders are presented in Figure 2.

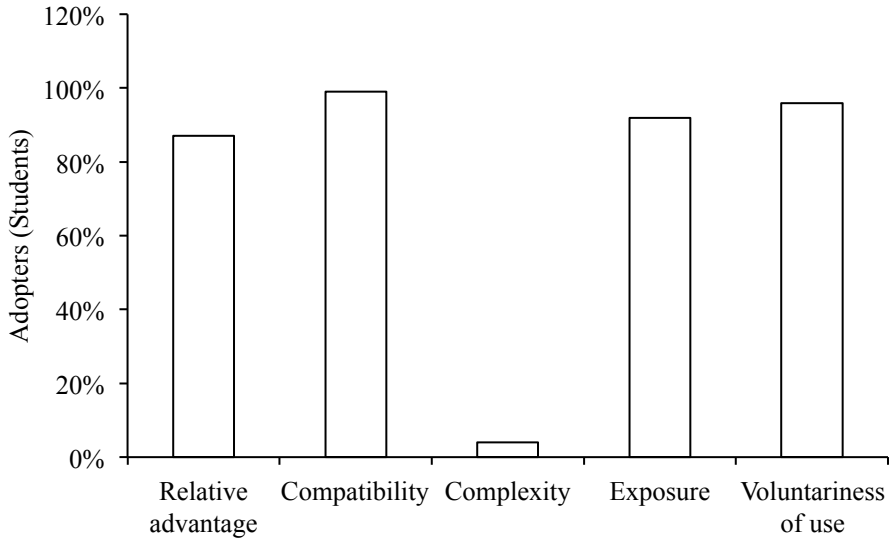

Figure 2. The diffusion of the ICN based on Sorensen and Sweeney's surveys of students (1992-1994).

The 1994 report also includes surveys given to 1385 Iowans, requesting information from them regarding what they thought about the ICN. Nearly all of these surveys were returned. Forty percent of the respondents (547 individuals) revealed that they were familiar with distance education. Their levels of familiarity ranged from some to full familiarity with distance education. As such, these respondents can also be considered opinion leaders; particularly 84% of them were highly educated. Basically, the measure of opinion leadership is applicable to individuals having some familiarity with distance education and the ICN. Figure 3 shows how these opinion leaders evaluated the ICN.

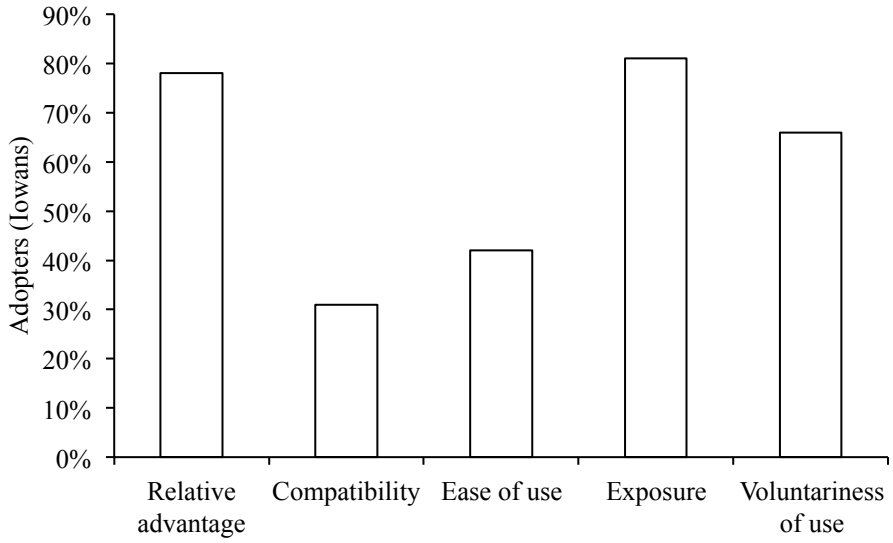

Figure 3. The diffusion of the ICN based on Sorensen and Sweeney's surveys of Iowans (1992-1994).

The second set of the documents includes Sorensen, Maushak, and Lozada's (1996) reports. During the period 1995-1996, as mentioned in theses report, the need increased to develop instructional materials suitable for use over the ICN. The reason for such increase was mainly the growth of computer and Internet technologies. Distant users were thus able to communicate with each other more effectively through the Internet. According to the report, the IDEA called for proposals addressing technologies that could be used to enhance distance education over the ICN. Two hundred seventy-eight examples of technologies were identified. Nineteen of these were recommended as exemplary applications. All of them involved the use of the Internet, multimedia, and computer software.

Also, as indicated by the report, during the period 1995-1996, 151 additional ICN sites became operational. These sites were connected to the Internet, and it was scheduled to connect 120 more sites during the next year. Meanwhile, 72 from among 382 school districts were connected to the Internet, and 85 were scheduled for connection in the next

year. The total hours of use of the ICN increased more three times, from 16000 hours in 1993 to 56000 hours in 1996. The number of courses offered over the ICN increased from 67 in 1993 to 166 in 1996.

Obviously, in terms of technology, by using the Internet, the ICN grew more sophisticated. It can be said that this more sophisticated ICN was a rather new innovation. But the goal of the ICN as a videoconferencing tool hardly changed, that is, the ICN continued helping learners at a distance learn through live audio/video classes. In the spring of 1996, based on Sorensen, Maushak, and Lozada's (1996), instructors participating in a course offered over the ICN about using the Internet in schools provided evaluations of the course. These evaluators' opinions are presented in Figure 4.

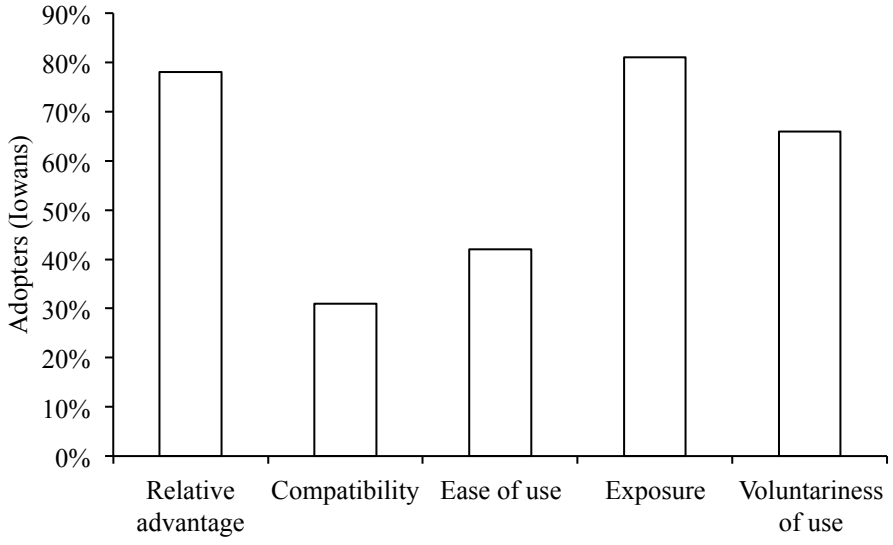

Figure 4. The diffusion of the ICN based on Sorensen, Maushak, and Lozada's surveys in the period 1994-1996 (instructors' evaluation of the ICN using Internet technologies).

Data From the Interviews

The initial plan in this phase of the study was to recruit 15 participants. Experts, educational leaders, and instructors familiar with the ICN would qualify as particularly helpful. Thus, the researcher obtained possible participants' email addresses, being publicly available, and sent them invitation letters. The recipients of the invitation letters eventually totaled 51. Fourteen of these recipients replied, expressing interest in the study. Twelve recipients clarified that they were willing to participate through Zoom or telephone. Two recipients said that there were more qualified people in their offices, and recommended the researcher to contact them. The researcher followed their recommendations. In the end, after ensuring that all options for recruiting participants were exhausted and there was no chance of receiving more favorable replies, the researcher used the views and insights of 12 knowledgeable participants to provide discussions and draw conclusions. A few of the participants indicated that the researcher could quote from them directly if their names are not used in the study. The rest chose the option that the researcher could use their names.

G (Director and Instructor)

G has been in his job 10 years (Appendix A). His office is responsible for ICN scheduling in… Iowa. Before this period, he was using the ICN in a different college. He taught a music class over the ICN during the 1990s. He has worked as an administrator of the ICN since 10 years ago. In response to how useful he thought the ICN was during the 1990s, he said that it was extremely useful because learners in the rural parts were able to obtain high-quality education. He described the ICN as "enormously" useful. In response to whether the mandatory nature of the ICN ("top-down" concept) made it seem less

useful, he said that it was subsidized, helping distant learners obtain high-quality education without travelling. Again, he emphasized that the fiber optic ICN was extremely useful in the 1990s. He agreed that the ICN played a crucial role in promoting distance education; in his words, “The ICN does not get the credit it deserves for being forward thinking.”

In response to what encouraged learners to adopt the ICN, G said, “It provided people with access to coursework.” “There were people who did not even have a car. They lived in a little town. They could walk to the ICN center.” Green also emphasized that the ICN was more reliable than the Internet, and it is still more reliable. It has help desk support for every class it broadcasts. He said that the discouraging factor was to get papers back and forth.

G said that it was challenging to use the ICN. It was a new experience. The instructor’s job was to produce videos, “little talk shows.” In response to how learners thought about the ease of use of the ICN, Greene said that it was somehow challenging for them to use it because they had to actively participate in class discussions. It was not only about pushing a button or learning how to turn on or turn off the technology. He insisted that the ICN was valuable and is valuable and will remain so in the future. Despite the rapid growth of communication technologies, students would still need to attend ICN centers, particularly those living in the rural areas. This is because the ICN provides support for distant learners, including technical support and academic advising. Students can also consult with advisors at an ICN center regarding their life issues.

G said that he is positive about the future of distance education. There is now much increase in the number of students registering for online classes. As well, we are

able to show to the public, state, and Department of Education that online students are actively engaged in the process of learning. Face-to-face education has been driven back relatively largely. This decrease in using face-to-face education might continue in the future too, particularly face-to-face education at college level. However, he added, it is difficult to imagine that face-to-face education will ever get eliminated. Now we have hybrid classes. Students learn simultaneously from face-to-face classes, ICN classes, and the Internet.

W (Superintendent)

Superintendent W (Appendix B) became an administrator in 1995, and he was engaged in building the ICN room of a high school in 1997. He was the principal of the high school then. He is currently a superintendent in two districts. Schools and educational institutions are, he indicated, using the ICN pretty much the same now as they did in the 1990s. In response to how useful the ICN was in the 1990s, he said that it was highly useful for students in the rural parts of Iowa. Before the ICN, such students had no option but to travel to a college campus to obtain college education. The ICN provided appropriate college education at centers near their homes.

Reflecting on how advantageous the ICN seemed to students, he said that they were excited about the new technology, but it was not unusual to see students taking ICN classes only for credit. Such students were often found to get away from camera's shot or not to be on task somehow. For this reason, teacher associates were sent to ICN rooms. Despite such minor problems, according to W, the ICN played a significant role in expanding distance education in Iowa. He agreed that the fiber optic ICN was the precursor of online learning.

W said that the ICN as an innovation was compatible with educational values of the time. It was viewed as a way of enriching educational programs. One big movement at that time, he added, was to incorporate virtual fieldtrips in a classroom. The ICN seemed to help achieve this goal of learning from virtual fieldtrips more realistically. Nevertheless, many students also felt unhappy that no one was in the room to talk to or interact with. Social connection did not occur. Such negative feelings went away over time of course. Increasing numbers of teachers learned how to teach over the ICN and how to approach electronic learning effectively.

Reflecting on the ease of use of the ICN, he said that looking from the standpoint of instructors, it was easy to use. But administrators would need to make much effort to administrate it or plan for ICN classes. He indicated that in the early phases, students often reported technical problems. Some devices including fax machines were not working properly. This was understandable because communication technologies were then analog. They were not perhaps advanced enough or sophisticated enough. Nowadays, it is easy for both instructors and students to use the ICN.

In response to what he would think about the future of the ICN, W suggested that it would continue growing and would adopt more modern technologies. Thus, technically, the ICN would become much easier to use. Reflecting on what distance learning would be like in the future, he expressed much optimism. Commenting on distance education versus face-to-face education, he said that he was once a student in a distance-learning program and he liked it. He described himself as an independent learner, and added that although large numbers of young learners are in virtual schools

now, he would recommend distance learning more to adult learners than to young learners.

Fratzke (Director and Instructor)

Fratzke (Appendix C) began teaching over the ICN in 1997. In response to how useful the ICN seems to learners and instructors, Fratzke argued that it has lost popularity it once enjoyed. In 1997, Fratzke said, there were 880 points of contact through Iowa, but their number is now about 500. Numerous schools have gone away from using the ICN and turned to adopting videoconferencing via web. However, Fratzke mentioned that the ICN was overall useful. She added that she took a course over the ICN and she liked it. Reflecting on whether the ICN represents the beginning of online learning, Fratzke's response was positive. Also, Fratzke pointed out that the ICN was originally established to help distant students in the rural parts obtain high quality education. It was obviously advantageous to such students. Without the ICN, they would have to travel. Further, Fratzke mentioned that the ICN is advantageous now, being upgraded to some extent. It now uses online technologies.

In response to the question regarding factors that would encourage learners to study over the ICN, Fratzke said that in the early phases, instructors were not familiar with how to use it effectively. Their poor skills as such were responsible for much discouragement. Nevertheless, Fratzke added, there were many grants that were available that were received by the ICN. These grants paid for high school students to take college courses over the ICN. In response to whether there was any resistance to adopting the ICN, Fratzke explained that some administrators were unhappy about students taking

college courses in high school. Reflecting on how fast the ICN became adopted, Fratzkes said that by 2000, the ICN was fully adopted.

In response to whether it was easy to use the ICN, Fratzke said that few ever complained that they were unable to operate it easily. There was also technical support available to learning groups. She added that the ICN was and is easy to use. In response to whether potential learners were exposed to the information regarding the ICN's goals, Fratzke explained that in the 1990s, schools held a lot of power. Because these schools did not consider the ICN a viable option, potential learners were not much exposed to the ICN information either. But after 2000, many parents came to realize that the ICN was an option for their children in terms of taking college courses. Thus, it gained much more popularity, and today its status is one of a regular procedure.

Reflecting on the question of distance education versus face-to-face education, Fratzke suggested that both modes are necessary. Different students have different personalities. Independent learners can benefit from distance education substantially. But other types of learners are more successful in face-to-face classes. In addition, young learners need to have social involvement and social activities to participate in. For such reasons, it might never occur. It is impractical to think of education being delivered only via distance education.

P (Director and Instructor)

P's (Appendix D) familiarity with the ICN dates back to the 1990s. He was then working for a community college then, and their data came through the ICN. But at a later date, he began scheduling for the ICN and using the system to deliver audio-video classes. In response to what he would think about the role the ICN in distance education,

P said that it was important in terms of delivering high-quality education to rural schools in Iowa. It helped connect rural high schools to community colleges and to regional universities. The ICN would still plays an important role in terms of providing data for regional institutions. Without the ICN, it would be financially difficult to deliver online classes to 10,000 students across Iowa.

In response to what would encourage students to study in the ICN and distance education, P said that it was and still is convenient for people to adopt this distance-learning technology. It is used, for example, in the federal court in Des Moines. Many families do not have the means or time to travel to the federal court. Convenience is the reason for adopting the ICN. Reflecting on how easy it was to be used physically in the early periods, he said it was very easy. There was a microphone in front of each student. When the student wanted to talk, he or she only needed to push down a button.

Reflecting on the future of distance education, P indicated that distance education would grow a great deal in the future. It would certainly be hard to replace technical labs or similar courses with online courses, but most lecture-based courses would be offered online. In response to how he would feel about distance education vs. face-to-face education, he said that it depends on the topic. The format is irrelevant. If we want to learn a social activity like dancing, we would have no option but to participate in an actual class and situation. But when we want to learn how to use a tool better, we would benefit adequately from a tutorial video on a social media site.

J (Director and Instructor)

J (Appendix E) became familiar with the ICN in 1993. In response to how he might evaluate the role of the ICN in distance education, he offered a comparison

between options for distance education in the mid-90s and options for distance education now. In those times, he said, distance education was extremely helpful in terms of connecting students who were unable to attend campuses where instruction was offered within real-time settings. It enabled students and faculty to interact on a real-time basis by broadcasting quality audio-video courses. It was a substantial technology that made it possible for quality education to be delivered to distant learners, and in this sense, it played a highly important role in promoting distance education nationwide.

Reflecting on what encouraged potential adopters to adopt the ICN, J indicated that the advantages were clear and numerous. There was, however, reluctance to adopting it mainly because faculty was not familiar with how to use it effectively. Once this problem was solved and users received appropriate training regarding its features, its advantages came to be better appreciated. J emphasized that it helped Iowa rural schools have access to high-quality education and allowed people to save a lot of time and expenses.

J pointed out that it was relatively easy to implement the ICN physically. Learners and faculty learned to use the physical features pretty soon and got adjusted to the touch-mix fast enough. In response to how the ICN might progress in the future, J said that the transport system on which the ICN was based was the MPEG video, which is rather outmoded now. Thus, the old ICN system would not much beneficial in the future. He added, “we have not offered courses for 4-5 years here in the university, and as a result of the sort of the subset and as a result of better options now that are available to colleges and universities and instructors, there is no way to rejuvenate that system and make it be viable in the long term” (Appendix E). In response to how he would feel about distance

education vs. face-to-face education, J said that technology is neutral and the delivery system has no effect on the learning outcome. Thus, he added, the quality of instruction is more important than whether the course is offered face-to-face or online.

Kabat-Lensch (Director)

Kabat-Lensch (Appendix F) became familiar with the ICN in the late 1980s when it was in the process of being created. She was then the director of telecommunication at Eastern Iowa Community College. Her organization used a point-to-point microwave system for delivering distance education. In response to what she would think about the advantages of the ICN, she said that it was extremely useful. However, it took some time before people were able to feel comfortable with it. Looking from the standpoint of students living in rural areas or being unable for one reason or another to travel to obtain access to high-quality education, it was "opening doors that you never had possible before."

Reflecting on what would encourage potential adopters to adopt the ICN, Kabat-Lensch said that students found it easier to adopt than faculty did. The ICN came with the ability to record lectures. As such, some teachers began to feel unhappy, saying that the system could use their canned lectures again and again and they would lose their jobs. Their concern was of course addressed by promising to them that the recorded videos would be destroyed after two weeks. She added that convenience was the greatest advantage that the ICN offered. Responding to the question regarding ease of use of the ICN, Kabat-Lensch indicated that it was extremely easy for students and faculty to implement. They had to only touch microphones. There were training sessions for faculty. On the whole the system was very easy to be used physically.

Reflecting on how she would view the future of the ICN, she said that it would remain relevant because of the infrastructure, the backbone and fiber. Most colleges would benefit from its services including Internet connections. She added, "It gave us the roadways, if you will, to connect whatever the technology comes down the road." In response to how she would feel about studying in distance education versus face-to-face education, Kabat-Lensch indicated that she would prefer face-to-face interaction, but she would also understand that that distance education could be as effective as face-to-face education.

Dunn (Director and Instructor)

Dunn (Appendix G) became familiar with the ICN in 1991-1992. He said that during many meetings and forums, he observed that teachers and administrators would often describe the ICN as being useful particularly for K-12 education. But he was later surprised to see that priority was give to offering college courses over the system. Dunn indicated that the ICN played a significant role in connecting classrooms and sites, so it was no longer necessary to hire three different teachers at three different sites. He agreed that the ICN could well be viewed as the beginning of online learning.

In response to what would encourage people to study in the ICN, Dunn said that there were students who could not take classes if they didn't take them through the ICN. Dunn added that there was resistance to adopting the ICN, but it was mostly because users were not familiar with how to use it effectively. It was practical and "very good for what it had been built for." He said that the ICN was "an economical move forward." He declared that it was easy to use the ICN physically. "It was not an esoteric thing that people had to learn from scratch."

In response to the question regarding the future of the ICN, Dunn said that its future would not be much promising. As a fiber system, it would become outmoded. However, as a common carrier, its prospect might be more positive. Dunn added that the future of distance education is bright. Distance education would continue growing. He said that this summer, in their community college, more than 70% of their entire enrollment would be online. Reflecting on distance education versus face-to-face education, Dunn said that the latter would never go entirely. There are many technical courses, including electronics, auto-collusion, nursing, and so on, which would definitely remain face-to-face.

Groner (ICN Administrator)

Groner (Appendix H) has been working for the ICN since 20 years ago. In response to the question regarding the role of the ICN in distance education, Groner said, "The ICN was created to allow education to be equal in Iowa." He added that it has changed over the years and is now adapted to current demands and conditions of distance education. Although there is drop in the number of hours of videoconferencing, there is much increase in the amount of Internet bandwidth usage of the ICN. Groner said that the ICN has definitely played a critical role in promoting distance education in Iowa.

In response to what might encourage students to study in the ICN, Groner said that availability and legacy were among the most important advantages. He explained that in the early phases, learners in the rural parts of Iowa could gain access to high-quality education through the ICN. At present, through the ICN, students can take classes at 2 o'clock in the morning or 2 o'clock in the afternoon. Groner added, "What the ICN is able to do is to attract the use of it and make those things available." He confirmed that

the ICN was easy to use physically. Everything was prescheduled and students only had to turn on the system. The ICN was built on MPEG videoconferencing technology. It now uses an IP-based backbone. But overall, it is very simple.

In response to the question regarding the future of the ICN, Groner said that the backbone, the actual fiber optic is extremely important. It can be seen as an analogy to an auto assembly line for example. There are all sorts of materials and designs that are used in making cars, but automobiles are produced through the same assembly line. The backbone is adaptable to all present and future communication technologies. Reflecting on what mode of learning he would prefer, Groner said that we would need to communicate and to interact. This need is satisfied through talking face-to-face or using technology. Teachers will never be replaced with robots. But as long as communication between two persons can occur through using a tool, it can be used as a technology of learning. Thus, these two modes of learning can equally be successful.

Gronlund (Director and Instructor)

In response to the question regarding the role of the ICN in distance learning, Gronlund (Appendix M) indicated that the fiber ICN is not perhaps as popular as recent Internet-based distance-learning technologies. However, distance education would continue growing. He added, “Convenience and access is the reason individual use distance education.” Reflecting on the question of ease of use of the ICN, he said that technology would offer more and more convenient features. Gronlund is not much optimistic about the future of the ICN. He stated that the private technology sector would eventually win the competition. The ICN is a public entity whose future is dependent on decisions made by elected officials. The problem is that “practicality and well thought-

out decisions" of such officials would prevent the ICN from reaching its full potential. Gronlund said that he would prefer face-to-face education to distance education because the former is more engaging and more powerful in terms of allowing him to be more of a reflective thinker.

McMahill

McMahill's (Appendix I) familiarity with the ICN dates back to the time when it was established in the late 1980s. Comparing the ICN with previous tools of distance education, she indicated that it was live two-way and "very reliable, perfect communication." She emphasized that it was extremely useful for learners in the rural districts. There are 300 school districts in Iowa. Two hundred of these school districts are considered rural. It was thus particularly helpful in terms of providing opportunities for large numbers of students across Iowa. Also, it connected other entities, including prisons, public agencies, courtrooms, and area agencies, to educational sites.

In response to what encouraged potential users to adopt the ICN, McMahill mentioned that it helped users obtain information without having to travel too far. Additionally, as a tool, the ICN allowed for much interaction, audio-video communication. "It was unique." She added that there were discouraging factors, including people's poor skills of using mobile cameras. Teaching electronically was still much of a stigma then. Another discouraging factor, McMahill said, was that few efforts were made to upgrade the system. In response to the question of ease of use, she pointed out that the system was actually easy to implement. However, there was resistance to using it because "technology wasn't common in their other lives."

Reflecting on how the ICN might progress in the future, McMahill indicated that asynchronous ICN live broadcast would perhaps stop being used in the future. There are now more powerful and more convenient tools such as Citrix, GoToMeeting, and other web-based and Internet applications. In response to how she feels about studying in distance education versus face-to-face education, McMahill said that under certain circumstances, distance education is much better. It allows for a great deal of interaction. Students can participate in distance learning programs from every part of the globe.

Schlosser

Schlosser (Appendix J) taught over the ICN in the late 1990s. In response to the question regarding the role of the ICN in distance education, he said that it was a "remarkable innovation," an interactive communication tool. He added that at the time, it appeared that much had to change. However, in fact, it was not necessary to change teaching techniques. It was a transitional innovation, a new phase in the history of distance education, the phase of synchronous distance education.

Reflecting on what would encourage people to adopt the ICN, Schlosser indicated that the ICN was not something coming from outside Iowa. It was created in Iowa and had great compatibility with the educational needs and perspectives of the Iowans. Iowa has a considerably large number of school districts, and people in Iowa, historically, would like educational opportunities to be offered in places near their homes. The ICN was able to meet such a need effectively. It seemed to many Iowans to be an extremely powerful educational technology that could bring high-quality education to areas where they lived.

In response to what he would think about implementing the ICN physically, Schlosser said that it was easy to use. Also it had standards. ICN rooms looked alike and used the same equipment and technology features. As regards the question regarding the future of the ICN, Schlosser said that he was not "equipped to address" the question. However, ICN videoconferencing might not be able to survive because Internet and high-tech interactive communication technologies are growing at a high pace. He added that in the late 1990s when using the Internet became increasingly popular, it was predicted that the ICN would go into the future mainly as a data carrier. But Schlosser expressed a good deal of optimism about the future of distance education, saying, "Strangely enough, as distance education becomes more ubiquitous, the field itself will begin to disappear because if all education has some elements of distance education, then what is distance education anymore?" Reflecting on how he would feel about studying in distance education versus face-to-face education, Schlosser said that he would prefer teaching at a distance. However, he recommended blended courses as favorable and effective.

Sorensen

Sorensen's (Appendix K) familiarity with the ICN goes back to when it was created. Reflecting on the role of the ICN in distance education, she said that it was established to help students in K-12 in the rural parts of Iowa obtain education without having to travel. But it also came to be used for connecting people for in-service activities, higher ED use, and for talking about common issues. In response to the question regarding factors encouraging people to adopt the ICN, Sorensen said that there was resistance to using it because many instructors thought that they would only need to replicate face-to-face courses and teach them over the ICN. This approach toward

distance education produced no result. As regards ease of use of the ICN, Sorensen implied that it was easy to use. However, to gain mastery, it was necessary to have some practice. In response to how she would evaluate the future of the ICN, she said the old format (live videoconferencing) is pretty much gone away. The Internet and high-tech communication technologies are more convenient, more powerful, and more available. As regards what she would think about studying in distance education versus face-to-face education, she said that well-designed instruction is effective. The delivery format is not important. “It doesn’t matter whether the truck brings the vegetables or the train brings the vegetables.”

Data From Blogs

Blogs contribute opinions to promoting distance education. In this section, data is collected based on how several representative sites evaluate distance learning. One such site is Rapid E-learning hosted by Tom Kuhlmann. In “Why You Need to Connect with Your Peers in the E-Learning Community,” Kuhlmann (2016) argued that it is necessary for people in e-learning industry to create their own communities because there is much information in this industry that users can learn from each other. The author noted that members of such communities can “exchange tips, best practices, and share resources.” People responding to this blog have all expressed agreement with the idea, confirming that e-learning communities would provide “inspiration and support.”

This concept is also reflected from Assistive Technology. In a blog authored by Friend and Friedlander (2016), they have placed a good deal of emphasis on co-teaching. They noted that co-teaching involves planning and implementing lessons collaboratively and greatly help improve students’ outcome. Responses to this blog contain praise for the

idea. Assistive Technology is much focused on introducing and describing new technologies helpful in promoting e-learning.

A similar concept is seen in Derek's Blog. Wenmoth (2016) noted that central to such high-performing systems as Canada, Hong Kong, China, and Singapore is the idea of collaborative professional learning. Teachers collaborate with each other to improve instruction and curricula. E-learning, according to Wenmoth, involves a great deal of collaboration. More clearly, the successful implementation of e-learning is dependent on whether the collaborative approach to teaching is emphasized during planning and designing.

In similar fashion, key to appreciating Quinn's (2016) blog is the concept of collaborative learning. The author argued that the traditional approach to planning courses is rather misguided. The problem is that this approach has excessive trust in designs prepared by individuals rather than groups. Today, Quinn added, the world is becoming increasingly complex, and we are in "an information age." It is easy to see that "the room is smarter than the smartest person in the room."

Summary of the Chapter

Data collected from the 1994 and 1996 reports regarding the ICN shows that it was widely diffused in the period from 1992 and 1998. The interviews with the 12 educational leaders are also indicative that clients were happy using the ICN. All of the knowledgeable participants are confident that the system was useful. It was easy to use, and students would find it beneficial. In addition, all of the participants are positive about the future of distance education, but they are not thus sure about the prospect of the fiber optic ICN in the coming years.

Chapter 5: Discussion

In this chapter, based on the findings, two concepts are developed. First, from the interviews with the 12 education leaders, it is clear that the ICN has been widely adopted over many years. In terms of diffusion, its present status is close to being supplanted by Internet and web technologies. At the moment, the ICN as a videoconferencing tool is not particularly popular because of Internet applications, being capable of offering features that are easy to use and available wherever learners go. Second, the data collected in this study includes elements that can readily be processed into forming a hypothesis about how distance education might progress in the future.

The Five Degrees

Responding to the question regarding the role of the ICN in distance education, the 12 educational leaders mentioned that its purpose was to allow rural learners in Iowa to gain access to good-quality education. There is obviously consensus among them that the ICN was extremely useful. To put it more tangibly, 100% of the participants were of the opinion that the ICN was relatively advantageous. The first criterion is thus met fully. That is, none of the participants were reluctant to adopt the ICN.

In a similar way, all of the participants agreed that the ICN was compatible with social norms and values in the society in which it was introduced. J (Appendix E.) implied that the ICN gained popularity within a relatively short period of time. He would disagree, he added, that the term “top-down” innovation could adequately characterize the fiber optic ICN. It was not imposed on anyone or on any educational institution. In line with J’s view, Schlosser (Appendix J) pointed out that the ICN was not something coming from outside Iowa and was in fact well suited to Iowan educational needs and

perceptions. Nevertheless, both educational leaders emphasized that there was degree of resistance to adopting the ICN, which they attributed to a lack of familiarity with the system or with how to manage teaching at a distance on the part of the user. In terms of giving a percentage, it can be said that the overwhelming majority of users (over 90%) during the 1990s considered the ICN compatible.

As regards ease of use of the ICN, all of the participants declared that it was very easy to use. However, McMahill (Appendix I) pointed out that at the time, some would simply refuse to learn the skill. Here, again, it can safely be said that nearly all users would find the physical features of the ICN easy to adopt. Reflecting on the future of the ICN, the participants were not highly optimistic, suggesting that its future as a fiber optic videoconferencing tool is rather limited. Schlosser (Appendix J.) pointed out that in the 1990s, the ICN was often regarded as a technology representing distance education in its utmost form and essence. This notion can be viewed as indicating that during this period, exposure to the ICN was close to 100%. Most participants indicated that their feelings are positive toward using distance education. Only one participant (Appendix M.) said that he would prefer face-to-face education to distance education. Thus, it can be deduced that the percentage of users who adopted the ICN voluntarily in the 1990s is close to 90%.

The data thus extracted from the interviews with the 12 educational leaders is represented in the following figure.

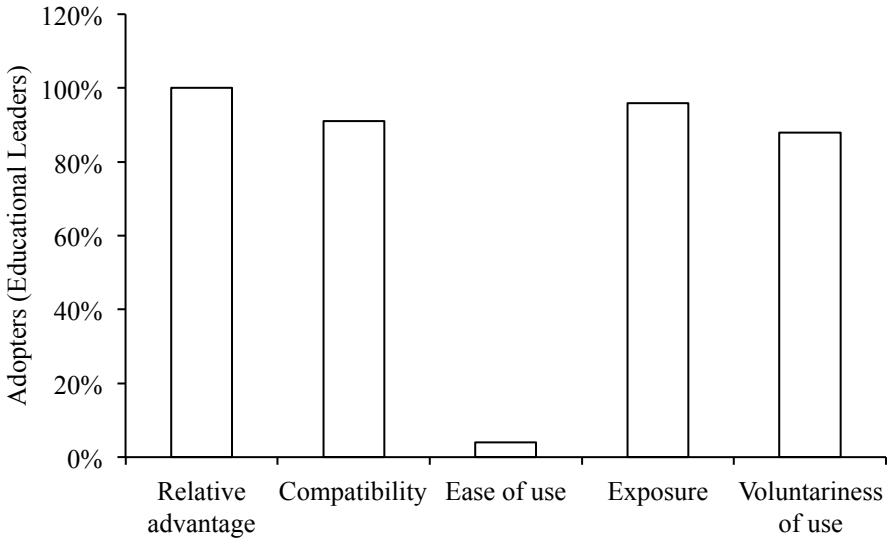

Figure 5. The diffusion of the ICN based on the interviews with educational leaders (1996-2000).

Overall, when putting the results from the previous figures and those from Figure 5 together, the graph would be similar to the following (Figure 6.).

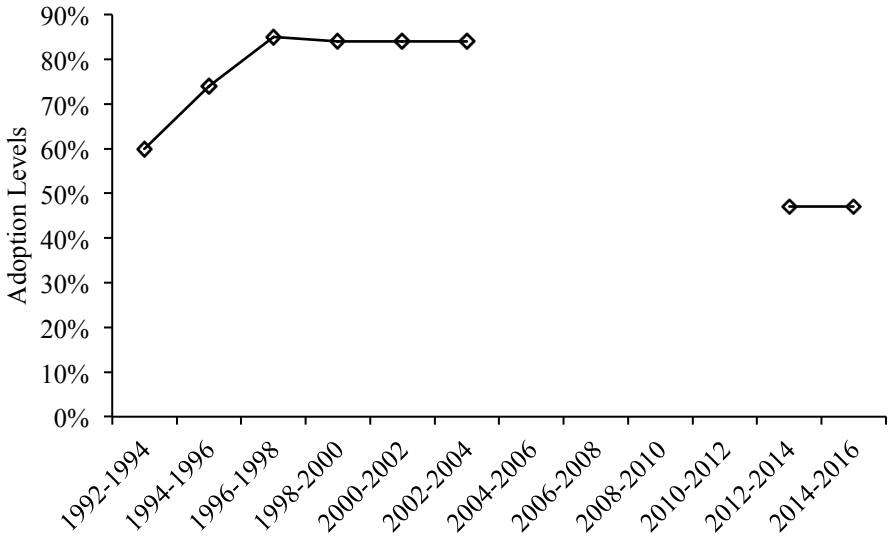

Figure 6. The diffusion of the ICN over the past two and half decades.

This figure shows that during the period 1992-1996, the diffusion of the ICN increased at a rather high pace, from 59.57% to 83%. The diffusion rate seems to have remained stable until 2004-2005 when World Wide Web users and interactive

communication tools began to experience extremely high rates of growth (G, 2005). The adoption rate of the ICN decreased between 2004 and 2015. According to Frtazke (Appendix C.), in 1997, there were 880 ICN rooms. This number fell to 500 in 2015. Based on the information in Figure 6, it is clear that the prospect for the further diffusion of the fiber optic ICN is not much promising. The fiber optic ICN might still be used for educational communication, but sooner or later it would be replaced with new generations of technologies. It would then be remembered only as an early step in a process that allowed people to utilize distance education more widely and more realistically.

The Future of Distance Education (Grounded Theory)

The fiber optic ICN is obviously highly important as an innovation and a tool of distance learning. But there are now new technologies that can deliver courses to distant students more effectively and more conveniently than the ICN can. To use Dunn's (Appendix G.), the ICN as a tool of distance education has run its course. However, it is important to note that the ICN has helped distance education—another innovation—grow more visible as well as more valid. The question to be considered in this part is how distance education would progress in the future.

An analogy might here help understand why this question is crucial. The purpose of inventing automobiles was to transport people and objects over distances. Thus, to achieve the goal of transportation, early vehicles were manufactured. Modern vehicles are still used to transport people and objects, and will ever be used to do so. Transportation would always remain a goal to be achieved. But technologies might undergo drastic change. In a similar way, the fiber optic ICN would be replaced with

more advanced technologies. But distance education would remain a subject to be explored and utilized now and in the future. It is an innovation to be adopted by present and future generations.

Reviewing the 12 educational leaders' comments, all of them were more or less interested in talking about two key concepts: wide growth of distance education now and in the future and the necessity of social connection. Dunn (Appendix G.) indicated that in the community college where he works, over 70% of the entire enrollments are online this summer, being higher than the rate during the previous summer. Dunn disagreed that face-to-face education would stop existing at any time in the future. Technical courses such as auto-collision courses, electronics, and nursing courses would continue being offered real-time face-to-face.

Reflecting on the future of the ICN, Fratzke (Appendix C) indicated that parents are nowadays comfortable with the idea that distance education is a way for their children to take courses. She implied that face-to-face classes give students the feeling that "they are included." Students wouldn't often feel that way in distance education. In a similar way, G (Appendix A) expressed optimism that online education will grow widely in the future. He said that online education has begun to "drive" face-to-face education, and it is now easy to convince the Department of Education that online learning is as effective as face-to-face learning. However, he implied, some institutions would still be reluctant to embrace online education because of their "captive audience, a residential population." This type of audience seems to feel disconnected in online courses.

In similar fashion, Groner (Appendix D) said that the future of distance education would be promising. However, there will always be teachers, or teachers will never be

replaced with robots. People like to communicate and they should be face-to-face. It is possible that technology will be able to give users the feeling that they can interact and are socially connected. Such optimism about the future of distance learning is seen in Kabat-Lensch's comments (Appendix F) too. But she pointed out that she would enjoy face-to-face real-time interactions a good deal. Only, "with the life style we have, it is not always available." That is why distance education is necessary.

Optimism surrounding the future of distance education is reflected from McMahill's comments (Appendix I). Describing the ICN as a highly useful tool, she emphasized that the ICN might not be able to survive because more advanced technologies are available and distance education is now for the most part dependent on the Internet. She also indicated that in certain circumstances, distance education is better and more robust. However, it is implied in her comments that interaction between learners is particularly important. In a similar way, P (Appendix D) is confident that distance education will increase in the future, and students will not go to ICN rooms. Rather, they would use their tablets and laptops to join online classes. He said, "The format is irrelevant." Learning occurs in social situations, or at least some courses should necessarily be offered real-time face-to-face.

The two concepts are found in Schlosser's comments (Appendix J) as well. Reflecting on the future of the ICN, he emphasized that the ICN was a transitional innovation, "not threatening by any means." The World Wide Web, on the other hand, was the innovation that revolutionized all communication ways and means. He is, however, confident that for practical reasons and social reasons, face-to-face education will never go away. He mentioned that it would, for example, be difficult for working

parents to manage a situation where education is only offered online. What would they thus have to do with their children staying home? In similar fashion, Sorensen (Appendix K) expressed optimism about the future of distance education, suggesting that distance education would grow much because of the Internet and advanced interactive communication tools. As regards whether face-to-face education would grow less popular in the future, she said that well-designed instruction and environments are helpful. It does not matter whether the format is face-to-face or online.

It is also seen in Superintendent W (Appendix B) that the future of distance education would be highly important in our society. However, he pointed out that blended learning is actually favorable and effective, "more effective than just being scarcely electronic communication." Similar viewpoints are seen in J's (Appendix E) comments. He indicated that web-based education is "very popular with students and with faculty." He implied that face-to-face education would remain popular because different learners have different characteristics and different learning styles. Independent learners who learn mostly through reading and writing would be comfortable with distance education than visual and auditory learners. Also, Gronlund (Appendix M) suggested that the future of distance education would be important, and social connection plays a crucial role in education.

The Theme Common Among the Interviewees

As regards the future of distance education, the knowledgeable participants in this study are cautiously hopeful. On the one hand, they seem highly optimistic about the effect of high-tech communication tools and devices on the development of distance education. On the other hand, they express doubt regarding whether advanced technology

can solve the problem that arises from a lack of social connection. This contradictory situation obviously accounts for why the participants recommend classes of mixed character, hybrid classes, in which technology is utilized widely and social connection can occur among learners fairly easily. In the following section, this theme is discussed in more detail. Also the theme will be used to make predictions regarding what future-time schools and classrooms would be like.

Smart Schools and Classrooms of the Future

Examining the participants' opinions more closely, it is clear that they represent two rather opposing feelings. On the one hand, the educational leaders are confident that spatial distance in distance education would eventually become eliminated. On the other hand, they are concerned that social connection might hardly occur in futuristic online courses. There might come a time when learners hardly obtain chances of being in face-to-face interaction anymore. To put it more tangibly, as interactive communication technologies grow more and more advanced, it is likely that social connection among individuals would become more and more limited.

This concept can be seen as an analogy to a canvas painted blue. Then the painter begins to use yellow color. For a while, the canvas shows both blue color and yellow color. However, in the end, if the painter continues using yellow, the canvas would turn all yellow. Face-to-face education and distance education are like the blue color and the yellow color in this example respectively. Distance education would continue growing to the point where there is no room or justification left for face-to-face education to be offered anymore. In line with this idea, Schlosser (Appendix I) indicated that the filed of distance education would disappear in the future because if every course we teach were to

have some elements of distance education, then distance education would be no more than a tautology.

Nevertheless, face-to-face interaction is important. All of the educational leaders in this study were emphatic about it. Their views, representing views held by most distance-learning adopters, would certainly influence future ways of implementing educational projects and activities. Therefore, focusing on the future of distance education, this study would predict that it would be performed mainly in smart schools and classrooms. That is, students and teachers would be present physically, and technology would allow for having actual and virtual experiences simultaneously. In such schools and classrooms, students are free to use their own tablets. The other option for them is always to use the equipment provided by the school or classroom. Perhaps, as a future plan, the ICN can assume to itself the role of creating the first such classrooms. The ICN is a pioneer in the field of live videoconferencing classes, and ICN rooms can well be portrayed as prototypes of future smart schools and classrooms.

This concept of establishing smart schools is in line with collaborative learning in the blogs in the previous chapter. Basically, for such schools and classroom to be implemented, it is necessary that they should be connected within a universal network. Therefore, exchanges of information among learning groups occur on a regular basis. Teachers would learn from other teachers how to use technology features more effectively and sometimes more creatively. Likewise, learners would benefit from other learners experiences. There would be e-learning communities, teacher communities and student communities. A good deal of learning would occur through these communities in

actual places and buildings. In the future, education would be actual and virtual experiences combined.

A Different Finding

This study originally sought to determine levels of the diffusion of the ICN. Thus, it used various theories to create appropriate research tools. When the results were processed, it became clear that the ICN was actually fully diffused by 2000. There is consensus among the participants that the role that the ICN plays as a tool of distance education is not significant anymore. But it can also be seen in the interviews that the participants are in favor of the concept of utilizing virtual classrooms that are similar to ICN rooms. That is, the concept of using such rooms is well alive now. It can thus be said that distance education in the future would be modeled on the basis of creating classes of mixed character, simultaneously actual and virtual. This idea of delineating the ICN as a model for distance education in the future is new in this study.

Summary of the Chapter

The fiber optic ICN became adopted within a rather short period, several years. For some years from 1998 onward, its rate of adoption remained somehow stable. It then began to lose popularity. Clients would turn to the World Wide Web, the new communication innovation. Also, there is consensus among the 12 educational leaders in the study that distance education would increase much in the future. Also, these leaders are confident that face-to-face education will never go away. An effort is made in this section to process these two concepts into a hypothesis that distance education can hardly succeed without including environments that allow for social connection and social interaction. Thus, based on the information in this study, a simple prediction can be

made; that is, in the future, people would go to smart schools and classrooms, in which students would have the opportunity to obtain actual and virtual features simultaneously.

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Appendix A

Interview With G

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

I have been in this job 10 years, and this office is responsible for all of the ICN scheduling in Southwest Iowa. So, we worked with the ICN quite a bit. We have two satellite centers, one an OCO and one a RODO. We broadcast on the ICN to two those centers college classes. Having said that, I am ward for the regional schedule for Southwest Iowa. So, the funeral directors have a meeting there. We've scheduled that. Mine safety people have been on the ICN, and so there are always community events. I've done that for 10 years. Five years prior to that, I worked in Graceland University, which did have an ICN room, and we broadcast to high schools college classes. That has been in 2000, I guess. I did teach one class over the ICN in the 1990s. It was only one class. It was a music class. I was not an administrator at that point. As far as administrator, the last 10 years, I have been working for the ICN all the time.

How useful was the ICN?

I think it was huge. This allowed very rural places to get college credit classes. It allowed the college to reach out to centers that we were not able to reach prior to the ICN. It was enormous. I do think it was very useful. The state sort of mandated this and set up all these rooms and subsidized all of it. This is the only reason that you could have that the state was underwriting nearly the laying of fiber and all of that, but things like EMT, emergency management technician folks…. They could get training over the ICN in their

hometown and not to have to drive somewhere. That was the vision, and it provided access to rural places, places that might not have had that today. Today people are not big fans of the ICN because the Internet has supplanted what the ICN was trying to do. I don't think the ICN probably doesn't get the credits it deserves for being very forward thinking and opening up that door. I think it is the idea people like that this could give access to rural America in a way they never had.

Question 2: What do you think encourage people to study in distance education?

It provided people who were place-bound with access to coursework. It could be that people didn't even have a car in little towns. The ICN was their one way; they walk to the ICN, to the center, taking ICN classes. They would have never been able to drive somewhere because they did not have a vehicle. We still have a very robust online presence; we still have a few people on dialogue. In the 1990s, everybody in the rural was placed on dialogue. The Internet just didn't work very well. The ICN was very reliable. It helped us broadcast every class and it is still good. It always had that support. Yes, I think as far as the teacher's standpoint, it was hard to get papers back and forth.

Question 3: What do you think about using the ICN physically?

I know I was an instructor; it challenged me to move into an area ahead that I had never had any experience with, which was basically you were producing your own television-show. You had to remember that if the remote site wanted to talk, you have to make sure

to show the remote site on the monitor and then remember to bring it back to yourself, then to the computer, then to your video, then come back to yourself. You were actually producing like a little talk show all on your own. That was what I found very challenging. It was a certain kind of person that enjoyed that.

The learners for the most part liked it. For something like an accounting class, you've got to see the instructor walk through everything. If you had to ask a question, you had to push the microphone to interrupt. Maybe that was slighting convenience, but really they had to participate in class. They probably wouldn't be able to learn.

Question 4: What do you think about the future of the ICN?

The ICN has become politically… but the fiber-optic lines are incredibly valuable. So, I think there will still need to be something there because of the value of the fiber-optic lines. They are still valuable. Those are how k-12, colleges, and other schools get their Internet and how we get our Internet access. It is still ICN fiber-optic cable. That is where the money is. That is what people are still thinking what we will do with this.

We have taken a little bit of… with the ICN video conferencing. So, we have changed our ICN rooms just this last year to be video conferencing rooms, and the ICN will support those rooms. So, our help desk will be ICN out of Des Moines, and we will pay them the video conferencing rates, and the reason that we did this was that we were very happy with ICN service. We liked the help desk. We liked the support desk. I understand

your question. If the future Internet becomes satellite-based, all those fiber-optic lines are useful.

Question 5: How do you feel about studying in distance education versus face-to-face education?

I think online education is starting to drive face-to-face education. It used to be that in distance education, we were sort of the ugly stepchild. We were on the side. Over the last 3 or 4 years, online is starting to drive face-to-face. What I mean by that is that

I can pull a report right now that shows how many minutes students have been online, how many submissions they have made, how much times they have spent looking at a particular piece of content, how many times they have replied in a thread of content discussions, how many times they have replied to peers in a thread of discussion. I can pull out an enormous amount of information proving that they are learning. They are doing something. I can do a learning objective and I can actually test that now by online test, and prove that they are meeting that objective, any of that.

There is going to be pressure on face-to-face instruction. You prove that students are learning something. They are actively engaged in the learning process, and we can actually show to the administrators, to show to the state legislators, to show to the Department of Education that it is easier in some ways…. In some ways, online is going to start driving face-to-face.

I think the pressure is on particularly four-year schools to acquiesce to online education. In community colleges, we have always embraced online education because our mission statement is a little bit different. We have an opener policy. We want to educate as many students as we want. Four-year school has a captive audience, a residential population.

Appendix B

Interview With W

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

I first became an administrator in 1995, and at that time the ICN was just being ruled out to different school Districts in the State, and they rolled it out basically to a third of the schools of the time, if I remember correctly, and so my school—I was a high school principal at—was in the third year of adoption. So, we built our first ICN room in 1997, I think. You know this, but I think I've been around the ICN rooms for quite a while. That's kind of now that I'm superintendent in actually two school Districts. We're still using the ICN. We've used it back in those years at Denver, Iowa, where I was principal, and used it for incoming community college classes. We connected with our local college… and we connected there with just a few classes that we didn't have certified teachers to teach, and so community college classes filled that gap.

I don't think it's changed too much from that. The majority of the classes we use right now are community college classes or even some private schools that provide us with classes that kids can get dual credit. In Iowa, we call it dual credit because high school credits and college credits for those classes…. Throughout my 20 years as an administrator, I have always seen ICN classes going on. It is a little bit of a unique situation actually that two school districts are sharing with each other. So, we really function as one school district, and we just this past summer have decommissioned our ICN room in the middle school building, which used to be high school building.

You are asking some tough questions about whether we should keep going because there are some other platforms that can do just as well without the dedication of equipment to doing that and stuff like that. So, it was all optical fiber that built this network across the state, first going to school districts and then working with hospitals and libraries and law enforcement…. It's all optical fiber, two-way. We have had the push-to-talk microphones when we started and now they've got a system of keeping microphones live in the room when ICN projects are going on.

We found it very useful for bringing classes that students couldn't get at our small rural schools. Iowa had at that time other dual credit options where students could actually go to a college campus and get into a college class and use a dual credit from high school. We weren't that close to a college that we could do that, so the only way that our kids could get into those classes do was through the ICN. They got that opportunity to experience college curriculum, which they would've had any other way. We had some AP courses and things like that, but it was different. It was useful, but cumbersome because teachers had a fax machine in the room and when… was giving a test, a lot of times that technology failed…. I think students were excited for the new technology, but as it went on…. We found that talking head on TV screen still wasn't as good as teacher or somebody in the room. Kids would take the classes for the college credit, but they didn't do…. I eye witnessed a lot of times that students were getting out of camera shot and not being on task in the ICN room unless we placed teacher associates. When that started happening, effectiveness started to decrease.

Question 2: What do you think encourage students to study in distance education?

I think a lot of us looked at it as an opportunity. As this grows, it gets better, and we've tried in some places successfully to get ICN classes between high schools. So, it's not just with the community colleges, but trying to get high schools to work together in rural areas, so that they could share classes back and forth over the ICN and done that successfully successfully from time to time. So, it was better than…. Before the ICN, some schools had some satellite technology. They would be… satellite dish on them… classes on that and had some distance learning, but that wasn't nearly as effective as the ICN because it wasn't too way audio-video. I think in other places too…. it was just one-way communication for the most part. The ICN was what you and I are doing now… talking to each other at the same time. So, that brought us to thinking about the possibilities of how you could expand teaching on distance education with technology backed up by optical fiber.

In the state of Iowa, I don't know if there's another system somewhere doing it too, but it really eventually was… all high schools in State. One of the reasons I think that people continue using the ICN and use it more and more was the opportunity for classes and coursework that they couldn't get otherwise. We also had opportunities for classrooms. One of the big movements of that time was to get virtual field trips into classrooms, where you call an expert, and they could show you around the inner workings of a zoo or something, and the kids were sitting in the classroom watching and interacting with the… as it was. That was a big part of the movement then too. It was those special programs that were more widely used, but they didn't offer that initial opportunity. So, in that form,

distance education serves a purpose of expanding the curriculum for a lot of high school students, enriching the curriculum of other classrooms as well. You ask as far as discouraging people from using it too? I think some students found that they couldn't absorb materials, not having someone in the room looking over their shoulder and having at face-to-face, also social connection. I think there were a few bugs in it early on, and then we must get them worked out. I think it got better and better as teachers learned to teach over the ICN.

What do you think about using the ICN physically?

It wasn't difficult at least as far as the ICN room was set up, in which you had a couple of switches that turned the whole system on, and they had phone connections that people can clear up any difficulties or things. Actually physically using the room was not difficult, but administering it was a challenge because there was a statewide scheduler and we had to plan semesters in advance. There was a little added level to that. That was cumbersome; it wasn't irritable. As I said, early on we had bugs in the system where we had fax machines and stuff going on. There was lots of frustration. When kids were getting into the class, the technology didn't work correctly, but I think the kids were happy to have the opportunity, for those learning opportunities that we could've offered otherwise. I think we've got better at delivering instruction f or over the ICN and it's really become natural distant studies. I think much of it is just another way that they're receiving coursework, education from a distance.

Question 4: What do you think about the future of the ICN?

The future of the ICN, I think it does prove itself. It can keep up with the technology that we get from learning management system and other platforms such as Zoom where the teacher can deliver education from a distance on other platforms.

One thing that I like about the ICN is that our bandwidth is unlimited as far as the amount of video we get. We've got 350 students in our high school, and half of them and over are trying to upload some video, some type either through teacher or they're messing around. The bandwidth gets used up really fast. For bringing them via the ICN, that's one feed of that class into one spot and then we can serve several students with that and it saves us a lot.

How do you feel about studying in distance education vs. face-to-face education?

The future of distance education is going to be very important. I think our society wants to have what they choose. Everybody is getting used to services that can be customized to exactly what they want. We are in the middle of Iowa. We've got a student who wants to study marine biology, taking classes from a community college that has marine biology courses. That student is capable of doing that, and unless the school district cannot provide those things the kids want…. It's just a like a market where everybody wants to have their choice of the very specific products that you want to buy. Education is a product, and if we can deliver the products that our customers want through distance education, that's going to be beneficial for us. I think what we focus now in distance education right now is that we are trying to get into blended learning concepts. There are

schools that are starting to schedule teachers to be teaching in several classrooms at once and having them travel between the buildings, so they can have for example every other day that that can be face-to-face in a different classroom with the other half of the class. That blended learning we have found and there's research to support that it is very effective, more effective than just being scarcely electronic communication. I think if we can master that and get a system set up toward using it, that's probably the direction I would hope that distance education goes because it's been proven to be most effective.

Appendix C

Interview With Fratzke

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

I probably need to back up, back in the 90s when this began. There wasn't anything around that even resembled this, being able to take a course via a distance, looking at an instructor on a television monitor or a large screen projector but not having that person in the classroom. That was not really heard of. Obviously, it is called The ICN because it is the Iowa communications network. It is not readily available to other states. At that point there were probably…. When I became involved in it, which was in 1997, there were 880 points of contact through Iowa. That has dropped now to maybe closer to 500. There are some schools that are doing away with it because they're doing more videoconferencing, which does a lot of the same things, except that the ICN is a dedicated, private network. Videoconferencing more or less is done now over IP, over your telephone or your Internet. But that is not always secure. As far as being on and up and available and not being disconnected downtime, the ICN is secure 99.9%.

There are the far exceptions. But usually it's like when there's a blizzard if there's tremendous wind speed. There is usually something like that. Sometimes the conditions are such that it is extremely foggy and it makes the connection bad. But it is still better to have a dedicated circuit, which is what the ICN is to be able to have the course. They have dedicated IMPEG lines basically that allows the course to be given.

First, it is an IP address, which again is on the phone or over the Internet. When you watch dish network or direct TV or any of those programs…. If you've ever had a blizzard or storm with tremendous wind and you see massive pixilation, it is the same type of concept. You're going to get distorted views, distorted audio. Things aren't going to be about connection, so to speak, and calls are going to be dropped. That's not good. You know even in the best of videoconferencing, most they can usually get for a kind of the guarantee with the IP video is about 97 to 98%. So, the ICN still comes in more favorably at the 99.9.

They did not have the video conferencing. They didn't have the voice…. Back in the 90s, it was still kind of a new up-and-coming thing. Whatever thing they did to disperse or make sure that the ICN was used is that the ICN people basically went around to schools and sold it from the standpoint of saying we have laid fiber and we want to use it. That was up to the individual regions. Hawkeye is in Region 7 out of the 15 community colleges; and within our region, we are the identity or the entity that handles any technology questions or technology phone calls that come in from the school.

When I first began, we had 3-4 courses. Now we have 28-29 courses per semester that we have on the ICN. So, basically, we have two classrooms dedicated here at Hawkeye specifically for the ICN, and we have a couple of other classrooms… we also do videoconferencing. But, anyway, more or less of ICN rooms are dedicated, and they're busy. There's a few times during the day that they're open mostly in the afternoon, but generally they're busy from 8 in the morning until 8 at night.

Question 2: What do you think encourage people to study over the ICN? What do you thing discouraged them discouraged them?

So as far as encouraging, we have to go back to the early days of the ICN. There were many grants that were available that were received by the state itself including the ICN itself, and they paid for people from the ICN to go out to the schools and contact the schools. Individuals at Hawkeye Community College, for example, contacted the schools in our region and said that we have these courses. This is a way for your students to basically either be enrolled in post secondary education, another form of post secondary education to be able to receive credit at your school, so the students are not even leaving your school, and then they're getting credit in your high school. If they're, for example, taking psychology, they're getting college credit. So, that was a win-win getting them, to see both sides. The legislators passed many mandates what to do in those situations…. So, it was important back in those days that we had a governor who was receptive to this and encouraged it and the legislators passed that, and I think that's why the ICN was successful.

There was some resistance. Sometimes educators were…. There were a couple different scenarios. Actually, we would get kind of a pushback because then administrators felt that the college was taking over that it wasn't the high school education they were getting. That was a valid point. It was our courses and our instructors were teaching, and yet we were giving college credit. So, in a way, that was correct, but we also let them

know that if they were receiving dual credit from high school, they were also responsible for what their learners learned. Another approach that we utilized this was that some schools basically kind of were like, okay, it was a college course, so you walk in this classroom and what am I going to do with you?

I know from an instructor viewpoint, one of disadvantages of the ICN is that when it first began, it really was a way to reach rural schools, which did not have an opportunity to send students within 10 or 15 minutes to a college, how you are able to reach the rural schools…. So, having a class like psychology for example where you do a lot of group work or you have a lot of discussion, it is a challenge to do that with just one or two people out of site. However, math problems or things that are more written out, it's easier to do that because you have more individual work. It was probably one of the disadvantages.

Question 3: What do you think about using the ICN physically?

I would say yes and no. The reason I say that is that I really don't think it's that difficult because people that still have the MPEG version know where you have to push microphones. It does not take somebody long to understand, and like in our classroom, we would have directions posted in front of the podium. So, when you were looking where the teacher was standing or if you didn't have a teacher, you would still see a sign in front of the podium that would say push it and hold it to speak. Directions are all there.

I think most of them [learners] do. One of the things that the ICN is doing now is…. In the old days, we had analog TV and analog systems, and everything has gone digital. With the movement of the digital movement, we're getting away from the old-fashioned push-to-talk microphones and we jokingly call them bats in the ceiling because it is the microphone that is in the ceiling, and their color is black and they are hanging from the ceiling. But they make it less intrusive. There isn't that push-to-talk microphone that students should push to talk. They don't necessarily feel intimidated. There is not a microphone in front of them. So, it's more intuitive. You know they're able to talk just like they are in a regular classroom.

Question 4: What do you think about the future of the ICN?

Actually, the schools would hold a lot of power. By that, I mean when you are talking postsecondary education, that is not something that Hawkeye is allowed to send an email or to do any advertising, send a letter, or send anything like that to any of the schools. The high school is the one that is responsible for telling the students that there is this opportunity. Now, there were all back in the 90s that did not think it was a viable option, and so they opted not to talk about it. After, I say about like 2000, I think the schools became aware because there were more parents that became aware that this was an option for the high schools students. Some students were obviously having more credit hours or exceeding the credits. They were looking for a way to further their students, their child, and then they would go to the school, saying that I've heard about the ICN, and why you're not telling me about it. That was some of the stuff that was going on in like 1999

to 2000. Nowadays, schools have no issues with that. You know they blatantly say that your classes are here in the high school; you can receive college credit if you are interested in taking college credit. This it is a kind of normal thing now. It took a while to be transitioned to that.

Question 5: How do you feel about studying in distance education vs. face-to-face education?

That has to do with the instructor. A lot of time, talking to the instructors, I want to make sure if they have asked open-ended questions. In a classroom, when you're face-to-face, you can see the doubt and you can see the students not getting what you're lecturing about. I don't know how to explain to them that you just know that the student does not understand what you are saying. When you're teaching at a distance, you don't always get that. The instructor has to be able to multitask from the standpoint of being able to lecture as well as…. We always call it a projector because it's a large screen projector that we put the students up. There are some students that don't like to be on the TV monitor. We always encourage the instructors to get to know their students because we don't want to do anything with the students that make them uncomfortable. On the other hand, the students need to understand that part of being at a distance is to go on the monitor, so that others in the classroom can see them and include them. You know it's a matter of feeling included…. So, the instructor's job is to ask the students open-ended questions.

There's a whole mix of things that goes into what makes it successful for students to succeed in a specific course, and so I don't feel that I can dictate and say all her classes are going to be at home. We're going to utilize Zoom, which is a video conferencing, and you are going to take your class at home. The students need that social environment. Since I was an independent learner, I didn't need that. I took my masters degree online. But you know there are some people that are not maybe as focused…. There are a variety of things that I think a successful person needs to do be able to do completely online classes

Appendix D

Interview With P

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

Right, I would say that my familiarity with the ICN mostly came to be in around the late 1990s, but not for a videoconferencing perspective or data perspective. At that point, I was working for a large community school district [in the state here]. We had had campuses in 5 different cities and our Internet data was coming through the ICN system. In a part of that district, we did have ICN videoconference classrooms, but I did have to deal with those. Later I came to the college here and have been here about [19] years, and I came more involved with the ICN in 2006 probably, and we used the ICN video network. [We are the regional scheduler for the ICN video network in our region], and then we used that system to deliver audio-video classes or interactive video classes to the high schools in our area, for the high school students take college credit classes, interactive credit classes, and we also did some college classes because each one of our 9 locations had video conference rooms that had ICN capability. So at that point I became more involved with it; [and I am the community college representative for the ICN for our region of the state].

Historically, the ICN has been a ruling key in the state of Iowa in connecting high schools. There are many rural high schools in Iowa. Optical fiber has helped us connect high school systems to other high schools as well as high schools to community colleges and to the regional universities. But that has died off incredibly in the last ten years, but every thing we do distance-education-wise relies on the web features and the ICN

provides for regional institutions in the state and we are all tied up to that for the data that we receive, and we offer this semester alone, spring semester alone... we probably had 10,000 students taking online asynchronous classes. We couldn't have done that without the ICN system to deliver our classes. That is because how we transport our data. I don't see that slowing down any. We could do without the ICN system. We could have another Internet provider. But we don't do that when we get discount rate from the ICN. The other thing is that our zoom classes are on. Although we were not offering very many classes using the optical fiber for ICN high schools, we have web-live classes, and in web-live classes we stream such streaming because students have the ability to zoom to interact like we are right now. Obviously they have the ability to participate in many live classes that they would not have had in the past.

Question 2: What do you think encourage people to study in distance education?

I think from a recipient point of view, a participant, or a student studying in the ICN, I think the adopting was quick because it was convenient for people. We use the ICN system to leverage education. We oftentimes have court proceedings over the ICN. We have our federal district court in here Des Moines, two hours from here. We sometimes do court system over the ICN or schedule court system, maybe it is for custody or cases like that over the ICN system for families who live here and don't have the means or the time to transport themselves to the federal court in Des Moines. For them it is convenience to try the new technology. For them it is a convenience to try technology and utilize it. That is the participant or the student experience. I think the same was for

our students in the area in here too. It was convenience to them not to have to travel, the time on the road. It is a Time and space issue, so they get the time back and they have to give up a little bit. They don't have the face-to-face interaction, but it is a so much more convenient way for them to learn this and not to have to give up two hours road time to travel somewhere and not to take it away from their families. They are motivated to use it because the benefit for them is not only with receiving online or with receiving through the fiber system. The benefit is with receiving time to spend with their families

Now as far as resistance, there is also resistance from many using the system and people who are in the place of distributing the education. They may be not sufficiently trained to use the system. They may not have the capability of using it, and they find great pressure to have to use it, and apprehension about using it and frustration if it does not work while it is going to work, and they feel isolated. I think there is any level of acceptance. We have instructors who might say I would never do it again. There are others who say this is the best thing. I love it.

When you say it was a top-down system that most of the schools systems, actually I would disagree with that. They were given the choice whether they could use it or not. There was some truth to that. Every school district in the state was told that they would have an ICN room. They were also provided with free equipment and installation of this equipment in their high schools…. They did receive it at no cost and free. Even at that, there was a regional tech that would come and he would fix it…. But they were not forced to use the system. They were forced to designate a space. But they were not forced

to use the system. There was a space designated in their facility…. For that reason, many schools never used it. They didn't have the need. Some of the rural schools saw the need and used it a lot. Some rural schools didn't have the need. And still we have rural schools using it on a regular basis.

Question 3: What do you think about using distance education technologies including the ICN physically?

I think from a student's point of view, if the system ran correctly, it was no problem because the student would come in, and they sat down. There was a microphone in front of them with a pushdown button on it. When you want to talk, you push talk and talk. What happened at that time was that it was a new technology. It was a new system, and a new statewide system. If any support was needed and it wasn't there, it was so frustrating for people….

Question 4: What do you think about the future of the ICN?

The future of the ICN and the future of distance education… is that distance education will increase in the future. We are community college, and a lot of what we do is technical, not lecture, so we would never replace our technical labs or our lab-based courses, but anything that can be lecture-based or pre-lab based will be done to distance technology mainly by a tool such as the ICN, which may be videoconferencing or may be asynchronous technology that we use to deliver that. I think it will continue to increase.

We are probably also different as community college. We are not a residential campus. Our students are commuters. One of the benefits they get from distance education is that they don't have to commute. I think I can't speak for private institutions…. But for our students at the community college, being commuters, distance education will continue to be popular, and the ICN will play a role in that. Our fiber optical is out. Students are not going to drive to the designated ICN rooms. They are going to their tablets and laptops at their homes

Question 5: How do you feel about studying in distance education vs. face-to-face education?

To me, the format is irrelevant; it is the topic that I am learning. For example, if I am going to a dance class…. Dancing is a social activity. Even if I take the dance class with my wife, I would prefer to go somewhere with others dancing and be in a social situation. However, if I am going to learn to better use my micro-saw and I have it in my own shop, I can certainly watch YouTube videos and learn it through distance how I can I do that on my own. I don't think that one is better than the other; I just think it depends on what the topic and theme and what the education or learning is centered on.

Appendix E

Interview With J

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

We are going back to about 1993-1994. There have been a lot of changes in between…. I was hired about that time of the university. I believe the first set of courses that the ICN actually went live about 1994. So at that time options for distance education certainly did not even become close to what the options have since become available with regard to web-based, online, and asynchronous approaches. At the time, in terms of advantages, it was a way to connect students who could not attend classes on campus in a way that approximated real-time interaction within an instructional setting. At the time it was the best distance education system nationwide in terms of being comprehensive and scope and having the ability for students and faculty to interact on a real-time basis, using broadcast quality video and audio. It was unique from their standpoint. The advantages were clear in terms of the ability to expand access to students who couldn't otherwise participate and experience what was designed to approximate face-to-face instruction on campus

Well, again, since that time on there have been changes in technologies that have offered advantages over that system as but at the time it served you and I in terms of our approach to distance education. For many years classrooms were located in elementary and high school buildings across the state and there were more than 700 classrooms. There was basically an ICN classroom in 20-25 miles at the most from every student in the state. So our target audience and educators for our graduate programs had the ability

to stay in schools and participate after hours and gradate education especially for masters programs for teachers and for administrators, the system worked very well for us. One time we had approximately 2000 rooms annually using the ICN it was an important part of our delivery system important graduate it had a high impact on education throughout the state.

I wouldn't agree with that in terms of a top-down innovation. No one was required to use the ICN as the delivery system. The community colleges within Iowa were the largest users by far with regard to the Iowa Communications Network and to their satellite campuses. We were heavy users of the ICN. We did so because it was a system that was better than the satellite systems…. Also, community colleges didn't have the resources to invest in those systems.

Again, at the peak, it was a substantial delivery system to the state that allowed us to provide quality education and then have support from our faculty because you have to remember that 20 years ago or 25 years ago, faculty were much more skeptical about distance education especially at the graduate level… the familiarity that our faculty had and the comfort level with being able to adjust the materials to teach over the ICN, to have discussions, to break out multi-group activities, to record back it back over the system. This was the most powerful incentive to get our faculty on board with the idea that you can deliver high-quality education to students even though they're not physically in front of you. So, from that standpoint, it helped propel us to where we are today with

regard to the history of establishing a credible and effective way for waiting delivering distance education.

Question 2: What do you think encourage people to study in the ICN and distance education?

There is always reluctance to try something new. One of the strategies that we deployed early on was that we provided an instructional development support, individualized support for faculty and practice sessions for faculty to become familiar with how to use the touch screen and how to navigate and manage multiple sites and so on and so forth. I don't think that we had that over the years that we offered courses through the ICN. Maybe a handful of instructors that taught one time and then didn't teach again, but for the most part, we had faculty, cadre of faculty, who taught year after year, semester after semester. Once they became familiar with it, it was very much of routine effort on their part to carry out the classes. I don't agree; I don't think that there was any negative stigma attached to it. Part of that was due to the historical context of the university here. Our long efforts outreach go back to a century ago actually in terms of sending faculty out and providing training and other modes of transportation to the faraway regions of the state to provide professional development. There is a long history of reaching out and traveling to sites to teach face-to-face. Obviously, the downside of that is travel time and expenses, and how much of that you can be done. Obviously, the ICN allowed us to reach out to places on a scale that we weren't able to reach previously. So it was seen as overall

positive for the university and for the program that we were able to drive and use it as a delivery system.

Question 3: What do you think about using the ICN physically?

One of the advantages of the ICN was that it was relatively simple to navigate and to use the touch screen again to move the cameras, to manage the cameras. Faculty and students got readily adjusted to the touch mix quickly. That was one of the advantages of the implementation of the ICN; that is, it wasn't a gigantic stretch from going to face-to-face instruction to teaching over the ICN and all contrast that going from the database class to teaching the entire course through blackboard or some other LMS. That requires a lot more in terms of preparation, and the complexity is far greater, and as a result, I can say this: we had one instructional developer at the time we were using the ICN heavily, and this is before online courses took off. Now we've got 4 instructional developers to essentially help faculty navigate the complexities of the blackboard…. And relatively speaking, it was a much easier transition for faculty to make and the tool itself was relatively easy to master in a few sessions.

Question 4: What do you think about the future of the ICN?

Well, it is a tough question to tackle because I think all account of the ICN as a distance education system is widely down. The MPEG video, the transport system on which the ICN was based, is not going to be supported. But there is a subset on to support the ICN

as an organization to the current video system. So, we have not offered courses for 4-5 years here in the university, and as a result of the sort of the subset and as a result of better options now that are available to colleges and universities and instructors, there is no way to rejuvenate that system and make it be viable in the long term. But I think it served the state pretty well, but it's run its course. And the advent of video conferencing can do many of the same things that the ICN did. It is a new technology that we embraced and it is very popular with students and with faculty.

Question 5: How do you feel about studying in distance education versus face-to-face education?

Well, I think there are a lot of variables that are going… preferences and effectiveness, but the proponents of distance education who have done comparing different modalities of teaching and learning suggested that if the quality of instruction…. It is the characteristics of the learner; it's not the delivery system…. Technology is neutral. I guess some students make a difference in terms of academic content…what tools are more effective, weather it is face to face or not. But oftentimes distance education solves the problem of distance and accessibility. So, I don't necessarily frame it as should be offered face-to-face or should be offered online or some other types of delivery systems. I think you have to look at the learner, at what's the goal of a particular course or a particular instructor in what makes the most sense of going from there to accessibility and the learning outcomes for a particular course. I think many courses could be taught equally effectively whether it is online, blended, or face-to-face. I think it is the quality of

instruction, how coursework is organized, the engagement of students and faculty, and so forth, not the combination of different technologies….

Appendix F

Interview With Kabat-Lensch

Transcript of Interview

Question 1: What do you think about the role of ICN in distance education?

I want to go back to the 1980s at the community college, Eastern Iowa Community College. We had developed a point-to-point microwave system, and there was another community college in the state (Kirkwood Community College) that also had a point-to-point microwave system. It was actually our particular classrooms when the ICN was coming about that they came and…to use as a model for the state. So in the 80s, I was the director of telecommunications here at Eastern Iowa, so part of my job was getting the faculty to utilize the system. For us, we ran certain high specialty classes that would connect our three main colleges, and certain classes that we did not have the expertise at each college site, so we would utilize the ICN to spread expertise across. We also recruited faculty to use the system for specialty classes that they liked more on an elective basis when there wasn't enough students. One of the classes that a gentleman taught was in Germany. There were not enough students at one site. But if he could open it to multiple sites, that would give those instructors the ability to teach some of the PET courses. So, we were utilizing the system in the 80s as a microwave system. We had actually even put it an additional hop to tie to the University of Iowa, which is about an hour away, and did some…it was a master's degree in counseling classes for the university. There were some pioneers particularly at the community college level that were already doing some of that before the ICN came about. When the ICN started, it was truly all about access and equity, looking at how to use every resource, and make sure that all of those individual students particularly in rural areas are able to have access

to the same educational opportunities as those in what would be urban, and so there was a group of individuals who came together.

I thought the ICN was very useful. But I was used to our microwave system and I saw the ability that it gave to our instructors and to our students, and I have to tell you I did my dissertation on distance education and I replicated it as a study that was done in Utah but then utilized the ICN. This was done in 1993. So I was an advocate from the beginning. It took a while to get people to accept it. But if you were a student who does not have that capability, this was opening doors that you never had possible before. Students now are amazed at the stuff we did back then, but it was fairly revolutionary. One of the things that I appreciated from an educator standpoint was that we took a lot of time to train individuals how to use it, the pedagogy of using it, so you didn't have what we used to laugh at just like a hairy forearm in front of the screen. So one of the things that was an important component wasn't just learning how to put it on, but how to best utilize the system, how to make it as engaging as you could, so it was just in one way, and that was a point of pride that we took who were involved at the beginning was to make sure that it was a quality experience that occurred.

I will give you an interesting anecdote. We would ask our instructors to go to the other sites on occasions, so that you could obviously change your origination sites, but to go to make sure that you make some connection with those students. Many times the students would give feedback. They really preferred to have the instructor at a distance because they could continue to talk in class. They could do a lot of things and the instructor would

never know what they were doing. So when the instructor would come and physically broadcast from their site, then they had to behave. So it was very interesting. Some of the other interesting social aspects that occurred is the students would get to know other students over the system, but almost all of them without the instructors asking would find a way to come together as a group at least one time during the class. A lot of times it might have been in a bar. But there was a genuine interest to get to know those of the other sites. So it wasn't as sterile as some people would think. And all of the students that I worked with felt that their satisfaction levels were the same, whether they were with face-to-face or remote. I would think though that could have slightly be tinted by the fact that remote site students were so appreciative to have the opportunity not to have to travel….

Let me add one other thing. I don't know if you are only looking at the educational standpoint, but if you also look at it from an economic standpoint and efficiency standpoint, that was one of the huge uses of the system also from the efficiency of being able to do group meeting, not necessarily a credit or non-credit courses, but living in a state where weather can be bad, it was a huge savings in time and in resources paying for gas. So that was also an administrative advantage of the system

Question 2: What do you think encourage people to study in distance education?

If you look from the student's standpoint, the students were slowed down immediately and I would say we had a tougher time with some of the faculty. That being said, many of

our students particularly at the community college work. And so making it the class all the time isn't always possible. One of the things that the ICN has the capability to do was that we could record lectures. That was very threatening to the instructors because the feeling was that you wouldn't need me anymore. You can just do my canned lectures. There was a fine line that we had to walk for the convenience of our students and so what we would do with the faculty is promise that we would destroy the videotapes within a week or two weeks. So if we had like firefighters for example who miss some courses, they could go to the library and check out the video within two weeks and then we would destroy it. So the flexibility that it gave the student they recognized it right away, but from an instructional standpoint, it was more frightening for the teachers. The other thing is you can sometimes go into a classroom unprepared and may be able to pull it off. If you are going to go on the ICN and haven't adequately prepared, it is much more intimidating and it's much more evident that you are not prepared for class.

Question 3: What do you think about using the ICN physically?

Yes, for the students it was very easy. They just had to touch microphones, but we had formal training for any instructor. Each site had an ICN (I don't remember what we called them) who would go and train at all the sites. Any instructor that was going to teach would go through a certain training session. One of the things I mentioned that we already had in our microwave systems was that they came and looked at our controls and how we had things laid out. They really had put user-friendly podiums together. Probably the only instructor that we really had difficulty accommodating was the one who liked to

walk around the room because they would walk out of the field of vision. But they were very good when we looked at putting the system together, talking to all of us that had systems, what was good and what was bad and how would it be changed if we could. They put together a very user-friendly system.

Question 4: What do you think about the future of the ICN?

You know the ICN could not move as nimbly as some of the colleges could. So as newer technology came about, a lot of the different colleges started utilizing that and using the ICN less. But why the ICN will stay relevant is because of the backbone and the fiber that is throughout our state. So most of the colleges still utilize that for their phone lines. Most of us still utilize that for our Internet connections. It gave us the roadways, if you will, to connect whatever the technology comes down the road. I think that was what was probably the best foresight they had was how large of a pipeline they put throughout the state.

So you go in a classroom now and if someone has an updated… and you still have a TV server two feet wide or three feet wide and you look at it and it looks archaic and it still works. But when you have students that have grown up like we are doing now, I am looking at my phone and I can walk anywhere and I can talk, it seems ridiculous to be sitting in a classroom.

It was just technology moved faster than the state could convert. They had 99 classrooms in every county and then it got to be such a behemoth of equipment across that it could no longer be nimble, but the backbone stays all of us to do additional technology plus we get incentives from the state for using that system so you have discounts that we utilize through the state that is another huge schools still connected.

Question 5: How do you feel about studying in distance education vs. studying in face-to-face education?

I enjoy social interaction. So from that piece, I enjoy face-to-face interactions, but I also am someone who very much so appreciates and expects efficiency. So I have taken some courses on the Internet for actually for a fund-raising certificate that I got, and you could take some of the courses online or you could take some of them face-to-face, depending on how it worked to your life style and what not. I took half of them face-to-face and took half online. I like the efficiency of online. It worked to my schedule, but I got frustrated at it sometimes because of way that the class was laid out. You could read all the materials, answer the quizzes, throw out for discussion, but not everybody else was doing on the same timeframe you were. You need to answer the discussion threats and you have to go back and keep checking until you had individuals you could interact with. So at the end of the day I liked face-to-face real-time, but with the life style we have, it is not always available.

Appendix G

Interview With Dunn

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

My perspective… I don't claim to have any more general knowledge about the whole system than that. When I speak, it would be for my own experience with it. My own experience with the ICN was yes indeed. I think your thesis is correct. There is utility in accepting a new technology or a new methodology, and there would obviously be much more than clients would have adopted. In the case of the ICN, in the early years of it, it became obvious to many of us who were users of it that it was going to be a lot more successful at the college level and particularly at the community college level than it was going to be at the high school level, and the irony of that was the way I was given to understand it in all of the prep work that we did a couple of years prior to its inception…that would have been in approximately 1991-1992, we had many meetings and all kinds of forums. Much information was transferred back and forth to the entire user group about how it was going to work and how it was going to revolutionize Iowa education. Most of the emphasis that I recall in those days was that it was going to particularly revolutionize k-12 education, but it never did. It never did. It tried. Some schools were very forward looking about it. Some individual teachers and administrators in particular were forward looking about it. But it was always hampered by one particular logistical feature that it seems like everybody overlooked. Colleges, my college being a good example, used it like crazy. But I am talking now about the k12s. It was going to take the K-12s really adopting on a massive scale to make it to success every one wanted

it to be, and I submit to you in my experience that it never happened. The reason it never happened was that schools refused to adapt their schedules.

I didn't take classes I didn't take formal credit classes. I learned many things we had meetings, workshops, and forums all the time. I learned a lot of stuff.

Yes, I liked it a lot, and I found that it was actually very good for what it had been built for. The thing is that you had to understand the practicality of it. Now at the community college level, as I am sure you know very well, almost all community colleges have satellite campuses, their branch campuses around, in fact regions kind of do too. But a community college is a visceral thing because every community college has a service area, multicounty service area. So, we have to have campuses out there to on a very practical every day basis serve the population in those service areas. For us it was huge boom. It was not the most elegant thing in the world, but it was pretty damn good for its time. I mean the technical quality, the quality of the video, the quality of the sound, its capacity to hook up multiple sites and still make it work. It was a virtual sort of arrangement. You could hook up any combination of the several hundred classrooms. I appreciated that the relatively high quality wave and the technology worked. My point is that when I really think about was that it connected these rooms, it connected our sites our sites, so we didn't have to hire three different teachers at three different sites. That alone made it work for a while. It worked for us very well for many years.

I think you are right. The ICN was the beginning of e-learning.

Question 2: What do you think encourage people to study in distance education? What discourage them from studying in distance education?

My answer to these questions is very simple. There was plenty of resistance, and resistance would always be based on lack of familiarity. Students would quite often not enroll in the ICN course because they simply couldn't conceive of taking the class where they weren't in the room with the instructor, physically in the room with the instructor. It is really no more complicated than that. A lot of student wouldn't do that. But a lot of students did do that. There was no resistance to it whatsoever. They were usually students who realized that they couldn't take that class at all if they didn't take it that way. It was an economical move forward. You've already heard me speaking about our connected campuses. People at those satellite campuses wouldn't have access to those courses at all if they hadn't taken them over distance. It was pure practicality.

My school used tele-courses liberally we had a huge they were the best course ever made. They had million-dollar budgets. They were excellent stuff. But we could never get that many people to take them. There was resistance to that too.

Question 3: What do you think about learning to use the ICN physically?

It was very easy. It turned out to be no different than what they were used to. It was just a matter of overcoming the…. Once they would come in the classroom and sit down in

front of their microphone and we told them every time you speak, You've got to press that bar over the microphone so everyone can here you. That was the only thing that had to be learned. That wasn't much. So, yes, the technology was very elegant. It was nice. It worked well.

It was never that tough. It was not an esoteric thing that people had to learn from scratch. It was really well put together. It was a good system.

Question 4: What do you think about the future of the ICN?

I really wonder about the future of the ICN. It just depends on what aspect of it you are talking about. As a means to connect classrooms with the traditional two-ways audio, I think the prospect may not be so good. Generally, the ICN is still a pretty nimble system. It is only fiber. It was the first fiber-based state network of its kind in this country, I think. I am not sure how many of those kinds of networks there are around the country. As a carrier, a common carrier, its future might be ok. It is still used by most of the schools in Iowa as their primary data carrier and in some cases still as a voice carrier. Just in those terms, in purely technical terms, its future might be a little brighter. But as an education medium with two-way audio-video, time has passed it by. That is my impression based on my colleges' use of it and what I see going on around the area in terms of school usage in general. It is not really used that much for what it was designed for, the video….

It is outmoded for one simple reason. Forgive me if it doesn't sound well. The reason that it is outmoded is that the Internet has passed it by. The reason that the Internet has passed it by is because it is a lot more convenient to sit down at your laptop than it is to drive to a campus to go to an ICN classroom.

I would absolutely agree that distance education would continue growing. Let me put it this way. At my college, distance education is the only aspect that has steadily grown over the last years. No other area has. For example, this summer, in Western Iowa Tech, my college, about 70% or so of our entire enrollments would be online. Our online enrollments are up significantly this summer from the last summer. There is no other area of the college enrollment that is like that.

Question 5: How do you feel about studying in distance education versus face-to-face education?

I don't think that hands-on face-to-face education is never going to go entirely, at there are least in our life times. In our online courses, we have hundreds and hundreds of sections of online classes every term at my college, and I think that is fairly standard around the country, but we don't have very many classes in what we call technical educational areas, hands-on programs, auto collision, electronics, nursing, that sort of thing. We don't have very many wholly online programs in those areas yet. So, there is that whole bridge to be crossed yet. That kind of stuff is considered to be inherently hands-on classes. We will a whole lot of curricula that

Appendix H

Interview With Groner

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

One of the reasons why the ICN was created was to allow education to be equal in Iowa. It was built primarily to help and serve rural education in Iowa, so rural schools could have the same access to content, educational resources, classes, and teaching curricula that a large school has in the major metropolitan area in Iowa. So, from that perspective, a network was created to make education equal across Iowa. So, it was extremely beneficial that rural Iowa schools that maybe have a few hundred students could access to classes like a foreign-language class that is taught in the metropolitan area.

The other thing about the advantages of the ICN is that it has changed over the years. We created in the platform that we used a videoconferencing platform for distance education, two-way interactive video conferencing. So, teachers and classes in one city were directly interacting with teachers and classes in another city through the audio and video, two-way communication. Those methods of distance learning have changed and they have changed primarily because of the Internet and how we deliver services and what network is used for in terms of the fact that education has changed significantly. You can see a drop in the number of hours of videoconferencing that correlates exactly to the increase in Internet bandwidth usage of the ICN.

From those two points I would definitely sat that the ICN has made a critical role in education in Iowa simply because it's got education to where there was no opportunity before and it helped enable how education and distance learning were delivered in Iowa. Again, the original, what we would call our flagship service, was a text classroom-based distance learning videoconferencing system. That certainly does not have a role anymore. At the peak, we were generating and using over 300,000 hours per year of distance learning methodology. Today that methodology is below $20,000, and what has overtaken it is Internet. Our network has been updated and refreshed a couple of times in the last 20+ years.

As a matter of fact, we are getting ready to enter into a new phase. We're going to move from a10 gigabit backbone to a100 gigabit backbone. We've served not only education, but also others. We serve government, we serve public safety, we serve healthcare, and we also serve education. Those are the four articles that we buy by law and are authorized to provide services to. We provide a wide range of services not just distance learning. We do on our own ISP, so we are Internet service provider. We deliver data connections on our backbone point-to-point and other types of data connections. We deliver voice services. We're a long distance provider. The SCC as a common carrier in fact classifies us. So, we deliver a whole range of products and services to those who are major user groups. That makes us relevant. There is the endpoint technology in some classrooms that does not belong to the ICN or belong the individual school or community college or private college. Those were the responsibility of the college to upgrade. The core backbone of the delivery mechanism was the ICN, which was refreshed several times.

Years ago, we moved to the IP-based videoconference system. It is not the legacy system, not like the legacy system we were using in the past. So, our technology is current. Our means of delivery are current. We've employed very talented, technically savvy people in our engineering and operations. We run 24 by 7. We are very relevant to any number of areas, not just education. In particular to education, we are probably one of the only providers in Iowa who can deliver the kind of Internet bandwidth that is required to run education. We have some schools, small rural schools, where we're to which we were delivering 500-megabit bandwidth. We have some schools that already have up to a gig. We have area education agencies that support geographic areas and schools. They may aggregate or need Internet traffic up to 10 gig and plus 10-gig connections. Without the ICN, education in Iowa would not have had the capacity, and Internet backbone capacity, to deliver online tools.

Question 2: What do you think encourage people to study in the ICN and distance education?

Sure, I would classify that—the reason that they would use the ICN—as availability and legacy, meaning that we were able to deliver a class via videoconferencing, broadcast quality video conferencing, at over 700 points in the state, and made education available. So, a person could take night classes from University of Iowa, but they lived in rural cities across State, and had to travel and live where the university was and had housing expanse to take classes. The same is true today. Now, it is not just nighttime classes; you have students using Internet to taking classes at 2 o'clock in morning or 2 o'clock in the

afternoon. They have availability to reach their content and curriculum from teachers and classes any time they want to be on the Internet. So, really, what the ICN is able to do is to attract the use of it and make those things available.

Question 3: What do you think about implementing the ICN physically?

The system was designed where if you entered a classroom that was enabled by ICN videoconferencing at the point, it was all prescheduled. We had a centralized scheduling system that you would schedule your time and your class, and reserve it for whatever multiplying points, and it had the specified time of the class. It was all automatic, meaning that the session would pop up and all the scheduled appointment was scheduled for that session. Students, teachers, and users didn't really have to do anything except turn the lights on and the classroom itself. The classroom itself would automatically come up. At the end of it, let's say you scheduled the class for an hour and half, 90 minutes later the session would automatically end. So, it was easy to use in terms of entering the class and stopping the class because the distance learning was automatic, and was automated by our centralized fiber system and by centralized scheduling for everybody. So, a scheduler in one part of the state did the schedule for all the classrooms. It was built with the push-to-talk system originally. That was designed because you have to press the push-to-talk microphone to block all the other microphones out, so only that student could talk. It was very easy and simple to use. It was as simple as possible. Well, that system that I just described, when the network was first built, was built on MPEG videoconferencing technology, and continued to use fiber optic for the delivery of that. It

was a TDM-based service. Today we still have the same fiber optic backbone for delivery. However, it is an IP-based backbone and all our videoconferencing is IP-based…. It is very simple.

Question 4: What do think about the future of the ICN and the future of distance education?

I tell you the biggest asset that the ICN has. It is our backbone, the actual fiber optic that is on the ground and is terminated with lasers and the optical electronics on the end of that, which can be refreshed and replaced and reframed. To use your analogy, one of the greatest innovations is not necessarily the car, but the assembly line, the core structure of what the assembly line does. That model is still used by carmakers today. No matter how cars look like or what materials are used in them, the concept of the assembly line is still used to build the same thing. Our backbone is such a robust high-capacity private secure communication backbone that can be adapted to whatever technology for distance learning comes online. So, in the beginning, it was used for videoconferencing distance learning, the very traditional brick-and-mortar-based concept of education. That was used for the current model, which is an online-based form of distance education using the backbone for Internet delivery, IP delivery. Whatever the future holds for distance learning, whatever technology that might be, the backbone can adapt to that and carry on with that.

Question 5: How do you feel about studying in distance education versus face-to-face education?

Well, I don't know if it would… and I'll tell you why because models change, technologies change, and the ways things are done can change. However, people still like to communicate. For instance, I know my video is not working, and I am sorry for that. But you and I should be a face-to-face… or I can see your face. I can interact with you like you're sitting in my office here. We could have done this by regular conference call. We chose to do it by a different means because, I think, in some point, human interaction is still and will always be valuable, especially in learning too when you have someone teaching you something. I think there are always teachers. Teachers will never be replaced with robots. When you have that, human interaction will enable that one-to-one type of feeling that people get when they are talking to someone. I think that the backbone and the Internet will enable that, whatever format it takes, whether it is the legacy video platform, zoom technology, a virtual reality type environment like the one you just described… that you're sitting in your living room as if you are in a classroom with others, whatever that entails, the Internet, backbone, and delivery mechanism….

Appendix I

Interview With McMahill

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

My name is Dr. Janet McMahill. My current position is Dean of the Drake University School of Education in Des Moines, Iowa. I first became associated with the ICN in 1993, when I was also employed at Drake as the assistant Dean of the School of Education in charge of continuing education and off-campus programs. It was in 1993 when our university opened the site, and it was also the year of one of the worst floods in Iowa history. I was present when Governor Terry Branstad live broadcast to the stage, talking about emergency preparedness from our university.

We were very proud at that moment because everything with the ICN worked. It was impervious to water that was surrounding it. Other lines of communication were down. The ICN—that wonderful fiberglass—Worked perfectly. Shortly after that, I began talking to other leaders around the state, and there were very many of us involved in distance learning at the time. A few people at community colleges, Dr. Simonson, and early adopter have been there from the beginning, when there were frame relay satellite learning desktop, video conferencing, audio conferencing, and videotapes lessons. Closed circuit TV was older. But this was something new and very different and powerful, so we gathered together in an association, ultimately formed as the Iowa Distance-learning Association. It is still an active chapter today. I then became affiliated with the United States Distance Learning Association, where I was one time an officer, and still am a remember of the Iowa group. But What we found was that the fiber was installed, and it

was going quickly from about 100 sites to 200 and 300, and I think this time there might actually be up to 700 points connected one type of communication or another, one user or another. But almost no one knew what to do with it and so, Dr. Simonson wrote and received, to my knowledge, the only training grant that the State of Iowa had called TEA, Teacher Education Alliance.

With those training dollars, he helped people in community colleges, area education agencies. There were 15 at the time. I would divide them as 15 segments. Each one had an area agency that helped K-12 teachers, each one at a community college. Each one of those had at least one site. Universities came on. Private colleges like Drake came on at our own expense. We brought the fiber from the road and the lines from the road, the highway, to our university, so you could say it was part of the early adopter, and then helped use it for some of our continuing education.

Absolutely, I agree with that, and it was history making. It was live two-way, point-to-point, multipoint, perfect communication that was crisp and reliable, and there was like no other. I would go to places and people would say, tell me about Iowa Communications Network. So, there was a great deal of interest in the beginning and it really transformed things from one way or stilted two-way to very lively multipoint communication. So, it has the potential. Please understand we darkened our site and are embarrassed about that, but about 10 Years ago, we darkened our site and we cannot use it. I believe we use the Internet service, but at the time there was certainly nothing like it.

Iowa is full of…. It probably started this, but we have a few large urban centers much smaller than urban ones that you consider that. Only a few million people in the whole state, but in cities like Des Moines, there are a lot of opportunities, a lot of teachers, and schools can offer pretty much everything they need to. But in 300 school districts in Iowa, 200 of those would be considered rural or very small. Some of those would even have fewer than 500 people in K-12. This has the potential of bringing educational equity to places where they could not afford specific content area, advanced level courses, many electives, things that school districts really need. I know it has seven categories of users: its prisons, its armories, its medicine, it's courtrooms, area agencies, public agencies, high schools, community colleges, and colleges, potential for everyone, but I really think the governor and the legislator's vision was for the improvement of K-12 educational opportunities, and every school district had at least one site and one classroom furnished at the state expense.

Question 2: What do you think encourage people to study in the ICN and distance education?

To encourage, it would certainly be content or information that is very difficult to receive or to get in another form and another time and place. A second would be the live interactivity and the ability of those mobile cameras to capture an entire group of people, and that still makes it unique because you and I are just two and two, and there is somebody by me helping me, but that was two one-one, and had the potential to have an entire group of people who could actually see on camera an entire another group of

people and maybe another. It was very powerful. So, it was live interaction. The other potential was to save time. That's time for those who teach, those who use service, time for the students, that's driving time and maybe time that is not even available, and then another is to share talent. So, many people studying in schools cannot afford to have a specialist and everything, and so there's a lot of talent, but not only local talent. In the early years, we brought in national and international talent. So, if someone came to our university from another country or culture, we could broadcast to some of our students in many places. So, I started using the ICN in different parts of Iowa. I would broadcast from Drake or I might travel to another part. I was a teacher before as well as being an associate dean in the early years. But we had a discouraging point: it was the fees. So, if I had 20 students in a class and the students came by and wanted to stay in five different places, the discouraging point was the same time driving and money and gasoline. So, why would they want to drive to wherever I was broadcasting?

So, I not only had to pay a fee for hourly use, but I had to pay a fee for every hour everyone else used the system. So, we use it for a few years and then decided that it was just cheaper to move our professors about, and I'm sorry to say we cannot continue. Another discouraging point was after a few of the early innovators like me, Michael Simonson, and others, there were not many people who were agile at using the camera. It sounds silly; today, my five-year-old granddaughter could operate it. It is not hard, but there was still a stigma of teaching electronically and moving the camera about and connecting… and how do I get my slides up and how do I have my handouts? So, there

was a perception of techno fear that was there, but there was almost no money invested in professional development.

So, administrators started looking, and principals the budget managers said, well, that's nice, but it's pretty expensive. Then another really difficult point was that the equipment didn't last forever. The equipment was free in the beginning, but very few people invested in the upgrading of the codecs of the system. The lines have been upgraded, and the upgrading is done at the state level, and it's absolutely workable, but most of the end-users did not upgrade their classrooms.

Question 3: What do you think about using the ICN physically?

I personally enjoyed using it and did not have difficulties, but I majored in speech education and public speaking and knew a little bit about technology, so I don't think I'm a typical spokesperson. I think most folks around me and I went into spots and said let's have a life meeting; let's connect next time on the ICN. If that's okay, I'll just drive over and see you. So, I think the reluctance was very real because technology wasn't common in their other lives. Now there are more devices that I can count, and I didn't do this one very well. I've got this computer eight days and I couldn't see that the audio is right in front of my nose, but I am not afraid…. It was ahead of its time.

Question 4: What do you think about the future of the ICN and the future of distance education?

I think that the future of asynchronous ICN live broadcast, although that's one of the shining points, is very limited. I think the early adopters have gone away. I think other technologies have taken over. They are affordable and more available and know no boundaries, and there has not been any investment of time and equipment and training. Unless there is some kind of renaissance underway and I don't know if that would be, but it would probably be costly and it would need a large infusion of dollars and a lot of folks to come forth and say don't worry about Citrix, GoToMeeting, or somewhere, or anything else. Just go back and look at your equipment, but it would cost us $50,000 to upgrade each ICN room. We're probably not going to do it.

Question 5: How do you feel about studying in distance education vs. face-to-face education?

I'm not going to be able to say one or the other without qualifying it. So, in certain circumstances, distance learning is far and way better, more available, and maybe even more robust and interactive lights than face-to-face classes. You can engage individuals from literally all over the world. You can increase perspectives. You can add talent and you can differentiate learning styles. Individuals have an opportunity to speak, to listen, to write, to connect, to broadcast, or not. So, you can use all learning modalities when it's done right. When an organization uses it as their only means of putting forth their mission, look at the mission of the institution and the mission of our institution would not include distance-learning only. It would be a component and where it fits, where it can do

something better. I will give you an example. We can and must embrace it. It's also fun and I know it could be. It could be better than life. So here's an example, and it's not that different from what we originally thought of the ICN. We have a program that allows teachers to take five classes and get an endorsement, a state of Iowa certificate, to go out and teach talented and gifted students.

By law, every school district needs one of them, only one. That is, there's no chance for me to put a good program together live with…. The city of Des Moines already has 12, another of my retirement, but across the land and in fact in the department of defense schools With the US military, there are people all over who need that, and so we have an exciting almost one-of-a-kind distance-learning program that deals with our unique need and gives them the content they need, when they needed, where they need it, with other people who needed, and the university also prospers. There is a financial element that shouldn't be ignored. But when I talk with folks like you, I speak often about it. I am asked to talk to our Board of Trustees. I was asked to do that… why we are doing more distance learning. I said we can and we should get to give more resources. We are not going to just scan syllabi, assigned readings, and tell people to turn in papers, or answer machines for test. There is a cost involved….

Appendix J

Interview With Schlosser

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

When the ICN was introduced, it was a remarkable innovation because it offered Iowans a way to teach and learn. In a way, they were already familiar with it. We worked with intact classrooms and because it was synchronistic distance education, instructors could see all the students; the students could all see the instructor, and the students could see each other. It meant that we could teach in a way…. We didn't have to adapt our teaching too very much. It was transitional. It was distance education, but not a big lead from what we are doing in the face-to-face classroom. It meant that we could increase the numbers of students and locations of students. In terms of teaching technique, pedagogy, nothing much had to change. At the time we thought there were some big changes, but now as when we look back, we didn't really have to adapt too much the way we were teaching. Instead of using a blackboard, we used an overhead camera. The brand was Elmo, so we used that generically. The quality was very high, and so we had very high-quality audio and very high-quality video, and so huge advantages I thought at the time was to learning curve….

It was new. We and other places had had similar technology. There were compressed video systems, using telephone lines, T-one lines, I guess they were called, and there were satellite delivered courses. There was ITFS. There was Instructional Television Fixed Service. Those were all effective, but they were not as refined, in my view, as the ICN. As with the satellites, the students could see the instructor, but the instructor could

not see the students. Students had to call the instructor on the phone, but there were often thousands of students in class, so very few could actually contact the instructor during class. As with ITFS, you were limited in distance, but with the ICN you could reach students all over the state.

Sure there was some. But as I reflect back, it doesn't seem as though the resistance was extensive. Also, a lot of the teaching at a distance was voluntary at that point. If you didn't want to teach at a distance, you didn't have to. The mandate that teachers have to teach at a distance came along later. So, the people using the system were early adopters, and by definition and by inclination, they didn't have to be persuaded too much, and for students at a distance, the opportunity to take classes and not have to drive all the way to… was a big advantage. I didn't think there was a lot of resistance at that time. It was useful. It was interesting. We all felt at the time…. It was a little bit like an experiment. It was new to all of us. We were trying things out. At the time, we had a sense that it was the future of distance education.

Question 2: What do you think encourage students to study in the ICN and distance education?

That was one of the great strength of the ICN. Remember that the ICN was not an innovation from outside Iowa that was imposed upon Iowa. It was generated from within Iowa, and because of that, it was designed to fit the Iowa approach to education. Iowa has overall a good educational system. People generally regard their schools as good quality.

It's historically been true anyway. So, the ICN was designed to fit within Iowa ideal of education. Iowa has an extraordinarily large number of school districts. In Florida, each county is one school district, but in Iowa, at the time, there were hundreds of school districts. Every little town had a school district, and of course there is some consolidation, but the idea is to keep kids as close to home even in small towns. In every small town, everyone wants to have some say in the education of the children, and so to be able to allow students to continue to stay in their home school to take classes that they would not otherwise be able to.

And in a way, it could hold up consolidation for a while, and that meant that the students could be offered opportunities they wouldn't have otherwise had. So, that made the local schools much stronger. In terms of higher education, it meant that there wasn't a huge difference in how we talk face-to-face and at a distance. I think it was all very compatible. It was synchronous and it was classroom-based. So, if you have a conservative approach to education and if you think what you're doing right now in a given time is okay and you have an innovation that allows you to do basically more of the same, then it is a good fit. The ICN fits into the existing system very well.

Question 3: What do you think about using the ICN physically?

Again, that has to be divided into two chunks, two basic ideas. The first is from the perspective of the user… and for the instructor… it was easy. The equipment was a podium, really a desk. It was very well arranged. There was consistency. So, there were

standers. Every classroom had to look basically the same. So, the tools were the same in every classroom, the same kind of overhead camera and the same kind of switch. The monitor in the classroom was a 32-inch Sony CRT. They were standardized. The room had press-to-talk microphones. They were all same. You could be confident that the equipment in the classroom to which you were teaching was the same as the equipment that students were using at a distant site, or you could go to a distant site and teach from there, if you liked. It wouldn't be all new equipment. It was familiar. For the students, it was simple. They sat down at a table. The classroom was usually arranged with tables, rather than desks, and it was very easy to use. It should also be born in mind that the classroom for which I taught had a control room, and whenever every time I taught, there was a technician there. If there were any glitches, he could handle it. There were rarely glitches…. I didn't have to worry about technical problems…. It was very easy.

Question 4: What do you think about the future of the ICN and the future of distance education?

I am not well equipped to address the future of the ICN. My involvement with it ended in the late 90s. So, I would be a poor source of information in respect to that except to say that I thought what we were doing in the late 90s was the future of distance education at least in the short to medium term. I was wrong. What I didn't count on was the rapid growth of the Internet, Internet users, and the ability to do on one's desktop what one was doing with the ICN.

The Internet had existed. What didn't exist when the design was proposed and construction began was the World Wide Web. The World Wide Web was the major innovation that was so very disruptive. I don't think the ICN was disruptive at all. As I look back, at the time, maybe I would have thought it was. But it was not. It was not a disruptive technology. It was a transitional technology, and that's an important characteristic of the ICN. It was a safe reassuring high-quality kind of technology that helped people become comfortable with the idea of distance education. It was not threatening. It was a transitional technology.

The brief answer is no. I don't think that's likely to happen anytime in the near future. I should point out that I had a very poor track record as a predictor of the future of anything, but some ideas about, some thoughts about your questions. First of all, I think there's a major difference between K-12 education and higher education. There are practical reasons why communities and parents and children want to have face-to-face instruction. For one thing, if you're working parents, what do you really want to do with your children at home all day? Would you be comfortable with that? Is that appropriate? There are some practical reasons for why we want to have students: social reasons and other reasons for having kids together face-to-face. In higher education, we can break that down even more: with technical education, with undergraduate education generally, and with graduate schools. I think there is always a role for face-to-face instruction, but in higher education, the role of distance education I assume will expand. I don't know about the tools, but it is going to be increasingly asynchronous and individualized. There may be a move away from traditional academic programs. In one institution, it could be that

students will collect credit toward a degree from a variety of institutions. We will just see. I don't know, but I don't think that K-12 education and higher education will have similar paths. They will be quite different.

As for the field of distance education, I think, strangely enough, as distance education becomes more ubiquitous, the field itself will begin to disappear because if all education has some elements of distance education, then what is distance education anymore? It's only education. It is not something separate anymore. It is assumed in the larger field of education.

Question 5: How do you feel about studying in distance education vs. face-to-face education?

Let me say first of all that I much prefer teaching at a distance to teaching face-to-face. That wasn't always the case, but then I used to teach photography, photojournalism, and back in the old times, it had a lab component. That would be very difficult to teach at a distance. Now it is very different. It is digital. But in terms of learning at a distance, I would prefer to learn in a face-to-face environment or maybe in a blended environment.

Appendix K

Interview With Sorensen

Transcript of Interview

Question 1: What do you think about the role of the ICN in distance education?

I think it ended up having a different role that people thought it was going to play. That's what I probably remember the most about it. When we were advocating for putting money in the ICN, part of the argument was to provide access to remote rural students to take courses and other kinds of coursework that they couldn't or wouldn't be able to have access to otherwise. It was very much targeting toward k-12 at the time, the PR at the time. But as it turned out, we ran through obstacles no one thought about in terms of using it toward our purposes. We obviously had certain purposes for what we needed it, but it ended up to be not what actually happened because we didn't anticipate things like schools have different schedules, different calendars. They were operating on different… schedules. There were all sorts of things that were difficult although there was activity… was anticipated when the ICN was initially built. However, what happened was it began to have a very big role in connecting people for a whole lot of purposes, for in-service activities, for higher ED use, for offering... for groups getting together to talk about common issues, for principals connecting across the State, for maybe chemistry teachers sharing information. It came to be used for many other things that it was originally installed for. So, it was intended to give one thing, but it ended up doing something a lot more than what we thought about. We called that unanticipated consequences.

Question 2: What do you think encourage people to study in the ICN and distance education?

I am not sure whether I like to call it compatible…. part of the problem is in general that it takes a while for people to understand that it is not just taking what you do in face-to-face class and converting it to distance education. My experience with the ICN when I went through that actually let me become sort of a leader in that area when I moved to the next institution I worked for. So, when I went there they were doing interactive video, which was similar to the ICN. They were doing interactive video when I moved there. And what I had learned through the ICN, I took with me. They would require faculty to go through training on how to teach interactive video. I was on training and then I thought in fact I had taught distance ED, but nobody requested me to do that. Why should I do that? I am familiar with that. I've taught young children and it is easy for me to do that. So, they let me do that, and I got really high grades, and nobody actually gets high grades in teaching video courses. What are you doing? Did our training help you? Your training is terrible because you focus on how to use the technology itself, not on how to teach in a pedagogical way that is appropriate for the technology. And so, as a result of that experience, I developed… and also trained every faculty member across the university who wanted to teach in that kind of environment. So, there is a learning curve always with technologies. As people look at the ICN, the people start out to replicate face-to-face classes and then learn through the experience they cannot do that. We have do things somehow differently when you teaching at a distance.

Question 3: What do you think about using the ICN physically?

With any technology, there is always a learning curve. I don't remember being afraid or anything like that. You should learn how to manage an additional thing. That's what I would tell faculty all the time when I would do the training thing. Look, it is going to be a little different in the beginning, but you have to think of it this way. It is like when you learn to use remote on your television. The first time you do it, you have to stop and think about it, but then you stop thinking about it. It becomes automated. You do it automatically. The same thing is with the ICN….

Question 4: What do you think about the future of distance education?

I am not in Iowa anymore. I have not been in Iowa for a very long time. I have no idea what they are still using the ICN for. But there are…. In terms of fiber optic network, providing information…. there are still… of getting access to provide the mechanism by which things can happen. However, video… that is becoming less… that particular format that we're using video with TV and all that has pretty much gone away for the most part. But the fiber optic cable itself still provides ways to interact and do things … using fiber optic network to connect. But more people are going to use all kinds of free media online and on computer to connect, rather than using the ICN.

Question 5: How do you feel about studying in distance education versus face-to-face education?

I tell my students all the time that it is a bad question. It is not an either/or question, or it is not just a this-versus-that question. Well-designed instruction is well-designed instruction. You need to design instruction for the environment and the way it is going to be delivered. Well-designed distance education is just as good—not a question to be asked—as well-designed face-to-face education. In either case, you can have a really bad face-to-face instruction and really bad distance education. For me, it is more about the well-designed instruction and environment. If learning takes place and the learning is effective, no matter the delivery mode. It doesn't matter whether the truck brings the vegetables or the train brings the vegetables….

Appendix M

Responses Offered by Gronlund

Educational Leadership Perspective:

I am highly supportive of developing distance-education. I believe technologies will continue to evolve and improve the learner participation within a virtual and distance learning setting. I also believe distance-education will allow learners to engage in their learning with experts and fellow students from around the world. It has the ability for learners worldwide to have access great teachers that are currently available only to students attending elite colleges, universities, and/or institutes. Another belief that I have is distance-education will reduce costs. We will reduce the number of classrooms (expensive facilities) for face-to-face learning. It has the potential to reduce faculty costs because we could have higher faculty-student ratios with distance-education thus fewer teachers. Lastly, I believe everyone under the age of 30 finds distance-learning an expectation of within their learning experience.

1. What do you think about the role of the ICN in distance learning?

Response: I believe the concept of electronic distance communication will continue to evolve and grow. It generates efficiencies because participants avoid travel time to a distant site and allows more people to be involved. However, the Iowa Communication Network is not keeping up with other available resources. Our agency was a frequent user of ICN in the past and, now, it is rarely used because our distant communications are via ZOOM. ICN continues to provide access for the agency and area schools to the Internet.

2. What do you think encourage people to study in distance education? What discourage them from studying in distance education?

Response: I believe convenience and access is the reason individuals use distance education. Online learning options allow individuals to access their learning based on their schedule. It also allows an individual access to worldwide experts and content to meet their individual needs. Therefore, individuals may engage in: online learning at 11:00 p.m. from their home; a webinar presented by a notable expert in the field while every participant participates from their home/office; and content that is not available at a nearby community college, college, and/or university.

I personally have gained more from learning that involves the interaction between a teacher and students in a room together. I am also over 60 years of age and I believe that I have a bias. My own children have used distant learning. Their remarks have been distance-learning works for content and algorithm application study. (e.g., math and accounting) They comment that learning involving higher order thinking, theory-based inquiry, and/or complex decision-making where teachers challenge student responses is better within a face-to-face format (e.g., philosophy and social studies).

3. What do you think about using distance-education technologies including ICN?

Response: I personally believe that technologies will continue to improve and distance education will grow. I believe technology will improve and it will provide for greater interaction (instant exchanges) between participants. I also believe that future students

will most likely attend at least half of their learning time engaged in a virtual learning setting because it would cut the cost of education (i.e., facility costs).

4. What do you think about the future of the ICN?

Response: I am uncertain. ICN has not kept up with the changing technology world. ICN is a public entity and the decision-makers are elected officials. Therefore, practicality, reasonableness, and/or well thought-out decisions by elected officials are hindering ICN from reaching its full potential. The private technology sector is a rival. These companies influence legislative action regarding the ICN future.

5. How do you about studying in distance education vs. studying face-to-face education?

Response: I prefer face-to-face because it allows me to be more engaged and to be more of a reflective thinker. Again, I am over 60 years of age. I have advanced degrees and the old system worked for me. I remarked earlier my own children are college graduates and have advanced degrees. They have used distance learning to their advantage and they have found value for specific purposes. (I mentioned those purposes earlier.)
I have found my distance-education experiences have more value if I have been able to meet and create relationships first; then, I have a relationship with participants to dig deeply into my thinking (knowing and doing) around applications of concepts, ideas, and/or theory.