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Guidelines for Development of Courses for Delivery Over The Iowa Communications Network

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy

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We hereby certify that this dissertation, submitted by Gary F. Hasman, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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This paper examines the quality of education as it relates to the Iowa Communications Network (ICN). It reviews the literature to determine a working definition of quality that was used to create a list of characteristics desirable in teachers who use technology. A list of such teachers was solicited from three administrative committees of the ICN and from the directors of the state's 15 area education agencies. Four teachers were selected from the list and their approach to creating programs for delivery over the ICN was examined. Personal interviews were used to discover commonalities among the four teachers' approaches to distance education that had led to their success. These commonalities, along with the working definition of quality, were used to develop a set of guidelines that can be used by developers of future ICN offerings. The guidelines contain information on designing courses for distance education, overcoming obstacles, use of collaborative techniques, and distance learning methodology. The guidelines were developed into a small booklet that will be distributed to teachers and administrators across the state of Iowa.

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Chapter I

Introduction

History of the Iowa Communications Network

In 1967, the 62nd General Assembly of Iowa appropriated $500,000 for "implementation of an educational television system in the state of Iowa" (State of Iowa, 1967, Chapter 88, Section 20). The same law created the state educational radio and television board under the comptroller's office that was charged with:

> "planning, establishing, and operating an educational radio and television facility and such other communications services as may prove necessary in aid of accomplishment of the educational objectives of the state" (State of Iowa, 1967, Chapter 88, Section 6).

In 1973, Iowa's radio and television facilities and management were placed under the Department of General Services. In 1983, the 70th General Assembly created the Department of Public Broadcasting. The department took over the responsibilities of the state educational radio and television facilities and replaced the General Services division of the previous 10 years. Under the same law, the state educational radio and television board became the Iowa Public Broadcasting Board.

The earlier board's charter was carried forward, but with the addition of a significant statement. Added to its duties, the board was charged with making educational programming its highest priority (State of Iowa, 1983, Chapter 126, Section 13).

In 1986, the Iowa Department of Public Broadcasting became the Division of Public Broadcasting under the Iowa Department of Cultural Affairs. The following year, the General Assembly passed a law which directed the Iowa public broadcasting board to "cause to be developed and adopt a state educational telecommunications design plan" (State of Iowa, 1987, Chapter 303, Section 84). State agencies, state political subdivisions, private institutions, and other private organizations were required to submit their telecommunications plans to the board for coordination with the state level plan under the same law.

The 1989 session of the General Assembly separated educational telecommunications from other state telecommunications. The general state telecommunications was remanded to the Department of General Services and the educational portion was given to the Public Broadcasting Division of the Department of Cultural Affairs for administrative purposes.

Also created was the state communications network fund in the amount of $10 million for each of the fiscal years between July, 1989, and June, 1994. These funds were appropriated to the public broadcasting board to finance a statewide communications network with "sufficient capacity to serve the video, data, and voice requirements of state agencies and the educational telecommunications system" (State of Iowa, 1989, Chapter 319, Section 33.1).

This same law gave responsibility for the network system design to the Department of General Services. General Services also retained responsibility for the network infrastructure. At this time, the development of the network was divided into three phases, each spreading the infrastructure further and further into the four corners of the state.

In 1989 the Department of Education was charged to provide assistance to schools, area education agencies, colleges and universities in the use of educational technology for instruction purposes. The department was required to consult advisory committees and end users in developing and operating the technology.

The 1993 legislative session moved the Division of Public Broadcasting to the Department of Education. In 1994, the 75th General Assembly created the Iowa Telecommunications and Technology Commission. The state network became the Iowa Communications Network (ICN) as it is known today. The commission became responsible for the network's design and implementation. The network's overall management was given to the Educational Telecommunications Council and its regional subcouncils. These councils establish scheduled usage of the network and recommend long-range enhancements to the commission (State of Iowa, 1994, Chapter 1184, Section 7).

Eventually, the ICN connected schools in all of Iowa's 99 counties with over 2800 miles of fiber optic cable. Federal funding, through the Star Schools Program, provided impetus to encourage the use of telecommunications to improve resource accessibility to underserved populations. The Iowa project was titled the Iowa Distance Education Alliance (IDEA). IDEA, considered an unqualified success by many, began with six goals:

1. Distance education in Iowa using the ICN will be conducted in a coordinated and systematic manner.
2. Instruction using the ICN will be understood and accepted by Iowans.
3. Iowa educators will be prepared and supported so they can effectively teach students at a distance.
4. Iowa schools will be connected to the ICN and through it to other telecommunications networks.
5. Instruction in mathematics, science, foreign languages, literacy skills, and vocational education will be improved and the number

of opportunities will be increased.

6. A program of research and evaluation will be established to document the impact and effectiveness of the use of the ICN.

(Simonson, Schlosser & Anderson, 1993, figure 3)

Statement of the Problem Investigated and Goal That Was Achieved

Conspicuously missing from the list of goals is any reference to quality. Acceptance, teacher preparation, connectivity, and instruction improvement are mentioned, but insuring that these result in quality education is not. It is interesting to note that the World Wide Web home page of the ICN includes the following statement:

> First and foremost, lawmakers have stressed that education, though not the only reason for the Network, is the ICN's top priority because the Network was founded to strengthen the *quality of education* [italics added] in Iowa ("Welcome to," 1997).

This appears to argue that quality education is the driving underlying goal of the ICN. Why, then, did it not receive direct attention with a specific goal? The "program of research and evaluation," mentioned in goal number six, while covering many aspects of the ICN, appears to have missed this particular facet of the technology.

The goal of this paper was to develop a guidebook of tips and techniques that could be used by teachers to create courses for delivery over the Iowa Communications Network with an eye towards improving the quality of initial offerings. Toward that end, an investigation into the concept of quality in education was undertaken. The investigation examined definitions of quality in the literature and discussed the use of the term in relation to education. For the purposes of this paper, a working definition of quality education was developed from the viewpoints found in the literature. This definition led to the examination of indicators of quality. The types of indicators, how they are selected, and their applicability to education were discussed. The working definition coupled with the discussion of indicators generated a list of characteristics desirable in teachers who use technology. This list served as the criteria against which teachers were selected for further study and provided a basis for the elicitation of their expertise.

Names of teachers were solicited from three committees that oversee the ICN. These committees were the Education Telecommunications Council, the Star Schools Partners Council, and the Technology Team. The list of characteristics developed from the research was provided to these committee members to assist their selection of teachers. In addition, this request for names was sent to the 15 Area Education Agencies who oversee regional education efforts in the state. Inputs from these sources provided a short list of highly qualified teachers who use the ICN regularly.

The author of this study then looked at four teachers selected from the above list and examined how they created their ICN course offerings. This examination focused on techniques and methodologies that led to these teachers' successes and extracted commonalties from their techniques and methodologies. Coupled with concepts and ideas from the literature, these commonalties were formed into guidelines to be used by developers of future ICN programs.

The current lack of specific guidelines was a cause for concern by the administrators of the Iowa Communications Network (P. A. Pfitzenmaier, personal communication, February 19, 1998). Therefore, it seemed appropriate to examine the concept of quality as it related to the ICN. And, there was sufficient experience to generate an initial set of guidelines to improve first time ICN offerings. These guidelines were turned into small book (see Appendix F) to be distributed to all teachers in the state for their use. This book constituted the goal of this project.

Relevance and Significance of the Study

Actual construction of the Iowa Communications Network (ICN) infrastructure began in 1991. Its original purpose was to equalize access to educational resources by all rural Iowans. More than nine years later, there are over 500 sites connected to the network with more to be connected in the coming years ("Welcome to," 1997).

Over this time, several studies examined numerous aspects of the ICN. Some papers (Abel & Hays, 1997; Abou-Dagga & Herring, 1997; Fagan, 1997) examined whether teachers were inclined to use new technology. Many looked at teachers' attitudes towards the use of distance education in the presentation of curriculum (Miller, 1997; Sereg, 1997; Torrie & Miller, 1997). Others looked at specific courses offered using the ICN (Downs, 1997; Simonson, 1997; Tillotson & Henriques, 1997). Overall, these studies of the Iowa Communications Network (ICN) dealt primarily with its infrastructure. Creating the network, connecting schools, providing access to the technology, and presenting education classes over the network were examined in some detail.

While valuable in and of themselves, these studies had one serious shortcoming. Few of them (Sorenson & Sweeney, 1994; Downs, 1997; Simonson, 1997) studied the quality of the education the students were receiving, and none generated a cohesive set of guidelines for developers. In particular, the literature generally ignored the question of how to incorporate the technology in a smooth and comprehensive manner.

It was time for the lessons learned over the past several years to be summarized in a coherent fashion so newcomers to the technology could become more proficient in its use at an earlier time. There appeared to be enough experience available to encapsulate into guidelines so that new users could avoid obstacles and provide valid classroom experiences without repeating mistakes made by others.

Once clearly stated, such guidelines, helpful hints, and cautionary notes can lessen lead-time for course development. This should generate improved distance learning in a shorter time due to elimination of extensive trials.

Barriers and Issues

Because of the money involved in creating the infrastructure, the above-cited studies had focused on getting the technology in place and determining if the technology was being used and to what extent. These same studies obtained an overall "feel good" opinion from the using population, but no significant study had developed a rubric of key components that would lead to a quality program using the technology.

The key reason behind this shortcoming was simply time. The users of the technology were so overwhelmed by the immensely time-consuming tasks of course creation and delivery that they had not been able to examine their own methodologies with the idea of creating a handbook for future users and developers.

Another difficulty was quantifying the term "quality of education." This term had various meanings to different education stakeholders. Even within these groups of students, teachers, parents, and administrators, there was significant controversy as to what constituted educational quality. Creating a working definition was an early challenge in this study.

A third challenge in this study was the problem of contacting the various teachers selected. They were located over the entire state of Iowa and multiple means of communication was used to gather the required information. Additionally, coordination of the investigator's schedule with their schedules to permit face-to-face contact required significant effort.

Research Questions Investigated

The first question investigated was "What is meant by quality of education?" To better select courses and teachers providing exemplary education models, some determination had to be made of what characteristics were desirable in an exemplary model. If quality of education could not be defined, then whether a course provided it could not be determined.

The second question investigated focused on quality indicators. If quality of education can be defined, then some means to measure it had to be developed. Here, the various facets of quality education were examined. These facets were reduced to a reasonable group of quantifiable indicators that provided the basis for determining the extent of the quality.

From this set of indicators a parallel list of teacher characteristics was drawn. Using this list of characteristics, a group of knowledgeable individuals was asked to select teachers known to them who most closely matched these characteristics. This permitted some judgement to be passed and allowed a representative sample of high level programs to be selected. Once the programs were selected, these teachers and their various ICN course offerings were studied to determine why they were successful. Specific issues studied include:

1. What challenges were faced in developing courses for delivery over the ICN?
2. How were these obstacles overcome?
3. What factors most directly influence creating ICN-based programs?
4. What, if any, recommendations can be made?

This study of quality programs implemented on the Iowa Communications Network provides a foundation for future critical review of new programs. The guidelines established here will help to insure that new programs are developed properly. These guidelines provide a rubric for new courses both in the state of Iowa and in other states using or planning an educational network such as the Iowa Communications Network.

Limitations and Delimitations of the Study

This study was limited to the examination of several highly successful courses being offered over the Iowa Communications Network. The Director of Educational Telecommunications for Iowa Public Television, Dr. Pamela Pfitzenmaier, provided access to the three committees mentioned earlier. Her judgment and experience have guided the Iowa Communications Network since its inception, and she was the individual who originally expressed the need for this study and the resulting guidebook (P. A. Pfitzenmaier, personal communication, February 19, 1998).

The developers of these programs were interviewed to obtain insights into the course development process and to capture key issues and solutions used to overcome barriers during that development. Additional information such as course content and pedagogical issues generated supplemental material for the handbook. The handbook was issued in preliminary form for field-testing. The feedback from that testing was incorporated into the final version of the manual, which was present to, and accepted by Dr. Pfitzenmaier.

Definitions of Terms

The following terms are defined to assist the reader of this paper.

The **Iowa Communications Network (ICN)** is "a statewide two-way full-motion interactive fiber-optic telecommunications network with at least one point of presence in each of Iowa's 99 counties" (Maushak, Simonson, & Wright, 1997, p. 4).

Distance education

> implies institutionally-based educational activities where the teacher and the learner are normally separated from each other in location but not normally separated in time, and where two-way interactive telecommunication systems are used for sharing video, data, and voice instruction (Simonson & Schlosser, 1995, p. 13).

The **Education Telecommunications Council** is an 18-member group established by the Iowa Code, Section 8D.5 in 1994. It establishes scheduling and site usage policies for the ICN, coordinates activities of state regional telecommunications councils, develops proposed rule changes, and recommends long-range plans for ICN enhancements (State of Iowa, 1994, Chapter 1184, Section 7).

The **Star Schools Partners Council** is an 11-member group of Iowa State University, University of Northern Iowa, Area Education Agency, Iowa Department of Education, and Iowa Public Television representatives that advises state administrators and directors of the federal Star Schools project on day-to-day operations (P. A. Pfitzenmaier, personal communication, December 23, 1998).

The **Technology Team** is a nine-member group of Iowa Department of Education and Iowa Public Television personnel who provide state-level guidance to the Department of Education in the areas of instructional technology and telecommunications (P. A. Pfitzenmaier, personal communication, December 23, 1998).

An **Area Education Agency (AEA)** is an intermediate unit situated between the Iowa Department of Education, the school districts, and the local schools. It is empowered to furnish educational services and programs to students in public and nonpublic schools within boundaries designated by the director of the Department of Education (Iowa General Assembly, Iowa Code 1997, Section 273.2).

Action research is a research methodology that has as its purpose "to develop new skills or new approaches and to solve problems with direct application to the classroom or working world setting" (Isaac & Michael, 1995, p. 59).

Constructivism is the learning theory that stresses the cognitive perspectives of learning through self-regulated active participation in the construction of new knowledge from prior knowledge and experiences ("Constructivist Theory," 1999; Jonassen, 1996).

Instructional design is the "creative, active, iterative and complex" (Branch, 1997, p.249) process that "analyzes the needs of learners and designs structural 'possibilities' to address those needs (Shambaugh, 1994, p. 4)" (Dana, 1997, p. 71).

Summary

Administrators of the Iowa Communications Network needed a set of guidelines to facilitate the work of the persons involved in using the ICN. These guidelines provide a framework within which course developers can create new content for presentation over the network. The network's overseers desired a study of a selected group of successful programs already in place. This examination exposed a group of underlying success factors that can be transmitted to other would-be developers as guidelines. The resulting small handbook reduces lead-time, increases quality, and facilitates course development.

Chapter II

Review of the Literature

Distance education has existed in various forms for many years. As technology improved, newer infrastructures permitted new methodologies to be used in the delivery of educational curricula. Faster computers, fiber optic cable, fiber connectivity devices, and communications protocols that take advantage of the speed and bandwidth that fiber offers have led to the creation of full duplex audio, full motion video networks. These networks are capable of delivering real time educational events to an audience not heretofore able to participate in those events.

With the advent of these networks came the need to examine the consequences of this method of delivering education. Distance education was examined in its historical context in an effort to place the new technologies in perspective. The infrastructure of distance learning was studied to determine what changes might be required to effectively use the new technology. Concepts of learning and pedagogy were reviewed and studies were performed to determine which methods might prove most efficacious in the new environment. And, as the technology became more widely used, operational issues became the focus of study.

This literature review serves to establish the background against which the study described in this paper was accomplished. This review also provides the context in which the guidelines were created.

It is noted here that several references to web-based instruction and educational software design are included in this literature review. Lest these inclusions be misinterpreted, a short explanation seems in order. Both web-based instruction and educational software design offer close parallels to distance learning over a communications network. All three occur with the teacher being “removed” from the student. This separation requires that course content be provided with great attention to details such as amount, timing, and physical layout. The limitations of each venue require that the same principles be applied to guarantee quality results from the application of that approach to the education process.

The Technology

The age of information saw the rapid growth of computer use in educational arenas. It was no surprise that distance education eventually moved to incorporate the technology. This integration presents its own set of issues and concerns. For the purpose of this paper, a review of the role technology plays in education was prudent.

Where is the Technology?

The pervasiveness of the technology provides a background against which the current effort in Iowa can be viewed. Because technology has become some part of every state's education system, many private entities have looked at this integration and reported their findings. An example is Mayer's (1997) state-by-state report on the progression of the technological implementation in each. This document provided a solid basis for the comparison of the infrastructure in each state. Produced by the Southwest Educational Developmental Laboratory, the report discussed benefits of telecommunications and extracted themes from its survey of every state's use of technology in its education system. The report's two-page profiles of each state were delineated into 11 subtopics and indicated that nearly 20 states had 100 percent of their school districts with either dial-up or direct network connectivity.

Besides private investigations, government offices have taken an interest in the use of technology in education. For example, the Office of Technology Assessment of the United States Congress (1995) performed an in-depth examination of the use of technology in the classroom and reported on several issues. These issues included whether teachers use technology in their teaching, what happens when they do and why more teachers don't use technology. The report also covered how teachers learn about technology, teacher preparation to use technology, factors influencing implementation of technology in districts and schools, and the roles of all levels of government in all these areas. A second example is the Eisenhower National Clearinghouse for Mathematics and Science Education. This

United States Department of Education sponsored organization produces the Guidebook of Federal Resources for K-12 Mathematics and Science. This annual publication of nearly 300 pages provides educators with a “comprehensive national directory of Federal offices, programs, and facilities supporting K-12 education” (Thorson, 1998, p. i).

The rise in interest over adding technology to the educational process has fostered an increase in the number of conferences dealing with the topic. Organizations such as the International Society for Technology in Education, the Association for Supervision and Curriculum Development and the Association for Education and Training Technology hold annual conferences to promote, discuss and plan the use of technology across the curriculum. Papers presented at these conferences deal with definitions and approaches to quality in education, including quality in technology (Shaw & Roper, 1992).

Besides conferences, organizations such as the National Science Foundation’s Directorate for Education and Human Resources hold workshops on the role technology should play in education. Workshop attendees discuss underlying principles for using technology, establish goals based on those principles and delineate steps to realize these goals (Sabelli & Barrett, 1993).

Aside from these general approaches to the use of technology, there were numerous reports that focused on individual states. Articles such as Whelan, Frantz, Guerin and Bienvenu’s

(1997) qualitative examination of the Louisiana educational network project provided insights through an evaluative study of a statewide educational network system. A summary of the Florida Teletraining Project (Martin, Fosher, Moskal & Bramble, 1996) provided the objectives, methodology and results of a study of live interactive distance education provided to reservists by community colleges.

In addition to the print media, many states, institutions, organizations, and colleges and universities have developed World Wide Web sites dealing with distance education and states' efforts in integrating the technology into their school systems. For example, Tennessee provides a list of impediments to building an information infrastructure (Tennessee Information Infrastructure (TNII), 1998). One part of this self-evaluation product lists 11 instructional and administrative roadblocks and eight professional development roadblocks. Each area is complete with examples and questions that should be asked as the project proceeds. Finance concerns, technical expertise, the evaluation process, training, and management highlight the first group of obstacles. The second group includes technology support, lead times needed to learn the technology and its use, applicability to various curricula, and staff development.

The Texas Distance Learning Association has a site devoted to links to “various distance education/distance learning resources” (Logan, 1998). St. John’s University’s web site has dozens of links to similar resources (Sankowski, 1998). These are but three of thousands of sites containing electronic information dealing with the integration of technology into the educational process.

Even these few examples clearly indicate the proliferation of not only the technology, but also information about the technology. As other entities create, add, or improve their educational networks, they will create their own resources and will encounter problems that might very well have been dealt with by others. It is obvious that the literature is growing rapidly in this area and provides a rich first step in any such efforts.

Technology Use Issues

With such a widespread infusion of technology in the education process, there would inevitably be concerns over its use. Papers attempting to define the issues abound, as do papers tackling the best approach to resolving those same issues. It seems that everyone involved with both education and technology has an opinion about every aspect of the topic.

As industry and business increase their dependency on technology, there is a demand that the educational process keep up with these changes. Carnevale and Porro (1994) espoused the reform of schools be coupled with the modernization of the workplace. They link these two concepts into a requirement for future collaboration for mutual benefit. Supporting this idea is one of the more interesting movements to couple education reform with industry modernization. Applying Deming’s Total Quality Management principles, Maxwell (1995) sees the addition of the technology movement as mutually clarifying both purpose and direction of the needed reform in education. He believed that the issues of quality, reform and technology should be combined into a single effort aimed at educational improvement. Indeed, the need for educational reform to include technology is recognized at the national level. Increased government interest and commitment to national standards is encouraging moves towards bringing education to the level necessary in the information age (Barron & Orwig, 1995). Accepting this reality-driven movement, researchers agree that "the integration of technology into school curricula ... is a prerequisite to survival in a future ... driven and supported by technology" (Barron & Orwig, 1995, p. 8).

To that end, researchers have studied issues surrounding integration of technology into the learning environment. Barron and Orwig (1995) looked at improved access to technology and the need for increased emphasis on teacher training in technology. Bork (1997) examined the growing world population, the resulting need for more efficient education, the over-reliance on traditional lecture methods, a lack of education tailored to individual students, and the confusion over the difference between learning and simply pouring information at students.

Bork (1997) also covered computer issues including tendencies to focus on the hardware, the lack of interactive software, the generalized approach to software creation, and minimal evidence to support many opinions about the software. Whelan, et. al. (1997) declared availability of funds and knowledgeable technology personnel as key to timely and proper installation of hardware, software, and connectivity. This is required before teacher development activities are possible. They saw sufficient time to do hands-on training as critical to the development process. Also, equal access by students and teachers was important to any program's success. Seligman (1992) presented a list of five critical issues that must be considered when addressing the technological aspects of education. Learning materials, availability of those materials, familiarity of students and teachers with the technology and methods, management of the overall system, and a system of monitoring, evaluation, and feedback must be examined carefully when embarking on an integration project.

However, even among researchers there was disagreement as to what must be studied and how. Bagley and Hunter (1992) lamented that technology was not fulfilling its promises to enhance learning. They stressed the need for a new understanding of several areas including learning, teaching, and classroom relationships. The authors concurred that schools must be restructured and they promoted the integration of technology into the curriculum. But, they insisted on the need for these to be synergistically intertwined. Ehrmann (1995), who examined over 20 years of research about using telecommunications, computers, and video to improve education, looked at the questions that researchers have traditionally investigated and listed the shortcomings with these studies. After proposing several better questions, he pointed out that the study of strategies and methods for employment of the technology in education is what matters most, not the technology itself.

In spite of the controversy, many have suggested mechanisms to accomplish the task of incorporating technology across the curriculum. Bork (1997) proposed a focus on incorporation of proper teaching methods into interactive courses, proper evaluation of those courses, and adding speech to the software to improve interactivity. He advocated governmental and corporate sponsorship of these developments.

Promoting active learning multimedia environments, Woolf and Hall (1995) proposed an instructional model that "uses intelligent simulation, dynamic links (on-line generation of links based on student behavior), and multimedia composition and creation" (p. 74). To support their proposition, they cited several case studies that include simulations, multimedia composition and collaboration, and explanatory multimedia systems. They discussed ways to overcome the technological challenges to effective multimedia systems. They predicted knowledge-based multimedia systems that dynamically adapt to the learner's current situation and knowledge level and provide responses accordingly. They considered networks as the most obvious means of providing multimedia systems to more than one individual at a time. Woolf and Hall (1995) insisted that if these new multimedia pedagogues were soundly based on educational theory, they would improve the quality of learning of both students and teachers.

In a similar vein, Vargas and Vargas (1992) predicted response-based real-time sequencing of tasks to cause a resurgence of programmed instruction and promote the development of student-centered learning centers. To make the computer usable in programmed instruction, the authors prescribed four steps to take. First, design materials according to the tenets of behavioral science. Second, evaluate created materials based upon their effect on learner behavior. Third, design sequences of instruction based on the principles of verbal behavior. And, fourth, educate teachers to engineer behavior.

Barron and Orwig (1995) presented an eleven-step process for the integration of technology into education. Beginning with determining instructional goals and objectives, they moved through forming partnerships with local businesses, to incremental technology acquisition, to student and parent involvement, and, finally, to flexibility and planning for change.

So, who is to make all this technology work, and how do they see this process and their part in it? Several researchers have questioned the various stakeholders in education and have had varying degrees of success in obtaining the answers to these questions.

Teachers' opinions on the issues surrounding educational technology were obtained in several studies. Among them, Boone (1996) discussed such issues as teaching style, classroom size, the importance of interactivity among sites, and the installation, control, and management of the infrastructure with 50 teachers. Elliot (1995) interviewed a sixth grade mathematics teacher who expressed concern over the technology and how it functions. Teacher preparation time for classes was also mentioned. Fagan’s (1997) report summarized a study of 44 mathematics teachers about their concerns with implementing distance learning technologies and their role in that implementation. These teachers were unsure of the technology's impact on several issues, including preparation time, student achievement, and overall learning improvement. The author saw these results as forming a basis for teacher training and familiarization.

Administrators are also concerned with the addition of technology to their schools. They expressed worries over the obstacles to implementation from getting personnel to accept the change process, to funding and purchasing the hardware and software, to training staff, to generating continuing funding and, finally, creating lessons using the technology (Garcia, (1998). Sometimes the administrator, even when proactive, has little impact on the process. Abel and Hays (1997) discovered in a survey sent to 73 principals that no correlations could be drawn between perceived organizational innovativeness, the principal's innovativeness, and the use of the technology. While this lack was attributed mainly to a limited amount of data on usage, as most subject schools were new to the network, it is an interesting footnote that appears to highlight teacher involvement as necessary to progress.

One other group of stakeholders has been surveyed, studied and interviewed to obtain impressions on the use of technology in the classroom. Students, such as those in seven

University of Northern Iowa classes, indicated generally favorable perceptions of the use of the technology (Bozik, 1996). A study of the effects of Internet instruction on the attitudes of learners toward integrating the Internet into their work before, during, and after the instruction performed by Wells and Anderson (1997) saw positive results. Hecht, Roberts, and Schoon (1996) reported the results of a study that examined ninth-grade students in four science classes. They saw the integration of computer technology into the curriculum as a better approach than using it as an add-on to existing structure.

A three-year study of a random selection of sixth-graders from five Montreal schools summarized an investigation into the impact of multimedia on the learning process. Using an experimental environment, Large, Beheshti, Breuleux, and Renaud (1995) had the students read articles some with, and some without, animation. They used written recall, multiple choice questioning, problem solving, and enactment to measure retention of the material. The authors concluded that animation enhances learning, especially comprehension. However, they also noted that text only material lessens cognitive load and increases recall. They concluded that while multimedia can motivate students, much more research is required to design effective multimedia and integrate it into the classroom.

As studies continue, stakeholders become more involved, innovations are designed and suggestions such as the foregoing are followed, educational systems will reap many benefits. Among them are the engagement of Gardner's multiple intelligences, the promotion of higher level critical thinking skills, encouragement of student-centered, cooperative learning, and expansion of the classroom walls into widening cultural venues (Barron & Orwig, 1995).

Focus on Iowa

When the focus of the literature review is narrowed to Iowa, articles pertaining to the ICN become significant to this study. The Iowa Communications Network can still be considered to be in its infancy and as such has received limited treatment in the literature. Most of the work describing issues and events involving the ICN has been generated within the state by individuals directly involved with the ICN.

Michael Simonson is one of the more prolific authors covering the birth of the ICN and its growth from infancy. With Schlosser (1995), he described the concepts behind the ICN including the sharing of live, two-way interaction, and the increase of access by a largely rural state population. The authors explained the Iowa Distance Education Alliance (IDEA), which is the state's name for its portion of the U. S. Department of Education's Star School Program. And they provided a status report of distance education in Iowa. With Smaldino (1994), Simonson provided the background of distance education in Iowa, summarized its goals and objectives and described the various state and local educational and government agencies involved.

Maushak, Simonson and Wright (1997) contains 24 research papers dealing with distance education in Iowa. These papers provide a great deal of background information on the ICN in the form of studies and evaluations of practices and strategies for using the ICN. In these papers, researchers focused on teachers' attitudes before, during, and after use. A few limited studies of classroom use, access issues, and the impact of the technology on content presentation were performed. Very few looked with any depth at the quality of the courses being offered over the ICN or how the quality was built into these courses.

Simonson, along with others, also explored the impact of the ICN on Iowa's teachers and students. Some examined the application of the technology to specific course offerings. For example, Downs (1997), who examined some general perceptions of students and teachers on using the ICN for music classes, reported positive impressions with the technology. Simonson’s study (1997) similarly concluded that the ICN was effective "as a delivery system for applied music instruction" (p. 125). A few researchers discovered some ambivalence over the technology. Among them, Miller and Doerfert (1995) examined the efficacy of the ICN to provide general and agricultural education. Their prominent finding indicated that many teachers were undecided about using the ICN in their classrooms.

Students’ opinions included statements such as "80% of students who have taken an ICN course would take another one," and "75% would tell their friends to take one" (Sorenson & Sweeney, 1994, p. i). Being enamored of the technology, however, does not indicate whether the curriculum being provided over the ICN is significantly better than traditional classroom activity. But, these types of comments do provide impetus to continue using the technology as the customers of the educational system, the students, find this type of delivery satisfactory.

Several other journal articles (Simonson & Smaldino, 1994; Jarchow, Sweeney, Zvacek & Fortune, 1995; Jones, Simonson, Kemis, & Sorensen, 1992; Sorenson, 1994, 1996) have examined various aspects of using the ICN and the implications of that use. Within these articles, researchers reviewed specific course offerings, but more with an eye toward the delivery of content rather than the quality of that content.

The ICN's own web page ("Welcome to," 1997) provides background on the development of the network, an FAQ for current and potential users, schedules of usage, numerous statewide points of contact, and a database of associated information.

The Theory and Research Literature Specific to the Topic

This paper specifically deals with three topics. They are the quality of education, the measurement of that quality, and guidelines for creation of courses that promote quality. The literature surrounding definitions of quality of education was examined first. This review formed the basis from which a working definition of the term was generated.

Literature discussing the measurement of quality was examined secondly. Then guidelines for creation of courses were examined. The insights garnered from this review generated a conceptual basis for the creation of the guidelines to follow in the creation of quality courses for delivery over a network, specifically the Iowa Communications Network. These guidelines became the foundation of a handbook to be used by course developers who expect to deliver content using the ICN.

Quality of Education

Quality of education is a topic of considerable interest and, therefore, has been the subject of hundreds of articles, papers and conference presentations. It is obvious throughout the readings that there is "a growing debate over the concept of 'quality' itself - how quality should be defined..., how it can be measured and monitored, and how it can be sustained and enhanced" (Education Commission of the States, 1995, p. 5). Among this plethora of literature the main point seems to be the agreement that the concept of quality in education is a very elusive idea. Grisay and Mahlck (1991) explained that the “general concept of educational quality is complex and *multidimensional*” (p. 3). Indeed, this multidimensional nature is a result of the various groups that have a stake in both its definition, the outcomes resulting from that definition and the subsequent action necessary to realize the definition (Cheng, 1995). Hanes and Stephens are cited in Henevald (1994) as stating that “there are as many specifications of quality ... as there are interest groups in education (Hanes & Stephens, 1990, p9)” (p. 1). Others have pronounced the task of defining quality in education as problematic (Nolte, 1994; Monk, 1993; Commonwealth Secretariat, 1991), elusive (Istance, 1992; De Weert, 1990; Dlugosh, 1993; Zingg, 1987), or the center of a growing debate (Education Commission of the States, 1995). In general, defining quality is difficult, measuring it is challenging, and using it for comparison is complicated. In spite of the fact that many are led to conclude that “we really don’t know what works and what doesn’t and why” (Ginsberg, 1982, p. 7), this paper will generate a working definition to focus the subsequent discussion.

Defining Quality of Education

Despite the controversy surrounding the efforts to define quality in education, numerous articles dating back to the seventies and eighties and through the nineties have made the attempt. Their definitions provided the material for the synthesis of the working definition needed for this paper.

The most obvious starting point of any attempt at defining a term is the straightforward definition of its component parts. To that end, the following are offered:

> *Quality* – the degree of excellence which a thing possesses (Guralnik & Friend, 1966, p. 1189)

> *Education* – the process of training and developing the knowledge, skill, mind, character, etc., especially by formal schooling. (Guralnik & Friend, 1966, p. 461)

The simple combination of these two terms into “quality of education” then becomes “the degree of excellence of the process of training by formal schooling.” However, this first definition is too general for the purpose of this paper. Education is multifaceted and requires at least a cursory examination of those facets before settling on any single definition.

So, to further refine this definition, inputs from several levels of the educational spectrum were reviewed. Because the concept of educational quality is universal, it extends beyond the borders of the United States. Insights from around the world by individuals and organizations involved with educational oversight provided the initial broad-brush view. The focus of the discussion then narrowed to the national perspective. Institutional concepts of quality were connected to ideas about quality as applicable to individuals in the education environment. Finally, definitions of quality as pertaining to the primary and secondary education process, in keeping with the initial thrust of the ICN, are discussed.

The International Perspective

The international arena has been filled with papers about the quality of education. Because many of these papers focused on developing countries, they provided excellent insights into the world's view of education. These insights covered many fundamental concepts on which any education system can be established, as well as added the multicultural input necessary for many of the quality issues found in the literature.

Defining and measuring the quality of basic (K-12) education were the foci of a two-part report by the British Commonwealth Secretariat (1991) that served as the background document for the 1990 conference of Commonwealth Ministers of Education. It examined the issues surrounding quality education and its implementation. An extensive discourse on the quality of education began with the declaration that the

> “quality of an education system is partly defined by its accessibility to the highest possible number and widest range of learners, encompassing both sexes and the whole spectrum of ability levels and ages” (p. 3).

After declaring the notion “problematic” and that there was “no single definition of quality” (p. 4), the report examined several facets of the question. The first, intrinsic quality, looked at the purpose of education as being “to enlarge human capacities” (p. 4). A contrasting, but not necessarily opposite view, saw quality in “instrumental terms of usefulness both to the learner’s future life and to the needs of society” (p. 4).

The report continued with examining the quality of the school environment, levels of achievement attained, and whether students were "learning effectively, improving their knowledge, skills and abilities, widening their experience and growing socially and morally" (p. 5) as being parts of the definition of quality. Quality was also examined in terms of "the values and goals ... of that country's social system and culture" (p. 6) and in terms of "the policies, objectives and practices of its education system" (p. 6).

At this point the Commonwealth Secretariat's report declared that an education system that did not take into account the varying ages, aptitudes and abilities of its learners "in framing its curriculum is inadequate" (p. 6). Completing this thorough review was the not surprising submission to the ever-present "bottom line." The Secretariat report did not disregard cost in defining quality. Indeed, "education provision must be appropriate in terms of what society can afford. 'Value for money' is as valid a concept in education as elsewhere" (p. 6). A four-part treatise by Grisay and Mahlck (1991) reviewed quality of education in developing countries such as Kenya, Tanzania, Malaysia, and Thailand and reached similar conclusions.

Vedder's critique (1994) of the International Association for the Evaluation of Educational Achievement (IEA) began by discussing quality of education. His definition focused on the achievement of the anticipated effects of learning, and the realization of the functions of education. He determined that it was not a good practice to use a global set of quality education standards against the diversity of cultures found in third world countries. He offered suggestions to permit individual countries to establish internal curricula that satisfy a more general set of standards according to cultural needs. It seems appropriate in the multiculturally diverse environment found in the United States today that such advice not be ignored.

A Russian point of view explained that quality is “a system of socially determined parameters of the level of knowledge, skills, habits and values that must be reached by school leavers” (Malkova, 1989, p. 37). It is these parameters’ content that elicits the most controversy. Technocrats insist on scientific and mathematical abilities above all else. Humanists approach quality in terms of social responsibility, moral and spiritual values and attitudes towards human rights, internationalism, and world peace. The economic view suggests competitive success is the key. Malkova insisted that a focus on the pedagogical and psychological was the means to quality.

Carnevale and Porro (1994) also carried quality beyond the borders of the United States, but in a slightly different fashion. They saw quality education as the meeting of world-class standards. No longer can we keep our system isolated from global impact. Quality is a marketplace demand placed on education by its customers who more and more expect the same level from all institutions regardless of location. The internationality of industry and the codependence of countries require that education systems prepare students for life experiences that might easily occur away from their birthplace. In fact, a quality educational system is “essential to the economic, political, and social welfare of the United States” (Monk, 1993, p. 13).

National Viewpoints

At the national level, no less than the National Education Association (NEA) provides the following list of 11 characteristics of educational quality:

1. A shared understanding about achievable educational outcomes
2. A belief that all students can achieve under the right conditions
3. The use and understanding of statistical assessment of students on a daily basis
4. The level of teacher involvement in the process of choosing teaching materials and resources
5. The extent to which barriers are sought, identified, and remedied
6. The degree to which employees are provided training to help them perform their jobs
7. The extent to which the program, rather then individuals, is evaluated
8. The amount of two-way non-threatening communication
9. The extent to which teamwork is used for solving problems
10. The degree to which numbers are used constructively and where mandates and goals are eliminated

11. The degree to which all groups in the school and community are involved in improving education (Verdugo, Uribe, Schneider, Henderson, & Greenberg, 1996, p. 89)

These characteristics span both institutional and individual objectives that are necessary and need to be attainable in order to focus the energies and synergies of the institution (De Weert, 1990). Because the individuals cannot be separated from the institution, their performances are intertwined. In fact, the affective, cognitive and behavioral components of individual, group and organizational performance are usually indicated by the satisfaction, perceptions and performance of key players in the process (Cheng, 1995).

As an indication of how these attributes of quality remain the same at higher levels of education, a survey of 20 two-year and four-year college presidents generated seven different definitions of quality. To them quality was:

1. The accomplishment of the institutional mission.
2. The results of investment of resources to develop the competencies and skills of those whom we serve.
3. The amount and type of responsiveness to student needs.
4. Positive expectations for the college and students.
5. The contribution the institution makes to the welfare of its community.

6. How well the institution functions to maximize its resources.
7. Attention to the details of the academic programs and campus environment that impact faculty and students. (Cassel, 1990, p. 289)

These definitions compared favorably with the NEA list and can be seen as a set of institutional goals leading to satisfaction of the ultimate customer, the student. As this discussion progresses, this customer satisfaction point of view becomes central to the definition of quality.

To set goals and objectives is one thing. Their attainment might be a considerably more difficult undertaking. Input factors such as financial, staff, equipment, and students must be coupled with the effective processing of these factors and should be directed towards complete attainment of institutional goals, not just some portion of them (De Weert, 1990). Indeed, the view that quality of education "is composed of three interrelated dimensions: the quality of human and material resources available for teaching (inputs), the quality of teaching practices (process) and the quality of the results (outputs and outcomes)" (Grisay & Mahlck, 1991, p. 4) is a common theme throughout the literature.

Student achievement, school climate, quality of instruction, and funding are as much a part of an institution's goals as graduating students. The quality of the institution will ultimately be judged on how well it performs. Therefore, its objectives, learning opportunities, instruction methods, educational philosophy, and evaluation procedures must be continuously examined (Ediger, 1996).

Looking at various education levels assists the search for a definition of quality. Even at the lowest level, components of quality preschool education parallel the earlier NEA set of characteristics. Stable interactions between teachers and students head the list. Developmentally appropriate activities focused on specific learning results are next. Effective teacher-parent interaction and a strong teacher development process follow. A high degree of administrative skill coupled with familiarity with community resources is the fifth component. The space where education takes place should be well organized and contain efficiently arranged equipment. A safe and healthy environment is critical to student well being, as is food and nutrition as defined in local guidelines. Finally, the entire system should be regularly evaluated through both internal and external efforts for compliance (The Kentucky State Department of Education, 1991).

At the K-6 level, Pascal (1992) examined the ambiguous nature of quality and saw it as both a qualitative and quantitative concept depending on the specifics of the questions being asked and answered. In her investigation of the provision of education to young children, Pascal defined 10 dimensions of quality:

1. Aims and objectives
2. Curriculum
3. Teaching and learning styles
4. Planning, assessment and record keeping
5. Ratio of trained staff
6. Physical environment
7. Relationships and interaction
8. Equal opportunities
9. Parental involvement, liaison and coordination
10. Monitoring and evaluation (pp. 8-9)

Again, parallels with the earlier lists are apparent. Institutions and individuals are both required to be deeply involved in the process of generating quality. What should be noted here is that, in most of these references, the individuals involved are teachers, administrators, and community leaders. However, as alluded to earlier, the ultimate beneficiary of their efforts must be the students.

When discussing quality, the impact of education on the student becomes of singular importance. Garduño-Estrada (1992) believed an education will be of quality when “all the elements for the integral development of the person are united” (p. 3). This precept is supported in numerous papers. A prime example is Rutherford’s (1992) where he saw quality as directly linked to the improvement of learning for students. This demands the ongoing development of the system by the previously mentioned stakeholders who have clear purpose of, derive meaning from, and obtain satisfaction from their efforts.

In the end, quality education should have the desired effect on students (West, 1984). Teachers and learners should accomplish what they set out to do. Change and growth should occur. How and why these occur should be well known to the participants. And, most importantly, both the end objective and the process to get there must be intentional. This balance between the content and context of learning is generally variable and normally rather undefined, but quality refers to “both the level of goal achievement and to the value or worth of that achievement...” (Fenwick, 1992, p. 1). Smith (1996) concluded that pedagogy should be a conscious endeavor that leads child development rather than follows it. At the end, as at the beginning, the focus of quality must be on “what is taught, how it is taught, to which children, and in what kind of setting” (Henevald, 1994, p. 1).

Applying Total Quality Management Concepts to Education

Mention must be made of one current, and increasingly popular, approach to the quality issue. Deming’s Total Quality Management (TQM) concepts and principles, originally presented to corporate America, are being applied to education with increasing frequency. Authors discuss the "quality crisis" in American education (Monk, 1993; Audette and Algozzine, 1992). They connect Deming’s, Crosby’s, Juran’s, and others’ concepts of quality to the educational process and offer assistance to educators in understanding the relationship between Deming's principles and education improvement. In particular, they propound the key to quality as being in the eye of the customer. The customer is defined as students, administrators, parents, politicians and anyone else who has a stake in the outcome of the process. This fact alone constitutes the core of the difficulty in defining quality. Everyone has different expectations and, therefore, each has a definition that outlines those expectations. In spite of the differences, authors apply the plan-do-study-act cycle of Deming to educational systems and offer quality control tools, management and planning tools and some advanced tools to use during an educational improvement process (Wilson & Hedlund, 1994).

Maxwell (1995) concurred with this analysis. His examination of quality led him to believe it was not defined by “test scores” or “dollars spent on technology” (p. 21). He saw it as a dynamic, individualized and contextually bound concept requiring commitment to reform centered on continuous learning. Believing that quality was defined “by the students and teacher within a particular learning experience” (p. 21), Maxwell saw these customers as expecting to develop skills applicable to daily life outside, as well as inside, the educational environment. He believed that the TQM concepts of Deming, coupled with the technology movement, mutually clarified the purpose and the direction of the needed reform.

Continuing to promote Deming’s approach to quality, Satterlee (1996) cited the Council on Competitiveness in its TQM approach to education, who declared that "three factors are widely accepted as central to a successful quality program: customer satisfaction, executive-level leadership, and employee involvement (Council on Competitiveness, 1996)" (p. 2).

Never far from the minds of most authors is the proverbial “bottom line.” Money is many authors’ driving factor to quality. Particularly interesting is that this seems to be most governments’ approach to less than quality educational programs. In fact, the Ohio State Legislative Office of Education sees a quality education as the "mutual interaction of three factors: the amount of funds available, how the funds are used to support particular school practices, and the context of the community surrounding the school" ("A Model of Quality Education," 1993, p. 3). Experience may someday teach that not all problems can be solved or resolved by simply adding money to the situation. While money can alleviate many symptoms, quality improvements require a combination of funding, community influence and proper schooling practices ("A Model of Quality Education," 1993).

Constructivism and Quality

One concurrent theme throughout the literature, and this paper, is that of constructivism. This approach to learning stresses the cognitive perspectives of learning through active participation in the construction of new knowledge from prior knowledge and experiences ("Constructivist Theory," 1999; Jonassen, 1996). Collaboration is encouraged during which teachers and other students provide a positive environment, challenges to the learner's current understanding, and support for explorations into those areas new or less fully understood (Kent, 1995). The student then creates new understandings which become personal and, most importantly, useful to the learner's life.

Under these conditions, the emphasis is focused on the student rather than the teacher. This individualization of learning causes students to develop lifelong skills that are suited not to just the school environment, but to life outside the school as well ("Constructivism," 1998). This permits the learners to try out new knowledge within their own frame of reference. If the knowledge is discovered to be flawed in some way, the student is motivated to reassess and modify their thinking to again create newer knowledge that is more applicable to their situation ("The Role," 1996).

This paper has expressed this same point of view in several instances. The creation of an active student-centered learning environment is central to quality education. Such a teacher-facilitated situation encourages students to develop the higher order thinking skills fundamental to the constructivist viewpoint (Brooks & Brooks, 1993).

Technology and Quality

With the thrust of the Iowa Communication Network on K-12 education over distance technology, at least some mention must be made of quality in terms of the delivery systems and the inherent challenges of implementing them. Today the integration of computer technology into the curriculum is a better approach than using it as an add-on to existing structure (Hecht, et al., 1996). Using computers across the curriculum promotes constructive, high-order, critical thinking (Jonassen, 1996). Quality in distance education is dependent on good planning, good presentation and instruction, and good organization and management (Martin, et al., 1996). Seligman's (1992) five keys to quality in distance education included learning materials, availability of those materials, familiarity of students and teachers with distance education technology and methods, management of the overall distance education system, and a system of monitoring, evaluation, and feedback. These keys match up very well with the major points suggested earlier in this discussion.

Quality is, and has been, "an enduring objective throughout the nation's history" (Zingg, 1987, p. 174). In spite of its elusiveness, teachers, administrators, parents and legislatures all have made the effort to quantify it, measure and meet it. Quality is related to many factors in the educational environment. These factors are both internal and external. Some are measurable and others are not easily measured. Quality "indicates that what is required is doing the job effectively and appropriately" (Seligman, 1992, p. 6). This means that quality must:

1. Be well thought out,
2. Be carefully prepared,

3. Be responsibly implemented,
4. Have a firm direction,
5. Be flexible, and
6. Respond well to criticism and comment (Seligman, 1992).

An interesting concluding note on the challenge of defining quality is found in several papers that cite the Supreme Court Justice Potter Stewart incident over pornography. When asked to define it, he stated that he could not, but that he would recognize it when he saw it (McGuire & Miller, 1986; Zingg, 1987). Apparently quality education causes a similar dilemma to those who wish to create a frame of reference for its study.

A Working Definition of Quality of Education

Supported by the foregoing discussion, a definition of quality education is now offered. This definition will provide the foundation for examining quality indicators. A representative number of indicators will be used for determining which teachers to use for this study.

For the rest of this study, quality education is defined as:

> student-centered learning that is accessible to the widest range of learners. It uses stable teacher-student interactions with nonthreatening two-way communication to achieve educational outcomes. Change and growth occur through

> developmentally appropriate activities focused on specific learning results useful to the learner’s life.

This constructivist definition of quality emphasizes a student-centered environment, life-focused outcomes, collaboration, active learning, and communication. These are essential to the development of quality education that causes learning to last beyond the classroom.

Quality Indicators

Regardless of the challenges encountered in defining quality of education, stakeholders eventually discover it must be measured. However the definition is arrived at, whatever the final form of the definition, the process always comes down to determining whether the system under examination has it. More importantly, how much quality does it have and what should be done if it falls short of the definition? Needless to say, the measurement of quality has as many variations as the efforts to define it. So, the problem then, is not only to define quality, but to identify indicators, measure them effectively, and, most importantly, report the findings in an understandable manner (Grande Prairie, 1994).

So now, guided by the current definition of quality, indicators become the second topic of interest to this paper. An examination of the multitude of possible quality indicators will result in a group that is expected to serve the purpose of this paper.

Identifying Indicators

Before proper measurement can occur, the investigator must first determine which facets of the educational process are to be observed. That is, what level of information is desired? Each participant in the education process requires different kinds, amounts, and interpretations of data to support their views and contentions about the process. As the focus moves from a national viewpoint to a local one, the information needed also moves from general to locally specific. In any case, Baker (1988) suggests that what we really want to know is simply:

> What are the students learning?
>
> How well do the teachers teach?
>
> What is the quality of our schools? (p. 10)

As indicated earlier in this paper, the third question is ultimately determined by the answers to the first two. Audette and Algozzine (1992) noted that improvements in teaching produce quality in learning. So, "the fundamental processes that need attention are teaching and learning" (p. 14). With this in mind, the facets to be measured will focus on those teaching attributes that create the appropriate learning experiences in the classroom.

Once a list of facets is created, indicators can be selected that best typify the behavior of each of those facets. The types of indicators needed to properly validate the input, process, and output of an education system should take into account the opinions of parents, students, teachers, staff and community members who support the educational system with their taxes (Davis, 1994; Cheng, 1995). As a result, the many decisions necessary to build an indicator system are rarely clear cut. This provides “ample reason for argument about the extent to which the selected measures and metrics support the inferences that are drawn” (Koretz, 1992, p. 4).

The literature does offer guidelines for the selection process. The Commonwealth Secretariat (1991) suggested that indicators should be valid representations of the values for which they stand. It also declared that indicators used as tools for operational purposes should not be manipulable by schools and teachers. The Association of Universities and Colleges of Canada (1995) requires indicators to be result-oriented, evaluative and issue-driven. They should connect outcomes to structure and process. The Association, to the point of this paper, saw indicators not as absolute facts, but as best interpreted as indicative, suggestive or diagnostic. Nuttall's (1994) approach to selecting indicators involved examination of national and local policies, consideration of scientific and technical aspects of education, and practical issues such as number of indicators and time available for the study. Others (Verdugo, et al., 1996; Wilson & Hedlund, 1994; Schmoker & Wilson, 1993) used W. Edwards Deming's Total Quality Management approach to evaluate education. No matter which technique is used, the resulting indicators must minimally provide appropriate and justifiable inferences on which judgements can be made (Koretz, 1992).

Cautionary Notes

Indicators of quality can be elusive. The literature has numerous cautionary tales surrounding indicator selection. Because many (most?) of the facets of quality that investigators desire to measure are not quantifiable, the search for a few specific quantitative indicators can be futile (Franke-Wikberg, 1990). One reason for this difficulty is the ambiguous nature of the attributes being measured. Koretz (1992) labeled them as “frequently complex, poorly defined, and difficult to measure” (p. 3). Another reason, as alluded to earlier in this paper, is that "everyone and every group has some idea of what is wrong with and what should be done about education; the number of different ideas, approaches, backgrounds, and philosophies is staggering" (Rinehart, 1993, p. 265). The continuing controversy over what to measure, how to measure it, and what the results mean will continue into the foreseeable future.

A second cautionary note deals with the number of indicators used. Franke-Wikberg (1990) warned "a judgement based on a very few indicators does not provide any foundation for the development and improvement of a complex educational reality" (p. 287). But, how many are a "very few" indicators? Moreover, how many are enough? Some authors listed 40 indicators (Berg, Benz, Lasley, & Raisch, 1998), 60 indicators (Cassel, 1990), 75 indicators (Education Week 1999), or more (Henevald, 1994; Cheng, 1995). The number is dependent on the ends to be realized by their creation and measurement. Along this line, Nolte (1994) suggested that any set of indicators should consist of a manageable group of measurables that are easy and inexpensive to measure. Whatever the number, it must be remembered that "above all, indicators are seen *as part of a set or system of indicators* that together provide information designed to be greater than the sum of its parts" (Nuttall, 1994, p. 19).

The Indicators

Focusing on the student-centered definition of quality of education proposed earlier and the foregoing discussion about indicator selection and purpose, attention is now on the indicators used in this study. While Nuttall (1994) warned, “restricting the number of indicators ... may reduce the validity of the set of indicators” (p. 30), the list is purposely short to focus this paper on student-centered learning in an online environment. At a minimum, the indicators "first must serve the interests of the students" (Baker, 1988, p. 13).

Because the teacher creates the online courses, it seems obvious that specific characteristics of good teaching begin the list of indicators. This presents its own problems, as definitions of "good teaching" are as numerous as the previous definitions of quality education. However, some agreement has been reached on prerequisites that good teachers are presumed to need. Above all, teachers must be committed to teaching and must care about their students (Henevald, 1994). But beyond this basic empathy lies more practical requirements.

To begin, Ginsberg (1982) said, "competence and performance of faculty certainly seem to be essential" (p. 7). Baker (1988) elaborated by including "mastery of subject matter, mastery of basic knowledge about teaching, student development, and learning, and mastery of basic skills" (p. 12). This is echoed by Bork (1997) who expected course designers to be "skilled teachers in the area involved, experienced in understanding the likely problems students will have, and knowledgeable in helping students with these problems" (p. 72). Smith (1996) agreed that a "pedagogy should be conscious" (p. 335) with teachers knowing "what they are doing, [and] why they are doing it" (p. 335).

After determining that the teacher has the basic skills to be in the classroom, the classroom environment created by that teacher becomes significant. Müller and Funnell (1992) expected educational providers to ensure "that learners fully participate in, and contribute to, the learning process in such a way that they become responsible for creating, delivering and evaluating the product (Müller and Funnell, 1991a, p. 175)" (p. 125). This emphasis on the process of learning is prevalent in the literature and requires the maintenance of a careful balance of the content and context of learning (Fenwick, 1992). The balance must be designed "to develop self-directed learners, to encourage critical thinking for creative problem solving, [and] to develop interpersonal and intrapersonal relationships" (Goldman & Newman, 1993, p. 33).

Many researchers agree that such a learner-centered environment promotes life skills necessary for success past the classroom (Ford, 1983; Franke-Wikberg, 1990; Hughes, 1992; Scheffler & Logan, 1999). These life skills come from a meaningful learning experience that includes:

1. Reduction of student anxiety by making learning nonthreatening
2. Encouragement and preservation of intrinsic motivation
3. Allowing students time and opportunity to engage in deep learning
4. Maintaining close and detailed contact with individual students to monitor and discuss extent to which that which is being taught is being learned (Ford, 1983).

Therefore, this deep learning approach to learning requires course designers to include learner activity, student interaction, a well-structured knowledge base and motivational context (Hughes & Matthew, 1992). Müller and Funnell (1992) saw such characteristics as focusing on the learner's role in the education process and that promotion of quality requires that:

a) quality recognizes the centrality of the learner in obtaining successful learning outcomes;

b) to some extent the learner must take ownership of the learning process;

c) the learner has some responsibility for determining the style and mode of delivery of learning;

d) learners participate outside the formal learning context to the process of learning;

e) learners innovate, experiment and learn from failure as well as success... (p. 126)

Promoting active learning multimedia environments, Woolf and Hall (1995) proposed an instructional model that "uses intelligent simulation, dynamic links (on-line generation of links based on student behavior), and multimedia composition and creation" (p.74). These new multimedia pedagogues will be soundly based on educational theory and should improve the quality of learning of both students and teachers. Thus, quality of learning can be a significant indicator of quality of education. So, indicators in this area are required.

The search for quality education now turns towards the incorporation of the technology in the classroom. Many researchers and policymakers see increased usage of modern technology as a "key to student productivity and academic excellence" (p. 6) and "an integral factor in increasing educational equity, adequacy, and efficiency" (Texas Governor's Office, 1990, p. 5). Indeed, studies have indicated that K-12 technology usage has increased significantly in recent years (Wetzel, Zambo, Buss, & Arbaugh, 1996; Hecht et al., 1996).

Because the "importance of computers as a part of student learning is widely recognized" (Scheffler & Logan, 1999, p. 306) and "students are using technology as a tool to explore new information and produce new products" (Berg, Benz, Lasley, & Raisch, 1998, p. 120), indicators reflecting its use must be part of the list.

Teachers using technology to be more creative in assignment design, to change from traditional classrooms, to motivate students and to integrate subject matter provide an intellectually stimulating environment (Berg et al., 1998). These constructivist teachers apply technology "for their student's construction of understanding" (Dexter, Anderson, & Becker, 1999, p. 227). With full engagement in learning, students actively participate in this construction and make the understanding a uniquely personal outcome.

So, teachers need "knowledge and skills to make computers a seamless part of the school curriculum" (Scheffler & Logan, 1999, p. 319). They must be willing to learn to use these new tools as this can be a limiting factor on the capacity of the computer to assist in the delivery of instruction (Wells & Anderson, 1997).

Finally, the distance education factor must weigh into this discussion. In this area, Sorenson (1996) discovered that "the more positive the attitude, the more likely participants are to pay attention and learn" (p. 3). This is important when coupled with the fact that studies have determined that students generally favor the use of technology (Bozik, 1996; Wells &

Anderson, 1997). So, if the participants perceive the experience to be pleasurable at some level, they have a tendency to perform at a higher level. Therefore, the course designer must have an additional set of skills to create active learning over a distance. Fenwick (1992) examined the customers of distance education and promoted turning simple users into participants in the process. With his focus on the improvement of learning skills, he saw learning as involving “a complex interaction of different aspects of content and context” (p. 4). He espoused metacognition as central to quality distance education. This knowledge, awareness and control of one’s own learning is the constructivist key to success when teachers are not physically present in the classroom. The course designer must recognize this and incorporate appropriate tactics into the content. So, indicators are appropriate here.

The Indicator List

Keeping in mind that these indicators will be provided to selected individuals to assist them in locating exemplary teachers, the list of indicators for this project will focus on teacher quality, the teaching process, the learning process, the classroom environment, leadership, and motivation. These subsections, while not exact in their delineation, permit some categorization of the various aspects of the teachers being sought for further study. The previous discussion and the works of several authors (Eliot, 1995; Berg et al., 1998; Scheffler & Logan, 1999; Yager et al., 1995; Verdugo et al., 1996; "Some Thoughts," 1998; Garduño-Estrada, 1992; Henevald, 1994; Cheng, 1995) serve as the construct validation of the list. The list of desired teacher attributes includes:

TEACHER QUALITY:

The teacher

1. Is committed to teaching

2. Cares about their students

3. Has mastery of the subject matter

4. Has mastery of the teaching process

5. Understands student development within the learning process

6. Is passionate about their work

7. Believes all students can learn

8. Is knowledgeable about impact of technology on students and society

9. Willingly engages in personal development of technology skills

THE TEACHING PROCESS:

The teacher

1. Carefully sets learning objectives

2. Designs course to meet objectives

3. Implements strategies to meet objectives

4. Seamlessly integrates technology with the subject matter

5. Uses technology for creative assignment design

6. Uses open-ended questions

7. Encourages students to test their own ideas

8. Provides daily feedback and assessment

9. Uses technology to facilitate interaction

10. Involves remote site students

11. Gives structure to learning

THE LEARNING PROCESS:

The teacher

1. Provides sufficient time on task

2. Provides opportunities for trial and error

3. Uses student input to drive lessons

4. Encourages self-analysis

5. Creates an active learning environment over a distance

CLASSROOM ENVIRONMENT:

The teacher

1. Promotes a climate where all feel free to participate

2. Fosters a climate that is open to innovation

3. Reduces anxiety through two-way nonthreatening communication

4. Accommodates a variety of learning styles

5. Encourages the use of technology to locate new information

6. Promotes a learner-centered atmosphere

7. Provides opportunities for deep learning

8. Encourages higher order thinking skills

9. Focuses on creative problem solving

10. Requires and models high standards of work and behavior

11. Makes social and ethical development part of the curriculum

LEADERSHIP:

The teacher

1. Collaborates with colleagues

2. Shares expertise with colleagues and students

MOTIVATION:

The teacher

1. Encourages participation beyond the minimum

2. Seeks out and uses student questions

3. Promotes student leadership and collaboration

4. Actively removes barriers (learning, social, behavioral)

Course Development Guidelines

Guidelines for creation of courses for the distance learning environment have received a good deal of coverage in the literature. Authors have reviewed various learning theories, connected those theories to the classroom, and provided methodologies for producing guidelines that integrate those theories into course development.

Historically, instructional technologists have taken concepts and strategies from the various learning theories and brought them into their design and development processes. This eclectic approach removed the concepts from their theoretical framework and reduced their meaning by removing the context in which they had been devised. Bednar, Cunningham, Duffy and Perry (1992) refuted this approach and developed the proposal that instructional design and development must be based on some theory of learning and/or cognition. They believed “effective design is possible only if the developer has developed reflexive awareness of the theoretical basis underlying the design” (p. 19). They enforced the idea that designers must be fully aware of the theory they are dealing with in order to properly use its concepts in their designs. Focusing on a constructivist viewpoint of cognitive science, the authors concluded that this approach was a revolution in instructional design with far-reaching implications. Tennyson (1992) also proposed a cognitive model to serve as the basis for a theory of instructional design. Three guidelines, the acquisition and employment of knowledge, the interaction of content knowledge and higher-order cognitive strategies, and the inclusion of the affective domain were central to the model's development. His model had five basic components: sensory receptors, executive control, affective aspects of learning, working memory, and long-term memory. This model of instructional design theory was the author's contribution to the development of the cognitive paradigm itself.

Several authors referred to Gagne’s nine events of instruction as a good example to provide cohesiveness to the materials being developed for instructional use. Garavaglia (1993) emphasized the use of analysis phase information in the creating of design templates. Each template outlines what is to be learned, how it is to be presented, and how the learner will be evaluated to determine success. Garavaglia concluded that this methodology saves time and effort, and decreases costs.

Cook and Kazlauskas (1993) provided the details of a nine-month project to create guidelines for the production of computer-based training (CBT). The authors presented both the behavioral and cognitive foundations for their approach to the project and explained the reasons for using simulations. They related each part of their six-part lesson structure to Gagne's nine events of instruction and indicated how individual students can pace each lesson. Flynn (1992) also examined how Gagne's learning theory and nine events of instruction describe and support cooperative learning. His study of 26 fourth-grade students determined that cooperative learning works because it provides a rich environment in which Gagne's events can occur. His second conclusion indicated that directed learner control induces better task engagement than the teacher-led model. The ideas generated by these and other authors lead many to state that cooperative learning contains the events of instruction and is compatible with, and supports, process-oriented, social learning.

Besides Gagne, other theorists’ concepts appear in the literature. Cook and Kazlauskas (1993) used three lesson strategies in their nine-month project. These strategies of memory, procedure, and decision were based on Bloom’s taxonomy. Gilbert (1992) also examined Bloom’s approach to learning as an illustration of how taxonomies must match course objectives and student needs. In addition, Gilbert looked at McCormack and Yager, and Krathwohl in the development of questioning opportunities needed for student success. Smith (1989) used Skinner's behaviorism, Bandura's neo-behaviorism, Bruner's cognitive psychology, and the Dunns' learning styles as well as Gagne's information processing to develop a set of six superordinate guidelines resulting from the relationships he observed among those listed. Jordan (1993) examined numerous theories of development and learning and connected each with some aspect of the middle school and its goals. The cognitive theories of Piaget and Bruner were reviewed. Pavlov, Thorndike, and Skinner represented the behaviorists. Bandura, Gagne, and Vygotsky provided the social learning theory. Freud's and Erickson's psychoanalytical theories presented a holistic view of the middle school student. Finally, the humanistic points of view of Maslow and Rogers were examined. The author indicated each theory's place in the development of curriculum and teaching strategies and supported active faculty involvement in converting the theories to such practices as teaching for transfer, cooperative learning, handling disruptive students, and inquiry teaching.

In a more general frame, several authors considered consolidated approaches to developing guidelines. Constructivist theory was espoused by Smilkstein (1991) in declaring that creating an active, student-centered learning environment involves a six-stage process based on schema. Schema theory states that individuals create mental pictures of something learned. These pictures provide the basis for future learning of new material. Constructivist theory, based on Piaget's approach, explains that direct, active, hands-on exploration is required for schema to be built. Deutsch (1992) claimed performance technology was still concerned with the basic issues of the historical approaches to learning theory. These include presenting information in small steps, providing immediate feedback, using positive reinforcement, self pacing, and minimizing the error rate. Proper teaching methods and proper evaluation of courses are important considerations according to Bork (1997). The opinions of 50 teachers collected by Boone (1996) pointed out issues such as teaching style, classroom size, the importance of interactivity between sites, and the installation, control, and management of the infrastructure as being critical to guidelines which provide assistance in all aspects of the course development process. In the face of so much theory,

Smith (1996) concluded simply that pedagogy should be a conscious endeavor that leads child development rather than follows it. Finally, to agree with Smith (1989), it should not be assumed that these approaches represent an all-inclusive list, but are selections deemed particularly related to instruction development.

Once the theoretical approach has been decided upon, it becomes necessary to actually create the guidelines. Here again, the literature was ripe with guidance, assistance, and successful approaches to the process. Garcia (1998) approached the task from the administrative point of view. To successfully implement the technology, he suggested forming support teams to assist recalcitrant individuals in accepting the change process as his first step. A second hurdle required a series of steps that involved planning, obtaining funding, selecting, buying, and installing the hardware and software, and developing and delivering the training to the staff. The third obstacle was the need for continuing funding of the technology. The final hurdles involved communicating the technological direction of the institution to all personnel, developing training plans for all grade levels, and creating lesson plans that utilize the new technology.

Barron and Orwig (1995) presented an eleven-step process for the integration of technology into education. Beginning with determining instructional goals and objectives, they move through forming partnerships with local businesses, to incremental technology acquisition, to student and parent involvement, and, finally, to flexibility and planning for change. They stated "the integration of technology into school curricula ... is a prerequisite to survival in a future ... driven and supported by technology" (p. 8).

To make the computer usable in programmed instruction, Vargas and Vargas (1992) prescribed four steps to take. First, design materials according to the tenets of behavioral science. Second, evaluate created materials based upon their effect on learner behavior. Third, design sequences of instruction based on the principles of verbal behavior. And, fourth, educate teachers to engineer behavior.

Hirumi and Bermudez (1996) walked the reader through the step-by-step creation of a unit of instruction that utilized Internet technology. They presented the analysis, design, implementation, and evaluation of the module. They believed the benefits realized from the creation process outweigh the investments in its development. They saw the Internet as a viable mechanism for content delivery in distance education. Garavaglia (1993) emphasized the use of six specific activities to create instructional modules, including:

1. Writing objectives,
2. Creating course structure,
3. Classifying objectives,
4. Designing strategies,
5. Constructing test items, and
6. Designing actual materials.

Three models for using the Internet in course presentation are provided by Penn State's web pages ("An Educator's Guide," 1998). The traditional model incorporated the Internet as an adjunct facilitator of standard classroom activities in the form of listservs, email and search engines. The transitional model moved some of the classroom activities to a computer-equipped laboratory and delivered some of the content using the technology. The distance model took the classroom out of its four walls and delivered nearly all of the content over the technology. This model also used the technology for the major portion of classroom interactivity and communication. These pages also encourage researching available resources for content and delivery concepts, electronic collaboration, and conversion of current material to the appropriate model.

Other sites, such as http://www.edgorg.com (The Global Institute for Interactive Multimedia, Inc., 1998), offer suggestions about actions to take before a course starts, content of the course, and steps to take after the course is delivered. This particular site recommended an approach to teaching that uses the Internet. It also provided links to example courses.

Continuing in this vein, multimedia has had an immense impact on the learning process. Large, Beheshti, Breuleux, and Renaud (1995) investigated this area and concluded that animation enhances learning, especially comprehension, and motivates students. However, they also noted that text only material lessens cognitive load and increases recall. Promoting active learning multimedia environments, Woolf and Hall (1995) proposed an instructional model that "uses intelligent simulation, dynamic links (on-line generation of links based on student behavior), and multimedia composition and creation" (p. 74). To support their proposition, they cited several case studies that include simulations, multimedia composition and collaboration, and explanatory multimedia systems. They discussed ways to overcome the technological challenges to effective multimedia systems. They predicted knowledge-based multimedia systems that dynamically adapt to the learner's current situation and knowledge level and provide responses accordingly. They suggested authoring tools promote the rapid system development and networks provide use of those multimedia systems by more than one individual at a time. These new multimedia pedagogues must still be based soundly on educational theory, but they do improve the quality of learning of both students and teachers.

Beyond this literature, studies, reports and projects (Hecht et al., 1996; Sabelli & Barrett, 1993; Martin et al., 1996) discussed technology’s role in education. They summarized, listed and examined why technology should be used, what part team teaching should take, and a myriad of other issues deemed a necessary part of any discussion of guideline creation. The discussion appears never-ending.

There are also many books that provide guidance to creators of courses. Computers in the Classroom: Mindtools for Critical Thinking by Jonassen (1996) is an excellent how-to book on using computers across the curriculum to promote constructive, high-order, critical thinking. It provides rationale for using computers, suggestions for teaching with computers, and methods for evaluating learner outcomes. Referring back to Gagne, he, along with two colleagues, Leslie J. Briggs and Walter W. Wagner, have authored Principles of Instructional Design (1992) which provides theory, rationale and specific steps to creating instructional modules. Kemp, Morrison, and Ross (1994) produced a small book designed for use by instructional designers assisting subject matter experts or instructors in the development of small units or complete courses.

Sallie Gordon (1994) provides "principles and guidelines for the design of training programs and basic performance support systems" (p. xiii). She presents a three-phase design model that includes front-end analysis, design and development, and system evaluation. Even though the book is directed more towards the corporate training environment, the material is well suited to anyone who must put together a training program. As a last example of the extensive literature in this area, Heinich, Molenda, Russell, and Smaldino's Instructional Media and Technologies for Learning (1996) is directed at educators at all levels who want to incorporate current technology into their learning systems. While referring to the various learning theories already mentioned, these authors see those theories as ways to see how the technology should be integrated into the classroom. Citing numerous examples, they provide a well-done how-to book immediately useful to the educator.

All these materials provide a starting point for the creation of the guidebook. They clearly indicate that guidelines are needed, and that several organizations and individuals have responded to this need. By creating such a set of guidelines for ICN course developers, it is hoped that common obstacles and pitfalls can be readily identified. Once recognized, the guidelines will provide the means, based on experience, to surmount those obstacles. This will lead to successful courses faster, with less frustration.

The Contribution This Study Makes to the Field

After several years of studying the implementation of the technology across the state, it is certainly time for an examination of common factors that have led to success of various courses being offered over the ICN. This study quantifies factors key to the successes of representative programs.

The value of this work is in its creation of a set of guidelines that can be used to develop courses destined for delivery over the Iowa Communications Network. These guidelines, generated as a handbook, provide a basis for improvement of the types, levels and content of education being offered over the ICN. Strengths in the presentation of curriculum are highlighted, as are weaknesses. These guidelines can lead to faster development of courses by reducing the learning curve through timely attention to obstacles that delay that development.

Chapter III

Methodology

As stated earlier in this paper, conversations with Dr. Pamela Pfitzenmaier, the Director of Educational Telecommunications for Iowa Public Television, uncovered concern by Iowa teachers that there was no "how-to" manual for them to use to create courses for delivery over the ICN. The administrators of the Iowa Communications Network echoed this sentiment saying that state school teachers approach the development of courses to be offered over the ICN individually (P. A. Pfitzenmaier, personal communication, February 19, 1998). That is, the teachers do not have a central repository of experiential knowledge on which to base decisions for problems encountered during the development process. In response to the request by the state's teachers, administrators wanted to provide such guidance to the teachers. Both groups' specific desire was a singular document containing a course creation process that could be distributed to teachers. This manual would contain the cumulative expertise of individuals who have been successful over the past several years in creating and presenting classes over the ICN.

The manual will be distributed as part of the training that teachers receive for developing their own courses. This will provide teachers with a unique summary of the training and be a ready reference during their own course development process.

Action Research Approach

The action research approach was followed in the development of the Iowa Communications Network course creation guidebook. This approach is ideally suited to the solution of "practical problems through application of the scientific method" (Gay, 1996, p. 10). Because the focus of this study was on "a solution to a local problem" (McMillan & Schumacher, 1993, p. 21), it was "practical and directly relevant to an actual situation in the working world" (Isaac & Michael, 1995, p. 59). Its results were "useful within the practical dimensions of the situation" (Isaac & Michael, 1993, p. 59).

This chapter describes the steps that were followed in the development of the guidebook as outlined in Isaac and Michael (1993). The steps included:

1. Set the goal.
2. Review the literature.
3. Formulate strategies of approach.
4. Spell out the procedures to meet the objectives.
5. Establish means of acquiring useful feedback.
6. Analyze the results and evaluate the outcomes.

Set the Goal

The goal of this project was the creation of Guidelines For Creating Courses For Delivery Over the Iowa Communications Network. This course development guidebook will be used by individuals who will design courses for presentation over the Iowa Communications Network (ICN). The guidebook was created to satisfy several objectives as provided by the administrators of the ICN:

1. First time course developers must be able to recognize and bypass common obstacles that occur during course development.
2. First time developers must have available to them developmental expertise.
3. First time developers must have the ability to create courses for ICN delivery in a reasonable time.

Review the Literature

Chapter Two of this document provided a review of the literature and resulted in two pertinent items. The first was the working definition of quality education, which is repeated here as:

> student-centered learning that is accessible to the widest range of learners. It uses stable teacher-student interactions with nonthreatening two-way communication to achieve educational outcomes. Change and growth occur through developmentally appropriate activities focused on specific learning results useful to the learner's life.

The second result was the construct-validated list of characteristics considered to be highly desirable in teachers (see Appendix A). This list provided guidance to the people who were asked to provide the names of the teachers whose expertise formed the basis of the guidebook.

Strategies of Approach and Procedures to Meet Objectives

The knowledge required for the guidebook was gathered from teachers who had successfully delivered courses over the Iowa Communications Network during the past several years. These individuals were selected from names suggested by the three committees charged with control and management of the infrastructure and content of the ICN and by the directors of the state's 15 Area Education Agencies. This knowledge, collected through interviews with identified exemplary users of the technology, formed the content of the guidebook. To this end, the following steps were followed:

1. Identify the teachers.
2. Collect the knowledge.
3. Synthesize the knowledge.

Identification of Teachers

The content of the guidebook was garnered from the study of teachers who are considered exemplary users of the technology. Because the ICN provides courses to many different levels of education, more than one individual was consulted. To facilitate the selection of these individual teachers, Dr. Pamela Pfitzenmaier, Director of Educational Telecommunications for Iowa Public Television, with her numerous years of experience with the ICN and with the developers of much of the current course content delivered over the ICN, suggested the following three limiting criteria to assist in selecting teachers:

1. Developers must be over their initial technophobia.
2. Developers must have overcome the preliminary barriers they encountered.
3. Developers must be experienced, both as teachers and as users of the technology.

These criteria separated teachers who simply understand the theory from those who had put the theory into practice and had learned from their experiences, thus providing better input to the guidebook. To create the broadest, most useful guidebook that would cover the full extent of the current ICN offerings, she also suggested that individuals from three areas be studied to provide cross-referencing of product objectives and to meet the needs of the largest number of potential developers. These three areas were collaboration, or team teaching, traditional distance learning classes, and elementary or middle school.

Therefore, three individuals were expected to provide sufficient input to generate the steps to develop a course, a list of significant obstacles and how they were overcome, and other insights into the course development process. Additionally, material from the literature was used to enhance and reinforce these points.

The teachers were selected by a consensus of opinion from three major committees that deal with the implementation and management of the technology providing education to the state of Iowa and from the directors of Iowa's 15 Area Education Agencies. The committees were the Education Telecommunications Council, the Star Schools Partners Council, and the Technology Team. Dr. Pamela Pfitzenmaier assisted in providing access to these groups.

The Education Telecommunications Council was established by the Iowa Code, section 8D.5 in 1994. This 18-member group consists of two persons appointed by each of the following agencies:

1. the state Board of Regents
2. the Iowa Association of Community College Trustees

3. the area education agency boards
4. the Iowa Association of School Boards
5. the school administrators of Iowa
6. the Iowa Association of Independent Colleges and Universities
7. the Iowa State Education Association

In addition, three members are appointed by the director of the Department of Education, which includes one person representing libraries and one representing the Iowa Association of Nonpublic School Administrators. The administrator of the public broadcasting division of the Department of Education appoints the last person.

The Education Telecommunications Council has the following taskings:

1. To establish scheduling and site usage policies for educational users of the Iowa Communications Network,
2. To coordinate the activities of the regional telecommunications councils throughout the state,
3. To develop proposed rule changes for recommendation to the Iowa Telecommunications and Technology Commission, and
4. To recommend long-range plans for enhancements needed for educational applications (State of Iowa, 1994, Chapter 1184, Section 7).

The 11-member Star Schools Partners Council consists of representatives from Iowa State University, the University of Northern Iowa, area education agencies, the Iowa Department of Education, and Iowa Public Television (IPTV). This state-level implementation arm of the federal Star Schools grant advises the project administrators and its director on day-to-day operations. (P. A. Pfitzenmaier, personal communication, December 23, 1998).

The Technology Team has nine members from the Iowa Department of Education and Iowa Public Television. Key Department of Education staff personnel in curriculum, instruction, special education, and data work with IPTV staff personnel who perform such duties as administer grants, advise on Universal Service, and coordinate with area educational agencies. Together, these two groups of technology staff provide state-level guidance to the Department of Education in the areas of instructional technology and telecommunications. (P. A. Pfitzenmaier, personal communication, December 23, 1998).

An Area Education Agency (AEA) is an intermediate unit situated between the state Department of Education, the school districts, and the local schools. It is empowered to furnish educational services and programs to students in public and nonpublic schools within boundaries designated by the director of the Department of Education (Iowa General Assembly, Iowa Code 1997, Section 273.2). The AEA directors are familiar with the teachers in the region and are aware of the area's ICN efforts.

A short form (see Appendix B) was created to obtain the names of teachers who provided the inputs to this project. This Exemplary User Request asked respondents to name at least one teacher in each of the three areas (collaboration, distance learning, and elementary/middle school) who met the criteria suggested by Dr. Pfitzenmaier. The previously determined list of desirable teacher attributes (see Appendix A) was attached to the request to assist the directors and committee members in making their selections. This provided a reasonable degree of consistency in the resulting selections.

Collection of the Knowledge

To capture the expertise of the selected teachers, the knowledge acquisition phase of the project consisted of two interviews of the participants. Among several advantages, the research interview:

1. Permits greater depth.
2. Permits probing to obtain more complete data.
3. Makes it possible to establish and maintain rapport with the respondent or at least determine when rapport has not been established.
4. Provides a means of checking and assuring the effectiveness of communication between the respondent and the interviewer. (Isaac & Michael, 1997, p. 145)

Interviews consist of two types: the quantitative, and the qualitative. The quantitative, or standardized, interview is "an oral, in-person administration of a standard set of questions that is prepared in advance" (McMillan & Schumacher, 1995, p. 42). It collects data in the form of numbers or in a form that can be transformed into numbers easily. The qualitative interview is a flexible, adaptable interview that permits the acquisition of knowledge and data not otherwise obtainable, including mental processes, past events, and events not directly observable by the researcher (Gay, 1996, p. 223). It collects data in the form of words.

A semistructured qualitative interview was selected as the approach to gathering the teachers' expertise. Two phases of interviewing were used. The first interview served as an introduction to the project, gathered background information on each respondent and asked each respondent to describe the process they followed in creating courses for the ICN. With this background in place, the subsequent interview delved into the specifics of the course creation process. To focus these interviews, a set of general questions was developed to guide the discussion. Then the discussion was opened up with clarifying, unstructured questions. These key-informant interviews were conducive to discovering what the respondents had experienced and what they felt and believed (Gay, 1996). They were in-depth interviews of individuals who had special knowledge and who were willing to share that knowledge with the researcher (McMillan & Schumacher, 1997).

The development of the interviews followed steps delineated by Isaac and Michael (1997), including:

1. Define the purpose of the study.
2. Translate the general goals into detailed and specific objectives.
3. Develop a tentative guide to be used during the interview.
4. Develop a satisfactory method of recording responses.

The purpose of this study, as outlined earlier in this paper, was to gather expertise from teachers who had used the ICN to present courses and then to use that expertise to construct a guidebook of best practices for future course developers.

The earlier examination of the concept of quality in education, the subsequent creation of the working definition, and the follow-on generation of the list of teacher characteristics served to establish an approach to creating the questions used during the interviews. Therefore, the main objective was subdivided into several more specific goals. These served to focus attention on the specifics of ICN course creation. Initially, I wanted to:

1) Determine the background of each teacher for comparison purposes.
2) Delimit the skills necessary to teach any K-12 course.
3) Determine the any additional skills necessary for course delivery over the ICN.

4) Determine the steps followed by teachers to create a K-12 course.

5) Determine any special or additional steps needed for ICN delivery.

6) Identify ICN-specific obstacles/difficulties encountered during course creation

7) Enumerate the processes used to overcome each of these obstacles.

8) Determine any special materials necessary for ICN delivery.

9) Determine activities to incorporate into ICN courses that differ from "normal" course activities.

10) Enumerate tips, techniques, and methodologies that have proven successful in delivering courses over the ICN.

The main purpose and the general objectives were provided to the respondents so that they could prepare themselves for each interview (see Appendix C). With the objectives delineated, a series of questions was developed to elicit responses from interviewees that would lead to the successful attainment of these objectives.

These questions were decided to be of an open-ended nature per the qualitative unstructured approach to interviewing. Open-ended items gave respondents a frame-of-reference in which to react, without placing any constraint on the reaction. The questions allowed flexibility, depth, clarification, and probing. They enabled the interviewer to assess each respondent's degree of sophistication and knowledge and encouraged cooperation and established rapport. The format allowed unexpected responses, which revealed significant information not anticipated by the research design (Isaac & Michael, 1997, p 147).

Once the questions were formulated, they were fitted to planned interview patterns. One guide was developed for the initial interview (see Appendix D) and one for the follow-on interview (see Appendix E). These guides standardized the interviews, insured the comfort level of the respondents and facilitated the questioning process.

To facilitate the interview process, several factors suggested by McMillan and Schumacher (1993) and the International Management Centres (1998) were considered. These included:

1. Duration of sessions
2. Number of sessions
3. Location of each session
4. Preparation of the interviewee

Sessions were scheduled depending on their purpose. The initial session conducted to begin task analysis was relatively short, lasting only about an hour (Gordon, 1994). The follow-on session did not exceed two hours in any case. These time limits insured that the respondents would not become uncomfortable or bored during the interview. The preliminary interview of each teacher took place in their own classrooms at the schools where they teach (Gordon, 1994). Two of the follow-up interviews took place over the telephone and two were face-to-face conversations. Each interview was a one-on-one session with the teacher. Before each session, the interviewee was provided the questions to be addressed in that session (International Management Centres, 1998).

In general, each interview session followed a simple format. The first step was to explain the purpose and objectives of the interview session. The author provided an explanation of the focus of the research and included the reasons that the information gathered was important. After the introduction, the respondent was asked if there were any questions before starting. After going through the specific questions for the session, the respondent was thanked and allowed any last minute thoughts.

I decided that a satisfactory method of recording responses included both tape recording and note taking. So, per McMillan and Schumacher (1993), I took a tape recorder to scheduled interviews and, with the interviewee's permission, recorded our conversations. I also recorded field notes for every interview, describing such items as the setting in which the interview took place, pertinent facial expressions and hand gestures, as well as my thoughts during the interview, these latter being used for subsequent questioning.

After each session, the tape recording was transcribed. Then it was electronically mailed to the respondent for validation/verification of their answers. This process allowed the respondents to check the interviewer's perceptions. It permitted interviewees to make any additions or corrections where they felt it appropriate. And, it helped to build a positive relationship between the researcher and the respondents (McMillan & Schumacher, 1993).

Framing the Questions

Here again, the insights garnered from the literature review of the concept of quality in education proved invaluable in creating specific questions to elicit responses that most clearly represented each teacher’s “best practices.” The development of the actual questions used in the interviews followed the guidance of Isaac and Michael (1997). They suggest that interview questions must satisfy several criteria, among them:

a. Questions must be framed in language that insures effective communication between the interviewer and the respondent.

b. All ambiguous vocabulary must be omitted to insure they are clear and unambiguous.

c. The respondent should appreciate the purpose of each question asked by insuring the question is related to the research problem and objective.

d. Questions must avoid arousing suspicion or resistance by not asking for unnecessary personal or sensitive information.

e. The researcher must ascertain whether the respondent actually has the information sought and that the questions permit the reasonable recovery of this information.

f. Questions must not be leading.

g. The researcher must insure that the frame of reference surrounding each question is clear so that each respondent hears the question in the same way, avoiding misinterpretation.

Additionally, standard categories of questioning suggested by McMillan and Schumacher (1993) helped to group the questions so that the interviews could progress in an orderly fashion and insured that each objective was addressed properly and completely. These categories included:

1. Background
2. Knowledge
3. Experience/Behavior
4. Opinions/Values/Feelings

As indicated earlier, background objectives were addressed first as they provided the starting point of each respondent's comments. Beginning the initial interview with a bit of personal history served to set the tone for it and subsequent sessions as respondents tended to relax and were comfortable during the questioning process. The teacher's background also provided some insights as to their initial approach to new concepts and new technology. To that end, specific questions in this area covered

1. Years of teaching,
2. Educational background,
3. Years of ICN usage,
4. Computer experience,
5. Courses taught in both the traditional and ICN classrooms, and
6. ICN and distance education training.

Knowledge questions dealt with the factual information the person had. In this area I was interested in discovering each individual's:

1. Knowledge of instructional design methodologies,
2. Subject matter knowledge,
3. Teaching skill set,
4. Knowledge of available materials,
5. Course activities, and
6. Constructivist teaching practices.

Experience and behavior questions were concerned with what a person does or has done. Specifically, these dealt with determining:

1. The process followed to produce a course for the ICN,
2. Any procedural differences from traditional course development,
3. Critical tasks involved,
4. Instructional organization,
5. Outcome measurement, and
6. Classroom management.

Opinions/values/feelings objectives dealt with what each person thought about their experiences using the ICN. Here I was interested in intentions, goals of actions, and values of each teacher. In this area I asked questions concerning:

1. Educational philosophy,
2. Student skills developed during learning,
3. Teaching strategies,
4. The role of the teacher,
5. Impressions of teaching over the ICN (before and now),
6. Difficulties encountered and steps taken to overcome them, and
7. Recommendations to other teachers.

This area was divided into approaches to teaching, difference between theory and practice of course design, how the person reacts emotionally to their experiences, concerns about use of technology, impressions of students reaction to technology, and whether the ICN is a valid method of delivery.

Prior to actually using the questions with the respondents, the questions were provided to a panel of Graceland College Education Department faculty for review. These individuals, with more than 60 years of collective teaching and teacher training experience, were asked to examine the questions and provide feedback by answering the following (suggested in Gay, 1997) for each question:

1. Is the question clear?
2. Will the question solicit desired information?
3. Might the question produce negative reactions in respondents?

Their responses, insights, and criticisms were incorporated into the questions before interviewing began. They provided additional guidance during the knowledge acquisition process as concerns arose over particular questions that were developed in response to new information gathered during interviews.

The actual questions (see Appendixes D and E) were sequenced in an order of increasing depth as the interviews progressed. The initial session began with the demographic questions to establish each teacher's background. Once a main question was asked and responded to, interview probes were asked to obtain elaboration of detail, further explanations and clarification of responses. Along the way, questions were grouped by the topics listed earlier and were asked depending on the respondent's mood, with the more complex or difficult questions in the middle or later periods of each interview (McMillan and Schumacher, 1993). In addition, ad hoc clarification questions were asked during the interviews to elicit further comments or to insure an answer was interpreted correctly.

Synthesization of the Knowledge

Once the interviews were completed, the knowledge gained was coupled with information gathered from the literature and shaped into the guidebook. To facilitate this process, the formal instructional design process was studied. The interviewed teachers, while not adhering strictly to the principles of instructional design, did exhibit similar concerns and took similar steps when designing courses. So, even though they did not strictly follow this paradigm, it provided a firm theoretical grounding on which to base the guidebook. Because the guidebook was designed to be non-technical, instructional design terminology was used sparingly in the final product.

Acquiring Useful Feedback

The guidebook's objectives were validated in two ways. The first was a formative in-process review as the guidebook was developed. The second was a summative field test of the final product.

In-process Review

The teachers assisting in the guidebook development and Dr. Pfitzenmaier were provided in-work copies of the guidebook for ongoing critique of the guidebook as it took shape. Weston (1986) suggests that the final product will be more effective if it is evaluated by representatives of the target audience and modified during development. So, a series of expert reviews of the prototype materials during development were conducted and the suggested improvements were incorporated into the manual.

The first review took place after the initial layout of the guidebook was developed. At this stage, the chapter headings were listed and a short explanation of each chapter's content was provided. Once this format was approved, each chapter's content was fleshed out. As each chapter neared final form, the teachers were asked for their comments. The draft final product was sent to the teachers for final review. These developmental reviews provided ample review of the guidebook during its creation.

Field Test

During field-testing, materials which have been revised and are in semi-final form are tried out in a setting which models as closely as possible the actual use situation (Weston, 1986). So, the guidebook was covered and spiral bound as a Field Test Version. It was given to several individuals suggested by Dr. Pfitzenmaier, Mr. Dave Paulek, who teaches a course on delivering courses over the ICN, Doctor Sharon Smaldino of the University of Northern Iowa and Trista Peitzman, the K-12 Coordinator for the Iowa Star Schools Project. These individuals included K-12 teachers, AEA technical coordinators and faculty in the Education Departments of several universities. The teachers were asked to develop and present a course over the ICN following the guidebook's suggestions. The AEA coordinators and college faculty were asked to review the manual with respect to the materials and classes they present to prepare K-12 teachers for ICN teaching.

Debriefing of field testers was done using a feedback form. This instrument consisted of two parts; one gathered quantitative data, while the other collected qualitative data (see Appendix G). Calculating mean responses to the quantitative statements provided data to assist in the revision process. The second part of the instrument provided testers with spaces for written comments. These written comments shed light on lower rated items and contained many useful suggestions for revising the manual.

This instrument collected data that identified poorly designed sections. In addition, this method, by encouraging testers to provide written feedback, enabled them to be involved in the manual development process. These quantitative and qualitative data alerted the author to specific problematic aspects of the manual that needed to be addressed.

Finally, this field test data gave the manual developer confidence in the quality of those areas receiving high ratings. Surprisingly, no areas received low ratings.

The information collected provided proof that users' reactions to the manual were sought out during the development process. The information also provided proof that problematical items were either deleted or revised according to testers' suggestions. This process also allowed the author to demonstrate that areas not revised or deleted were perceived to be clear, relevant, and useful by testers.

Analyze Results and Evaluate Outcomes

The results from the field-testing were analyzed and outcomes were evaluated. They are summarized in Chapter Four of this document. After final editorial changes were made, the manual was given to Dr. Pfitzenmaier who documented her acceptance in written form (see Appendix H).

Final Form of the Product

The guidebook (see Appendix F) developed during this project is divided into several sections with a total of eight chapters. The first chapter provides an introduction to the manual to explain its purpose and lists the objectives of the guidebook as discussed earlier. The first section, containing Chapter Two, provides guidelines to school district and AEA personnel to insure teachers are provided the proper scholastic environment in which to teach.

The second section has five chapters, each devoted to a step of an instructional design process consisting of:

Analyze
Design
Develop
Implement
Evaluate

While the teachers interviewed do not consciously follow this step-by-step approach, they do parallel its concepts and intentions in the creation of courses that they teach. The insights gathered from the interviews with Iowa teachers were inserted into discussion to bring the focus to the ICN. These pertinent points were supported with material from the literature. Thus, instructional design permitted a systematic coverage of the course creation process and allowed for insertion of ICN-specific advice from experienced teachers.

A third section contains a chapter of guidelines that do not fit in the other sections. Finally, two appendixes provide a list of Iowa contact persons for teachers to network with during future course creation projects and a short bibliography of articles, books, organizations and web sites to provide teachers with a ready list of references to consult during their efforts.

Assumptions

The basic assumption made for this study is that most developers have encountered similar difficulties during the course creation process. This study addressed these commonalties.

Limitations

This study was limited to developers using the Iowa Communications Network for delivery of courses to students residing in the state. The guidebook may be generalized to provide guidance to similar groups of individuals operating in similar environments in other states.

Chapter IV

Results

In this chapter the results of the methodology outlined in Chapter 3 are provided. First the results of the teacher selection process is discussed. A summary of their experiences and expertise is given. Next, the step-by-step creation of the manual is covered with each section's content being given along with the reasoning for its inclusion. Then the results of the manual's field-testing are explained and analyzed. Finally, key findings are presented and a short chapter summary is provided.

Selecting the Teachers

The Request for Names was sent to a total of 53 persons on the three committees and the area education agencies (AEAs). Of these, 28 returned the requests with the names of 29 different teachers. These names were reviewed and consolidated into a single list. Eight names appeared more than once and, of these, three appeared more than three times. Letters of introduction were sent to these eight teachers. Initially six of them agreed to be interviewed for this project. Eventually, four teachers were able to participate in this study. The researcher determined this enhancement of the initial design of the project would improve the resulting manual by providing a broader scope of experiences on which to base the guidelines.

Therefore, four Iowa teachers were interviewed for this project. Their teaching experience ranges from 20 to 30 years and averages about 25 years. They have taught on the Iowa Communications Network (ICN) from three to seven years with the average being just above four years. The subjects they teach include high school German I and II, Biology, Health Science, General Science, American Literature, Speech and Writing, and Career Directions, and an elementary school fifth grade curriculum. Each teacher received a rudimentary introduction to the ICN through a one to two-day workshop. They then picked up most of what they know through experiential learning during actual usage of the ICN to deliver their classes. Three of the teachers provide instruction to other teachers in the use of the ICN.

Each teacher was interviewed twice. All were interviewed in a face-to-face first session at their respective schools in their respective classrooms using the questions from Appendix D. For the second session, two teachers were interviewed over the telephone and two were seen face-to-face. These interviews used the questions of Appendix E. All interviews were tape recorded and then transcribed. Each transcription was sent to the appropriate teacher for review and verification and to allow them to make any changes or corrections. The transcripts were then used to develop the guidebook.

The Guidebook

The guidebook developed during this project is divided into several sections. The first section provides guidelines to school district and AEA personnel to ensure teachers are provided the proper scholastic environment in which to teach. The second section mirrors a five-step instructional design process proponed in the literature. Pertinent points provided by the interviewed teachers are listed and supported from the literature. A third section contains guidelines that do not fit in the other sections. There are two appendices, one containing points of contact including teachers' names, and the other is a reference section containing pertinent articles, books, organizations, and web sites.

The resulting manual contains an approach to creating courses for delivery over the Iowa Communications Network. It could easily be adapted to any such distance learning environment with minor modification.

Administrative Guidelines

Before a teacher can be expected to provide quality education over any distance education infrastructure, there must be some agreement as to the environment that will be provided in which to conduct the learning experience. Adams and Burns (1998) state

> The introduction of computer technology demands a tremendous amount of physical and organizational restructuring - for administrators, teachers , and students. Schools must determine their educational goals and the ways technology can help them realize such goals. Teachers need high quality professional development and access to on-site technical assistance. They must be offered the flexibility, support, resources, and time to carry out the changes required by a technology-rich environment that supports learning (pp. 47-48).

In Iowa, the administrators within each school district in conjunction with the applicable Area Education Agency are tasked to ensure that these requirements are met.

In addition to guaranteeing the mere presence of the technological infrastructure, these parties are also responsible for its proper functioning either directly or indirectly. Beyond the equipment used in distance education, the other factors alluded to by Adams and Burns (1998) must be addressed at this level to increase the quality of the learning experience for the students. These factors include teacher preparation and training, class preparation time for teachers, student numbers and quality, and the role of facilitators or monitors at remote sites.

Administrators operate under the direction of state level agencies that have established classroom configurations, equipment lists and connectivity requirements. After insuring the basic connectivity between sites is in place, the question becomes one of classroom equipment, both its presence and its proper functioning. This study revealed that some classrooms do not contain all the necessary items. For example, one classroom does not have a fiber facsimile machine. While seemingly a small item, Glascott and Stone (1998) expect administrators to provide adequate technology at sites and strongly recommend the use of facsimile machines for rapid feedback This point was echoed by all four teachers interviewed for this project. The lack of this one machine greatly reduced teacher-student real-time interaction and added another impediment to the learning process.

Even if all the necessary equipment is in place, some of it is in need of repair or does not function correctly or, in some cases, not at all. Classroom comfort are affected by such problems as:

- Television screens flipping during transmission
- Videotapes not being clearly visible over the system
- Sound not being heard or garbled
- Excessive static during voice transmissions
- Color inconsistencies, color bleeding

Reliability of the equipment is obviously critical to any environment that depends on that equipment to provide information, continuity, and control. Any malfunction detracts from the flow during a session and produces negative results. According to the teachers, the technology should be transparent to the content being delivered.

Preparing teachers to provide distance education is unmistakably critical to a quality learning experience. Hsu and Sammons (1998) state that "teachers with no or only some experience in distance education frequently encounter problems they did not expect" (p. 179). This alludes directly to a need that must be recognized by administrators. Success in distance education comes from a carefully planned approach. "Well-trained and well-prepared faculty contribute to the success of any distance education program" (Bergmann & Raleigh, 1998, p. 61). Several authors, among them Wolfe and Harris (1998), suggest that a lack of understanding of the relationship between the medium and course design and instructor delivery methods reduces the effectiveness of distance education. Because distance education requires specialized skills, abilities, and training for effective teaching, "adequate training prior to the distance teaching experience, and adequate support throughout the delivery process are the most effective and efficient methods for ensuring long-term success" (p. 565).

Training goes beyond simply providing a short meaningful experience to introduce a teacher to the classroom and its technology. "Faculty are often anxious about the process or unfamiliar with the dramatic difference in assembling a distance learning educational product over one developed for the traditional classroom" (Lawton & Bonhomme, 1998, p 221). The thought of teaching in such a different venue is a main cause for teachers not taking up the gauntlet of distance education. New instructors must be introduced to the technology and, equally importantly, must be provide with the opportunity to practice using that technology prior to any actual classroom endeavors. Only then will they realize what the process of teaching with it will be like. Hsu and Sammons (1998) said, "it was not until they began teaching with the technology that they discovered how the technology affected their teaching process" (p. 184). This discovery is a cornerstone to distance education as it actively affects the interaction necessary for successful learning. Learning the intricacies of the medium, overcoming the awkwardness of using it, and dealing with its impact on education quality is of paramount importance to anyone associated with distance education.

Therefore, "To expand distance delivery in the future, it's important to understand the type of education faculty need so they can develop their skills and build appropriate teaching strategies" (Schauer, Rockwell, Fritz & Marx, 1998, p. 321). Schauer, et al. (1998) consider it to be very important for faculty to obtain further education, assistance with, and support for such teaching strategies as developing interaction, developing instructional materials, and applying selected technology appropriately. This puts the burden of providing such training directly on the administrators who must insure quality in the distance learning classroom.

Once teachers are adequately trained to perform in the distance education arena, they must be provided sufficient time to do so. "Distance education requires a great deal of up-front time from teachers to prepare for their classes" (Telg & Irani, 2000, p. 2). Some teachers contacted during this study indicated that they were provided no notice prior to the beginning of the school year that they would be teaching an ICN class in the coming school year. Having never taught in the environment, they were immediately at a disadvantage. Planning a course for distance learning, as outlined below, is significantly different from planning a course for the traditional classroom and requires increased lead-time for preparation. Additionally, a change in the approach to the learning process may be required on the part of the teacher and "shifting from a traditional, teacher-centered classroom setting to a learner-centered one is time- and labor-intensive" (Adams & Burns, 1998, p.45). Suffice it to say that the latest a teacher should be assigned an ICN course, or any distance learning undertaking for that matter, is the school year prior to the expected offering.

The teachers contacted in this study provided two alternative solutions to the preparation time dilemma. Some were compensated financially for the ICN courses they taught, while others were provided an additional preparation period during their normal school day. Those compensated financially agreed with Schauer, et al. (1998) who suggested that "consideration needs to be given to adjusting duties to accommodate course development rather than offering additional financial reimbursement" (p.327). The money did not remove the burden that lack of time to adequately prepare a class placed on them. Monetary compensation for the additional workload will never become as meaningful as providing the extra time needed by the teacher. This sentiment was endorsed by Glascott and Stone (1998) who saw it as necessary that administrators reduce teacher load to permit adequate preparation.

Time also becomes critical during the school year such a course is presented. Handling the logistics of several classrooms at various locations outside the immediate control of the teacher requires additional time on the part of the instructor. The additional preparatory period per school day mentioned earlier that is actually part of one teacher's contract can serve double duty in providing this time. Rutz and Hajek (1998) insist that "instructors should allow additional preparation time when involved in distance learning courses" (p. 316). They warn that teachers must be prepared for network problems, classroom technology failures, sickness and so on "if the students are to be properly served" (p. 317).

Probably the area of highest concern among the teachers contacted for this study, and in the literature is that of selection of facilitators or monitors for the remote sites. These individuals can not be simply "placeholders" at the remote sites. They must be seen as a critical part of the learning environment. In fact, "competent facilitators who understand the training objectives and the content will assist the distance learning initiative" (Goodman, 1999, p. 4). Additional support for this point comes from Kirby and Driscoll (1997) who, drawing from other researchers, state that "Bradshaw and Brown (1989) noted that most successful projects place a trained aide at the receiving site with students" (p. 1), and that "many believe the presence of classroom facilitators offers an opportunity to enhance learning for students in the remote classroom (Willis, 1992)" (p. 1).

Kirby and Driscoll (1997) include a list of typical facilitator duties. These include classroom supervision, management of instruction locally, motivating students, monitoring student progress, distributing materials, collecting homework, and proctoring tests. Because of these kinds of primary duties, facilitators should have no additional duties during class so they can provide the required assistance to the course instructor. At worst, facilitators should simply monitor classroom activity to ensure a positive, controlled learning atmosphere. At best, they should have knowledge of the subject matter and actually participate in the class. With a positive attitude and a display of enthusiasm facilitators should become an integral part of the teaching team.

Kirby and Driscoll (1997) sees one of the major roles assumed by facilitators to be the matching of the features and requirements of the distance education course to the local school and students. In close coordination with the primary instructor, facilitators can:

> 1) Schedule make-up sessions (or other arrangements) to compensate for calendar deviations,
>
> 2) Extend due dates to accommodate lack of off-air time during which labs would normally be done,
>
> 3) Determine when labs, quizzes, or other assignments would be dropped rather than made up, and
>
> 4) Establish local homework or test administration policies (p. 12).

If the monitor is in the classroom, it seems quite reasonable to expect them to be paying attention, handling the students, and assisting the instructor in delivering course content. Facilitators conducting other classes in the back of the room, reading a newspaper, or correcting papers detract from the learning environment, increase the noise levels to the point of distraction, and does not provide the instructor with the necessary control that enhances any learning situation.

If facilitators are not providing this type of classroom presence, should a course be presented to that remote site? What is the point of transmitting to a site that has so little concern for their students that they won't support what the instructor is trying to do? If there is genuine concern about what the students are getting out of what the instructor is doing, then selection of proper facilitator is critical to quality learning. If this is not done, then the consequence will be student failure, which is the history of many students who don't have proper supervision at the remote site. Administrators, and parents, need to be concerned about this.

The next area of concern is the selection of students to take the course. ICN classes require students who can work with minimal instructor intervention. "With the student role in learning largely dependent on the learner, the teacher will encounter difficult problems if the student has a motivation problem" (Malone, Malm, Nay, Oliver, Saunders, & Thompson, 1998, p. 4). Students must be aware of their responsibilities in the ICN environment and be prepared to shoulder more of that responsibility than they might in the traditional classroom. Students who are performing below expectations in other classes should not be placed in ICN classes as a remedy for their recalcitrance. It is wise to permit the teacher of the class to establish minimum entry requirements and for administrators to uphold those requirements.

Scheduling of classes is another area where administrators can improve the quality of ICN education. Glascott and Stone (1998) believe administrators must "ensure instructors are not unduly challenged with enrollment numbers" (p. 52) by keeping the number of sites to a reasonable level. The teachers in this study were concerned with the logistics of dealing with too many sites each with several students. It is easy to see, but sometimes not easy to recognize, that five sites of 10 students exceeds the normal class limit for a traditional classroom. Couple this with the delivery of materials to each site in a timely manner and the problems is exacerbated.

Additional problems fall into two categories: district-wide, and inter-school. At the district level there must be, at a minimum, some standardization as to the school year schedule. It does no good for the student to miss days and weeks of classes because schools have different holiday schedules. If the school that is originating the class has spring break the first week of April and one or more of the remote sites (within that school district) have it the second week of April, students miss two weeks of material. This places a heavier than normal burden on the instructor to "catch up" those students. Failure to coordinate this results in loss of class days, lower student performance, and higher failure rates.

Within schools, the scheduling of assemblies, fire drills and other classes must examine their impact on the ICN classes being offered. Some real effort must be made to make those periods of ICN classes inviolate to these events or, again, the quality of learning will suffer. These events interrupt the normal flow of learning and dilute the educational experience, limit continuity, reduce class cohesiveness, and require repetition of material.

It should be clear from the foregoing discussion, that while teachers bear the brunt of the distance education experience, it is in the best interests of the students that administrators become interested in more than the amounts of money distance education brings to a particular school district. They should equally be aware that providing quality education involves consideration of the impact their decision has on teachers' ability to provide that education. They must be prepared to train teachers, to provide sufficient lead time for class development, to allow preparation time during the school year, to select, and train if necessary, qualified facilitators, and to revise scheduling to minimize disruptions. Without these minimum steps being taken, the resulting educational experience has a real chance of being less than desired.

Teaching Guidelines

As mentioned earlier, this section of the manual provides guidelines for the construction of courses to be delivered over the ICN. It takes its basis from the instructional design methodology outlined in the literature. This methodology was selected because it provides a common ground for discussion across both traditional and distance learning experiences. The literature contains a wealth of discussion on the topic and also provides for the variations needed for the methodology to be applied to a distance learning environment.

While the teachers interviewed do not consciously follow the step-by-step approach advocated by the literature, they do parallel its concepts and intentions in the creation of courses that they teach. At various points, the insights gathered from the interviews with Iowa teachers are inserted into discussion to bring the focus to the ICN. Thus, instructional design permits a systematic coverage of the course creation process and allows for insertion of ICN-specific advice from experienced teachers.

Instructional Design

Instructional design (ID) is a "creative, active, iterative, and complex" (Branch, 1997, p. 249) process that "analyzes the needs of learners and designs structural 'possibilities' to address those needs" (Dana, 1997, p. 71). While several forms of the process exist in the literature, this paper will use a five-step process that seems prevalent today. The five steps are:

Analyze

Design

Develop

Implement

Evaluate

While the ID process appears rather linear, in practice the interviewed teachers rarely follow this step-by-step approach. "Teaching is a complex process in which teachers make and implement decisions that affect children and their learning. These decisions involve planning, developing, managing, implementing, and evaluating the instructional process to enhance student learning" (Earle, 1998, p. 31). They develop instruction in increments through interactive reflection (Wildman & Magliaro, 1999; Earle, 1998). That is, each phase is interwoven with small loops representing a refinement of a previously "completed" step as new insights are developed. The resulting course or subject matter section is likewise never "finished." Evaluation of the instruction's effectiveness invariably results in further modifications as does new information or changes in current theory about the subject matter. The process "requires continual analysis of progress and successes" (K. Fredericks, personal communication, January 21, 2000). "There is, then, much working back and forth as the total design work progresses" (Gagne', Briggs, & Wager, 1992, p. 34).

Each of the ID steps forms a separate chapter in the manual. The insights the teachers provided as a result of their experiences very closely match those discovered in the literature, so literature support is included where pertinent.

The Analysis Phase

The analysis, or planning, phase is the "foundation for all other phases of instructional design" (Braxton, Bronico, & Looms, 2000). During this phase, "instructional needs and learner characteristics are examined, and goals and purposes are defined" (Gillespie, 1998, p. 46) as well as selecting those tasks that need to be trained to the students (Clark, 1995). Earle (1998) suggests that teachers perform much of their analyses in their heads rather than on paper and use this "reflective mental dialog" (p. 31) throughout all phases of instruction.

In the formal ID model this planning phase actually consists of several parts. Here instructors perform substeps such as analysis of instructional needs, analysis of learner characteristics, development of instructional objectives, analysis of tasks, analysis of literacy requirements, and selection of tasks to reach instructional objectives. Normally, administrators of various educational agencies at the state and local levels identify the need for instruction. The teacher, then, handles the other tasks in preparation of the course.

The interviewed teachers agreed that their approach to subject matter content for their ICN courses does not differ greatly from the one they use in their traditional classrooms. "Remembering to let the subject matter of the course, not the technology, determine the course direction is an important issue to consider" (Lawton & Bonhomme, 1998, p. 224). Two points provide additional support on this topic. First, K-12 curricula are fairly prescriptive as to what material is taught. Within those general guidelines, teachers are free to select activities that will accomplish the coverage of that material. Secondly, there is a need to keep both ICN and non-ICN classes in the same relative position as the school year progresses. Applying the same rules in both environments "ensures the quality basis of the curriculum" (C. Larkin, personal communication, January 21, 2000). Aside from this, the teachers have a list of items they focus on in their planning. First, the teachers determine goals and objectives for each unit of instruction. Wildman and Magliaro (1999) provide the essential question "What are the primary concepts, BIG IDEAS [sic], or fundamental themes around which my course is organized?" (p. 1). The teachers bring to this not only specific, subject-centered objectives and goals, but general constructivist objectives and goals suggested by Lunenberg (1998) who says:

> At every level and in all subjects, students need to learn how to: Precisely put questions, define contexts and purposes, pursue relevant information, analyze key concepts, derive sound inferences, generate good reasons, recognizes questionable assumptions, trace important implications, and think emphatically within different points of view (p. 76).

At this juncture such items as depth of presentation, time limitations, available materials, previous experiences and expected outcomes come into play. Time limitations directly affect the depth to which content can be presented. Available materials influence which parts of the content get increased emphasis. Previous experiences, both in traditional and ICN classrooms, provide success factors that improve educational quality. Expected outcomes provide a rubric against which satisfactory student progression can be measured to manage course flow.

Also included in this analysis is an examination of the characteristics of the students who are expected to take the class. While it is not within the purview of teachers to strictly control which students take their classes as mentioned earlier, they should be given some prerogatives to set minimal entry standards. This is especially true for distance learning classes where student motivation has a high premium in this learner-centered environment.

With goals and objectives in place, teachers can then formulate the activities that will take the student to each specific goal. This is where a clear understanding of the distance learning environment and its impact on teaching strategies becomes critical. Here is where the experience of teachers using the technology can be of immense value. Here is where solid teacher preparation in the form of early training and inservice continuation training yield increased quality. The following points should be considered during the planning process:

Distance learning is a visually oriented medium

Interaction is critical

Working with technology comfortably is essential

Logistics must be considered

Time limitations are inherent

Student responsibility is increased

Alternatives must be prepared

The distance learning environment is a visually oriented medium. So, the teacher should think through activities with this in mind. This should be a prime consideration during course development. Here an understanding of multimedia and its impact will certainly enhance ICN learning. Using visuals uses the strength of the interactive video environment (Friscia, 1998). Also, the teacher should become more aware of visual cues provided during class interaction. Experience suggests that over the ICN up to 50 percent of these may be missed and makes gauging class progress much more challenging. This involves another point below - comfort with the technology. Changing camera views from site to site, and within the originating classroom are a must to overcome the difficulties of scanning students, which in the traditional classroom is instinctive. Also this manual manipulation keeps the teacher aware of all the members of the class, not just the local ones, and makes the remote sites feel included in the class.

Interaction in the distance learning classroom is the cornerstone of successful distance education (Lehman & Dewey, 1998; Berge, 1998; Goodman, 1999). "Creating and using more active methods to gain and maintain attention and foster active participation is of paramount importance in interactive television" (Baker & Stark, 1998, p. 485). Remote site students must feel involved in the class, otherwise the teacher becomes a talking head. Rutz and Hajek (1998) report that "students have indicated ... that traditional lecture presentations are particularly unengaging for students at the remote site" (p. 317). If they are involved their interest level increases, which increases their interaction. It has been noted that as the level of instructor participation increases, there has been a similar rise in student motivation to respond (Jiang & Tin, 1998).

Activities such as intra- and inter-site discussion, direct and nondirect questioning, writing exercises sent in by facsimile machine, and public speaking have been used with great success. Initially, students can be shy about using the microphones and seeing themselves on a screen thus causing physical responses to be slower in a DL classroom. The instructor must be aware of this and provide additional time for responses (Rita, 1998). Also, because keying the microphone cuts off the instructor from being heard, the teacher must be more aware of aural inputs and allow for them. Therefore, "managing the technology itself during class dialogues can also contribute to successful interaction" (Baker & Stark, 1998, p. 484).

Faculty need to be comfortable working with the technology because "organization, planning, teaching strategies, creativity, and instructional technology vary considerably from the regular classroom" (Thoms, 1997, p. 2). For faculty, switching cameras, using the microphones, using the computers and videotape machines, are obviously critical. These "new skills must be learned" (Hutton, 1999, p. 3) and should be part of each teacher's initial preparation training because proficiency improves all aspects of the distance learning endeavor. If left to experience, the quality of the classroom learning will suffer.

Students also should be encouraged to use the technology as part of their course activities (Connell, 1998). Giving short presentations, verbally and electronically, go to the previous two points in that these exercises increase interaction and become part of the visual orientation of the learning.

Logistics are extremely critical in the distance learning environment. All of the teachers interviewed expressed concern over this facet of their experiences and declared it one of the most difficult aspects to implement. The fact that more remote sites result in greater complexity is often overlooked in preparing for distance education. Logistical foresight is required to insure materials reach remote sites so the class period does not turn into a study hall. Materials must also be provided to cover alternative teaching strategies in case of technology failure, scheduling conflicts, or other foreseen and unforeseen events.

Increased organization is mandatory here, including the transfer of materials to the teacher and back to the student for purposes of grading, class exercise closure and the like. The teachers suggested that the use of AEA mail was not 100 percent reliable. They, therefore, take advantage of other technologies such as fax, email, and web sites, both student and faculty, to provide materials in a timely fashion to all parties. One teacher sends single copies to the site facilitators who then make sufficient copies to handout to the students at their respective sites.

The ICN imposes time limitations on any teacher. These are usually seen on a daily basis as specific start and stop times for each class as the management of the ICN tightly controls the usage of the system. Over the course of a school year, this means there is very little leeway for presentation of content and reduces contact time with each individual. Also, "the flexibility that campus teachers have to adjust content and presentation over a semester or year is rarely available to teachers delivering instruction to a distant population" (Kuntz, 1998, p. 23). The teachers therefore organized the content of their courses against this limitation, keeping in mind, of course, a clear understanding of their students' needs and goals. They condensed material without diluting it and thus increased the content of the available contact time (C. Larkin, personal communication, April 6, 2000). The general consensus was that a 20 percent reduction was a good approximation.

To compensate for time restrictions, the language instructor in the group indicated she used quicker warm ups and fewer spot checks of student progress. (K. Fredericks, personal communication, January 21, 2000). Others suggestions included keeping discussions on point by avoiding prolonged divergences into parallel topics, combining topics to provide a concentrated overview of some areas, and increasing external reading exercises. There was a general feeling among the teachers that material needed to "gotten to" in a more precipitous manner and getting through the material also required increased focus by both faculty and students to remain on task.

Another consideration of the time factor is the awareness to treat all sites as a single site. There were two thoughts on this point. One teacher suggested fighting the tendency to treat each site independently and giving instructions only once as if to a single aggregate group in a single location (C. Larkin, personal communication, January 21, 2000). Another point of view suggested that the disruptions caused by various scheduling conflicts resulted in having to repeat instructions to maintain student progression equally across all sites. The literature suggests the solution to both issues is providing such instructions in an extended course syllabus, especially in the area of requirements for successful course completion (Egan & Gibb, 1997).

Learning in distance education places increased responsibility on the students. Because DL is intrinsically more learner-centered, a high degree of self-motivation is necessary.

Self-direction and learner control become valuable student success factors (Berge, 1997). This point is best brought to the students on the first day of class. Both the teachers and the literature suggest getting together with the students no later than the first week of class, either by visiting each remote site or by gathering the students at the originating site (D. Paulek, personal communication, January 15, 2000; Urven, Yin & Bak, 1998; Thoms, 1997). This face-to-face contact serves several valuable purposes besides permitting the instructor the opportunity to stress the students' individual roles in their own success. During these sessions, the teacher becomes a person rather than just the "person on the TV." Meeting students can reveal personalities and provide a measure of cohesiveness across the several sites involved in the class. It can provide the teacher with an awareness of individual student needs and permit time to become familiar with each student to a much greater extent than normally possible over the ICN. It also allows the students to become familiar with the teacher's expectations and standards and allows for any necessary clarification (Neill, 1998; Berge, 1997).

Each teacher said they must plan alternatives to be used whenever situations arise that disrupt normal class flow. Versatility and flexibility are bywords all the teachers live by. The time factor mentioned earlier, the diversity of the students in the classes, and the complexities of several sites added to complicated technology all provide opportunities for less than optimal results in the distance learning environment. Therefore, the teachers suggest that technology failures should be expected and planned for. For example, if the cameras go down, the phone can be used to pass along instructions. Even better, such instructions should be in the materials sent to the remote sites in preparation for that day's class. Teachers need to think about alternatives to group discussion, videotape failure, missed classes due to incompatible scheduling of assemblies or holidays, and the like. Adams and Burns (1998) insist that "backup plans, always a necessity, are even more crucial when using technology" (p. 28).

All teachers made note of the fact that tying the current topic to previously covered material was important. This constructivist point of view permits students to connect the new material with their earlier experiences and generate their own understanding of the topic. It also permits teachers to reuse materials created earlier and to use materials created for other courses to connect content across the curriculum and to save development time.

Finally, every teacher indicated that some arrangements must be made to provide contact time outside the already limited class time. They suggest using email (Willis & de Montes, 1998), telephone hours established clearly in the syllabus, and, when available, web sites to handle the most common needs. They also saw the possibilities presented by online discussion groups, listservs, chat rooms, and bulletin boards (Hatch, Tuason, & Hatch, 1998) as other means to maintain continuity from class session to class session. Lawton and Bonhomme (1998) said it best:

When working at a distance, without communication the rest falls apart (p. 223).

All teachers agreed that detailed planning well in advance of delivering a course is the key to success. As one teacher put it, "Good things don't happen by accident" (D. Paulek, personal communication, April 4, 2000). Establishing clear objectives with specific beginning and ending points, planning activities that focus on attainment of those objectives, and measuring the degree of attainment must be accomplished with a clear understanding of the distance learning environment. Anticipating what might go wrong and being prepared to handle adversity will reduce anxiety, decrease down time, maintain flow, and make the experience much less strenuous.

The Design Phase

During the design phase results of the analysis are used to outline the strategies that will be used to actually develop and deliver the instruction. Several sub-processes take place during this phase. Here, "the learning objectives are refined, the training media specified, the syllabus is generated, and the individual lesson designs are specified" (O'Neal, Fairweather, & Huh, 1996). Design involves "answering fundamental questions about what the students will learn, how they will demonstrate what they have learned, and how the learning will occur" (Gillespie, 1998, p. 46).

During the design phase results of the previous analysis and planning are used to outline the strategies that will be used to actually develop and deliver the instruction. As in the analysis phase, several sub-processes take place during this phase also. Here, "the learning objectives are refined, the training media specified, the syllabus is generated, and the individual lesson designs are specified" (O'Neal, Fairweather, & Huh, 1996). Design involves "answering fundamental questions about what the students will learn, how they will demonstrate what they have learned, and how the learning will occur" (Gillespie, 1998, p. 46).

A first step in this phase is the production of specific learning objectives from the goals outlined earlier. Kemp, Morrison and Ross (1994) suggest three important functions that objectives perform:

1. They offer a means to design appropriate instruction, specifically to select and organize activities and resources that will facilitate effective learning,

2. They provide a framework for devising ways to evaluate student learning by guiding the design of relevant testing items and procedures, and

3. They guide the learner by identifying skills and knowledge that student must master.

Gagne', Briggs and Wager (1992) see this step as critical to the design process because ""the designer must be able to properly determine the conditions of learning necessary for acquisition of new information and skills" (p. 25). Moving from general goals to more specific objectives, that is, the breaking down of a large goal into smaller, more easily obtainable objectives makes this possible. This detail is also necessary for two other reasons. One is that this allows the development of materials to be coupled with the appropriate delivery mechanisms to accomplish learning because "different types of learning outcomes require different instructional treatments" (p. 25). And, secondly, it will now be possible " to measure students performance to determine when the objectives have been reached" (p. 26).

The teachers agreed that there is a need to find more specific approaches to the material of their courses. Because of the previously mentioned time compression the ICN places on the teacher, increased focus is very necessary (K. Fredericks, personal communication, April 6, 2000). As these objectives are refined, the depth of presentation that will be necessary to properly cover the content will become apparent. It is worth noting here that each objective should include helping students understand why they were learning the material, which is just as important as learning the material itself (D. Paulek, personal communication, April 4, 2000).

With clear and unambiguous objectives in place, the design phase now focuses on developing a "a plan for assisting the learners with their study efforts for each performance objective," (Gagne', Briggs & Wager, 1992, p. 27) otherwise known as an instructional strategy. Leslie (1998) defines an instructional strategy as "a methodology for how to present stimulus material to learners so it will be maximally effective in helping them master instructional objectives" (p. 535). Now, proper sequencing of content and associated activities takes center stage.

Kemp, Morrison and Ross (1994) offer three different kinds of sequencing: learner-related; world-related; and concept-related. Learner-related sequencing deals with the manner in which students approach content. This covers such styles as:

Identifiable prerequisite - learning a skill necessary to perform another skill

Familiarity - start in known territory and proceed to the unknown

Difficulty - being with the easiest and move toward the more challenging

Interest - start with topics that are expected to be the most interesting

Development - an apprenticeship approach; become proficient before moving on

World-related sequencing deals with the manner in which the content is seen in the real world and includes:

Spatial - a directional approach (left to right; top to bottom; north to south)

Temporal - an historical approach (timeline)

Physical - physical characteristics (hardness, color, size)

Concept-related sequencing approaches content in a manner that is consistent with its logical organization. Included here are:

Class relations - cover general characteristics before looking at specific cases

Propositional relations - show examples first, then the theory

Sophistication - begin with simple, concrete ideas and move to abstraction

Logical prerequisite - teach concepts in logical sequence (add before multiply)

Any of these sequencing methods can be combined to provide a necessary variety in covering course content. With a focus on what to accomplish, sequencing can provide both start points and endpoints for each unit of instruction (Goodman, 1999). This will then dictate the flow of work in that unit. Once a step-by-step strategy is in position, the next step involves designing the associated activities.

There must be a variety of activities in each area so that they focus on specific learning objectives. Here "the key is interaction" (K. Reed, personal communication, February 20, 2000). Passive performance is quite undesirable. "The point of the ICN is to have people interact," (K. Reed, personal communication, February 20, 2000) so activities must be designed to make this happen. Keeping students involved and interested can provide the impetus for them to expand their boundaries and become aware of the world outside themselves. Depending on the subject these activities might involve cooperative learning groups of four to five students where students teach each other. Kuntz (1998) suggests that each learning objective contain activities that address five components:

Preparation - put student in mood to learn by creating context for new learning

Presentation - provide content in 15-20 minute chunks

Participation - students process new information actively; deepen comprehension

Practice - reproduce a new skill with appropriate instructor or peer feedback

Performance - assess the degree to which students have attained new skills

The teachers see a need to enforce interaction in their classes. Their list of activities to involve students includes:

- Discussions
  - Speaking in a variety of situations
  - Listening in a variety of situations
- Hands-on activities
  - Individually

Working with partners

Working in small groups - across sites using the technology

Singing

Listening to tapes (comprehension)

Map recognition (locations)

Interactive (site-to-site) interviews

Interactive dialogues using set scenarios

Handling objects and describing them

Reading newspaper article and explaining what has been read

Writing a dialogue between two designated type of persons

Field trips

Writing essays

Presentations in front of class (15-30 minutes) using different media

Using students at originating site to demonstrate content points

Walking through case studies

Whichever activities are selected, they must engage the students because "students learn by doing" (D. Paulek, personal communication, January 21, 2000). "Creative teaching has a definite role in effective teaching at a distance" (Baker & Stark, 1998, p. 485). The ultimate desire here is to "instill a need to expand their knowledge" (C Larkin, personal communication, April 6, 2000).

As mentioned earlier, none of this design can be done without recognizing the impact of the ICN on whatever is attempted. Audiotapes can be hard to hear at other sites especially if there are background noises or another class going on in the back of the room. Any delays can break continuity. The time limits are more constricting. It can be difficult to go around the room for sharing with multiple sites. ICN technology failures must be anticipated and alternatives should be at hand. Most of these problems can be overcome, especially if both the instructor and the students are motivated to press on in spite of setbacks.

In the face of this rather daunting technology, the next item of interest in the design phase is the specification of the training media. It should be clear that this is not a separate step, but rather it must be part of the design of the activities. The question to ask here is "how can technology assist/expand what is done in the classroom?" (K. Reed, personal communication, January 21, 2000; Eastmond & Granger, 1997). Telg and Irani (2000) echo this sentiment and feel the media should suit the needs of the class and its selection should come after content has been decided upon. Berge (1998) supports "technological minimalism," or the use of only that technology that will get the job done, or the point across. The use of overly complex and expensive equipment was also frowned upon by the teachers, especially when it did not work properly.

Never use the media to simply entertain. The media should match the objective while creating variety for the learning environment. Friscia (1998) suggests choosing tools based on the objectives and activities. All the teachers agreed that course texts were a reasonably standard requirement, but not all subjects require textbooks. Other means to provide content were suggested such as internet web sites that could be used and would provide the extra learning activity of sorting valid material from invalid information. But, teachers should remember that "nontechnological tools are valuable real world tools that enhance and make learning possible" (Adams & Burns, 1998, p. 47).

The teachers agreed that more visuals were certainly warranted due to the visual nature of the ICN. They saw an increase in the use of multimedia from compact disks as a possibility. The use of films was suggested also. Both of these uses should be balanced against the dependability of the technology.

Some teachers use remote overhead cameras to have students show their work to all sites. Videotapes were recommended, again with a caveat that many times the technology doesn't produce good quality images at the remote sites. The English composition instructor used professional samples and audiotapes to show students what good writing looked and sounded like. Another interesting media suggestion was guest speakers. Using topical experts, either professionals or collaborative teachers, is an intriguing idea.

Documents are needed to one degree or another. Some teachers said they used fewer documents, mainly due to the logistical headaches of getting copies to remote sites mentioned earlier. Alternatives to mailing documents were using the overhead to see actual items (illustrations in text books, etc.), faxing or scanning materials for viewing computer imagery either directly or from a web site, and sending a single copy to remote sites for reproduction. Here is one instance where "the technology in ICN classrooms makes non-document materials an easier option" (D. Paulek, personal communication, April 4, 2000).

One point stressed by all the teachers was the use of backups for whatever media was used. As was said earlier, always be prepared for some sort of failure.

During the design of individual lessons it is time to think about the day to day operation of the class, as this will be directly affected by logistics. All the wonderful planning and designing will go for naught if what needs to be where and when does not happen. The preparation of remote sites to receive "special stuff" (video, handouts, satellite feeds, etc) must be considered. Even though it was mentioned earlier, it bears repeating: design individual lessons with logistics in mind. Be aware of the time it takes to get materials in place at remote sites. Proper lead-time for creation of materials and their delivery must be a prime factor against which is weighed the need for that material. Getting papers to the instructor for grading and back to the students in a timely fashion can greatly influence a student's satisfaction with an ICN course. This timeliness was mentioned consistently as a major influence on whether students (and instructors) felt the learning experience was successful. It was rated as the most difficult part of making an ICN class run smoothly. As was just suggested, here again, the use of the technology to transfer materials to remote sites can prove to be a valuable ally.

Now that the course is designed, produce a syllabus. This is highly recommended for all school grades and subjects. If modified for the grade level, these documents can provide every student with a clear idea of where they are going, and how they will get there; an outline of each class (Telg & Irani, 2000). When the students know what is expected, there are no mysteries and no surprises. With a schedule of daily events that includes what to do, when to do them, and where to be, each student can take on some additional responsibility for their own learning.

The syllabus can contain nearly all of what has been discussed up to now. Goals, objectives, activities, media, instructions, and so on can provide a clear picture of what is to come and a valid reference for review after the course is completed. At the upper grade levels, an included reading list can allow for skipping some depth in the time constrained ICN environment.

The last part of the design process, and certainly not the least, is the design of outcome assessment. At some point every teacher must be able to tell whether the course has been successful. This assessment actually falls into two parts. The first determines if the teacher was successful, while the second examines the students' success.

On the teacher's side, the question is one of "was the objective of the unit reached?" Was the content covered in sufficient breadth and depth to provide the students with opportunity to meet the objectives? Were all objectives met so that the goal was reached? These questions actually form part of the evaluation phase of the instructional design process and will be touched upon later.

The second question is "did the student obtain the skills to do the unit?" To what degree did the student master the content? Can they perform the required steps? What can they not do as a result of this unit?

To answer all these questions is not an easy task. However, because the objectives were clearly stated at the outset, it is now possible to devise assessment to match those objectives (Ehrlich & Kommel, 1998). Students should be assessed over the duration of the course using such methods as take-home exams, written reports, projects, peer evaluation of group activities, or student self-evaluation (Telg & Irani, 2000). By varying outcome assessment according to learning objectives, teachers can examine with reasonable accuracy the attainment of those objectives, and can provide stimulus for continued learning on the part of the student. This variation also accommodates the various learning styles of individual students and permits them to prove their successes in ways in which they are most comfortable. If expectations were clearly explained in the syllabus and in the face-to-face meetings described earlier, then assessment should add to the learning process and allow students and teachers the opportunity to share what was learned.

So, the design phase of the instructional design process creates clear objectives and related activities that can lead directly to student success (Egan & Gibb, 1997). With strategies outlined, materials decided upon, media selected, and logistics prepared for, the next phase, development, will be a much simpler task.

The Development Phase

The purpose of the development phase is to "generate lesson plans and lesson materials" (Braxton, Bronico, & Looms, 2000), develop the necessary media or software, and create any supporting documentation. Here is a good place to review current materials to determine which may be re-used in the new course. Also, it is here that instructors should "validate the instruction to ensure it accomplishes all goals and objectives" (Clark, 1995).

At this juncture, the actual development of the instructional materials for the course takes place. For most K-12 teachers, here is where the curriculum guide is created along with the individual lesson plans. From the earlier discussion it may appear that this has already been done. In this study design has been separated from the development phase. In some instructional design models, this phase is often combined with the design phase as they go hand in hand. So, it is easy to see that as design progresses, there is a very great likelihood that some form of written documentation will have been created, thus shortening the actual development phase.

A good first step here is the creation of the curriculum guide. In some instances this document already exists in a form dictated by the state and/or the local school district. If it does exist, then this document is still the jump off point for this phase of the process. If it does not exist, it is now when it should be created. When completed, a curriculum guide gives teachers ideas for the level and knowledge students in the course should acquire. It will also provide direction for writing and implementing specific lesson plans (Roblyer, 1996). Examining dozens of curriculum guides available on the World Wide Web suggests this document should contain sections such as:

Aim - an overarching reason the course exists

Goals - meeting these succeeds in meeting the aim

Philosophy - the reasoning behind the course's existence

Objectives - the ways to attain the goals

Activities - the means to attain the objectives

Resources - materials to be used during the activities

Competencies - skills to be gained by completing the course

Outcomes - what the student can expect to comprehend, know, do

Evaluation - how the outcomes will be assessed for success

From the more general curriculum guide flow the individual lesson plans. "Writing detailed lesson plans that cover content, presentations methods, interactivity, learner involvement, learning activities (both in and out of the classroom), and course management - will help ensure successful delivery" (Friscia, 1998, p. 504). These written documents will map out the day-to-day objectives and the activities to achieve those objectives. Materials needed, including media and documents, are listed. Sections such as an overview to explain the overall point of the lesson and a purpose to explain the why and what of the lesson are suggested. A competency list along with evaluation criteria should also be part of each plan. These documents should be short enough to fully explain the lesson and all necessaries for accomplishment. Learning plans are "*critical* [sic] in distance learning situations where learners do not have frequent, in-person access to teachers" (Neill, 1998, p. 266).

As lesson plans are created, the supporting media and materials are developed in parallel with the instruction. Creating learning guides and/or modules that contain actual instructions for teaching or learning the materials occurs now (Hoskisson, Stammen, &

Nelson, 1999). A short list of possible materials includes:

Presentation plan

Instructor's notes

Assignment sheet

A checklist to indicate progression

Milestone questionnaires

Materials for each lesson:

Documents

Visuals

Case studies

Role playing scenarios

Simulations

(Windschitl & Andre, 1998; Hoskisson, Stammen, & Nelson, 1999; Malone, et al., 1997)

Taking a point from Bergmann and Raleigh (1998), a first day's lesson plan might include at least one half hour to prepare the students for the distance learning experience. Reasonable student expectations should be established. The concept of a learning community where students are to learn from each other should be promoted (Egan & Gibb, 1997). This can be followed closely by the parameters of learner responsibility in such an environment. And, especially for remote sites, the rules of the classroom should be outlined. Malone, et al. (1998) point out that "how the teacher addresses learning at the beginning of the class period is extremely important" (p. 4). This approach can also provide both teacher and student with "advanced warning that the student-teacher relationship is going to be altered" (Mottet, 1998, p.12). How this difference will be handled, by emails, phone hours, chat rooms or listservs can also help alleviate some of the fears of both instructor and students.

If this first meeting can be done face-to-face, as was suggested earlier, all the better. Because the teacher's personality and expertise are not conveyed as well over the television medium, students may see the teacher as more of a talking head rather than a real person. This early personal touch can serve to alleviate this problem, and as a way to model the behavior that will be acceptable during the course (D. Paulek, personal communication, April 4, 2000).

Now is when previously developed materials should be examined for usability. All materials should be devised to "try to make the greatest impact in the amount of time available (K. Reed, personal communication, February 20, 2000). All the teachers made note of the fact that they look for previously used materials as the first or second step in their personal course design process. As items are created they should be pilot-tested and revised as part of an ongoing evaluation of the design and development phases of the instructional design process.

One particular item should be mentioned here. Videotapes seem to have a perplexing role in the teachers' lives. They like to use them when possible, but there are impediments to the use. Copyright laws that cover usage over an educational network are not well established. Therefore, an inordinate amount of lead-time is required to get permission from authors or publishers. This goes to the earlier point about planning well in advance. Some teachers indicated that some videotapes seemed to be unplayable if not on some arbitrary list of approved tapes. Research could not verify this specific problem, however.

Because the ICN is such a visual medium, as mentioned earlier, developing visual materials, particularly slides, requires special attention. The fact that simple visual materials "can improve the retention level of attendees by 50%" (Goldstein & Goldstein, 1993, p. 1) is worthy of note. With the need to condense content, "the use of computer generated graphics and text, usually maximizes the effective information density on a video monitor" (Gosselin, 1998, p. 127). Whether the materials are presented over the video part of the ICN or as hardcopy handouts makes little difference. Student study guides, instructions for projects or experiments, and the like will, when produced correctly, increase understanding and retention and increase efficiency of communication resulting in better results for the student.

Because slides make up a large portion of the presentation materials, the hundreds of pieces of advice in the literature concerning the intricacies involved are summarized in shortened form here. First as indicated earlier, some condensation of the content is required for presentation over the ICN. This lends itself to reduction to some form of outline. These outlines can serve as both instructor notes and as the basis for visuals in the form of overhead slides or electronic slides of the PowerPoint type. When creating these, tips fall into three categories: those for color, those for text, and those for graphics. Color for slides should adhere to guidelines that ensure readability. Selecting background and foreground colors that emphasize contrast is an example (Gosselin, 1998; Downs & Clark, 1996). Avoiding colors that bleed into each other not only improves readability but lessens viewer eye fatigue (Fu & Ouyang, 1997; Gosselin, 1997). Patterns that "ripple" on the screen should be avoided (Downs & Clark, 1996). Fu and Ouyang (1996) recommend the limited use of different colors on a slide. Downs and Clark (1996) go even further and suggest no more than two colors. The use of a consistent background color for duration of slide show is also recommended because it connects the slides in a series (Thoms, 1997).

Mucciolo and Mucciolo (1994) in a wonderful small book show how color can affect viewer mood, interest, motivation and perception. Therefore the use colors as emphasis keys and to signify associations is a good idea. Several authors (Clark, 1995; Mucciolo & Mucciolo, 1994; Fu & Ouyang) indicate that colors push viewers' emotional buttons and can directly influence how they receive the content being presented. For example, red can represent danger or excitement, blue can represent water, the flag or contemplation, and purple can be dignified or mournful. Fu and Ouyang (1996) suggest these additional uses of color:

- Group categorically related elements with the same color
- Use similar colors to denote relationships between elements
- Link color change to dynamic events
- Use the brightness of color to indicate action levels or priorities

Text also should follow some generally agreed upon rules. Font sizes should aid readability by being at least 24 points (Thoms, 1997; Gosselin, 1998; Fu & Ouyang, 1996). Limiting the number of fonts and using sans serif fonts are recommended to avoid visual confusion and increase clarity (Fu & Ouyang, 1996; Downs & Clark, 1996). Understanding can increase when the number of lines per screen is kept between five and eight with white space used generously, especially around the edges of the slide (Fu & Ouyang, 1996; Thoms, 1997; Downs & Clark, 1996). Headings, subheadings, uppercase and lowercase lettering, and judicious use of keywords and phrases also improve the students' ability to comprehend the slide content (Thoms, 1997; Downs & Clark, 1996). A final point here is to be aware of the red/green color problem that colorblind students may have. Avoiding these colors or at least minimizing their use can go a long way toward student satisfaction with the course.

Graphics in the form of charts and images are also a way to reduce information content to a single memorable event. Graphics should be relevant to topic (Downs & Clark, 1996; Fu & Ouyang, 1996). Cute graphics can have their place, but within the limited time available to deliver content, staying on task is more important. If possible, using photographs rather than simple drawings to increase understanding is recommended (Thoms, 1997) because realism makes a heavier impact than just words and is better than words for memory tasks (Fu & Ouyang, 1996). The literature also suggests not pushing images to the edge of the slide by keeping about a 10 percent border around all slide materials (Goldstein & Goldstein, 1993; Gosselin, 1996).

In general, slides should be created focusing on one topic or concept per screen with the location of the information balanced on the slide. Varying the position of information and images by not placing it all at left edge requires the students to move their eyes and sometimes their heads to see the content. This readjustment aids in drawing student attention to the material being presented. Another technique is to bring information onto the slide in pieces. This use of builds also creates a need to focus attention. Finally, before any actual presentation, slides should be tested for readability using the ICN room monitors not a computer screen. The slide's colors, text sizes, and all the previously mentioned points will appear differently on the two very different video screens.

Having said all this, it should be remembered that slides are not the only materials the require development for an ICN course, or any course, for that matter. Electronic items such as email, listservs, newsgroups, and chat rooms are especially relevant in the ICN environment where communication methods that differ greatly from those used in a traditional classroom are required. While direct interaction is required in the day-to-day operations of an ICN course, it should be remembered that "interaction does not have to occur in 'real time' to be effective (Russell, 1994a)" (Telg & Irani, 2000, p. 4). Therefore alternative methods should be created to provide maximum opportunity for students to interact with the teacher and with each other. These methods also create learning communities where there are

> opportunities for students to teach one another, to clarify course-related questions and assignments, to receive academic and social support, and to develop relationships that extend beyond the duration of telecourses (Egan & Gibb, 1997, p. 36).

Each of these requires special knowledge on the part of the instructor and preparation time to set them up with the appropriate technology coordinator. Also this is the time to validate the existence of such technology and its availability at each of the sites where the class is to be offered.

During this phase, any software deemed appropriate to the course must be located, its suitability must be determined, and its availability scheduled. Here is where cost becomes a factor. Special educational offers from various companies can be quite useful at this point, but they must be discovered and acted upon to insure timely delivery for the course.

This is also a great time to look for guest speakers that might enhance the course material (C. Larkin, personal communication April 6, 200). While not thought of as "materials" per se, this is one type of material that should be looked at early on to insure timeliness. Another such area would be field trips, either physical or electronic. Quite a bit of coordination must be completed with the site of the trip and the students at several sites to get everyone together successfully.

Once the lesson plans are in place, the activities planned, and the materials are created, the instruction needs to be validated to ensure it accomplishes all goals and objectives (Clark, 1995). This formative evaluation is part of the evaluation phase to be discussed later. It is mentioned to remind the reader that everything in the instructional process is subject to review at all times. The obvious purpose is to revise those parts of the course that appear insufficient before the class is given. This review also provides an overall look at the class for items such as flow, meaningfulness, and appropriateness for the grade level.

With the development completed the next step of the instructional design process is the implementation phase. Now the effort expended in the previous phases come to fruition. Now the course is presented to the students and actual learning will hopefully take place.

The Implementation Phase

The implementation phase involves the actual delivery of instruction. The focus here is "the effective and efficient delivery of instruction" (Braxton, Bronico & Looms, 1995). This phase promotes student understanding of material, supports student mastery of objectives, and ensures student transfer of knowledge through carefully choreographed use of cameras, computers, facsimile machines, and telephones (Kuntz, 1998).

Implementation is not just a matter of standing in front of the cameras and delivering a lecture. As alluded to so far, the distance education environment requires a different set of dynamics to result in success. In order to understand those dynamics of delivering instruction over the ICN, the role of the teacher must be examined. The interviewed teachers suggested that they treat distance education students with increased expectations and require them to take a great deal of responsibility in their own learning. Because the distance education environment is much more student-centered, the participants' roles require adjustment. So, "we move from a learning environment that is teacher directed to one that provides for more learner options" (Gillespie, 1998, p. 43).

Thus, the teacher's role changes from simply a content provider to that of guide, stimulator, and modeler of usage (K. Fredericks, personal communication, April 6, 2000). In this constructivist atmosphere the teacher becomes "more a conductor, a facilitator, and a manager than a deliverer of knowledge" (Jiang & Tin, 1998, p. 17). It is the teacher's responsibility to provide a positive climate in which learning can occur. In this atmosphere "the teacher serves as the class instructional leader" (Adams & Burns, 1998, p. 13). The instructor doesn't provide all the answers or control all the content, but rather establishes the structure that launches student exploration. That structure includes the items previously designed into the course such as setting and keeping curriculum goals, assessment, and managing classroom activities. While the teachers who were interviewed could not define constructivism, it is interesting to note that they practice these methods in their daily teaching.

During the previous phases of the instructional design process, the teacher created some sort of a learner profile in which the general nature of the students expected to take the course was outlined. In thinking about the prospective students, such items as prior skills, experiences, and goals were examined, and it was suggested that the instructors have some control over which students are permitted to take the course. In the first days of the course these views can be solidified and provide a clearer picture of the student population. Also created was the syllabus where classroom rules, contact methods and times, and frequently asked questions were covered. Again, early class session can serve to clarify these points. It now becomes the instructor's task to maintain student motivation.

Using the previously designed audiovisuals, learning guides, activities, and checklists now bring the course content alive. "Personalizing the activities in each lesson can increase student motivation" (Adams & Burns, 1998, p. 31). Winfield, Mealy, and Scheibel (1998) also suggest relating content to real situations using case studies and simulation that mirror some aspect of the students' lives. Instructors should give students autonomy to pursue their own questions (K. Reed, personal communication, February 20, 2000) then require them to share the results of their investigations with the class.

The literature has several references to teaching in "chunks," or 15-minute pieces, interspersed with some sort of activity to engage the students. Using a different audiovisual technique or color-coding slides will serve to segment the presentation. Planting a "flag", or making an exact point, in each segment can wake up wandering minds and bring the class back on task (Goldstein & Goldstein, 1993). By enforcing interaction students won't feel they are simply watching television (K. Reed, personal communication, January 21, 2000).

Learning must also take place outside the classroom. Malone, et al. (1997) recommend independent practice to extend content recently taught. Using such interactive techniques helps remote site students stay on task and involves students in teaching themselves, a true constructivist concept.

Gosselin (1998) says "good teaching is a learning activity for both the student and the instructor" (p. 128). So the teacher must question skillfully, monitor discussions, establish rules, model reasoning and thinking, identify and restate student beliefs and understandings, support student-teacher, teacher-student, and student-student dialogue, and provide feedback (Adams & Burns, 1998). "At the very least, teacher behaviors tried and tested in a regular classroom will need modification if they are to be successful in distance learning" (Malone, et al., 1997, p. 1). But when all is said and done, "a good teacher teaching well is the key" (D. Paulek, personal communication, April 4, 2000).

The distance learning environment expects a high degree of involvement on the part of the student, more so than even the regular classroom. The teachers require their students to take on increased responsibility for their own learning and instill this philosophy on the first day of class. They tell their students that the ICN situation is unique and different and requires more attention and more effort on their part (D. Paulek, personal communication, April 4, 2000). They model appropriate behavior and encourage students to self-regulate their own behavior in favor of the group. Students are reminded that they can not simply show up for class. They are induced to participate in various discussions, engage in teaching each other, role-play, or whatever else is required to promote learning.

When participating in group exercises, they are instructed to do their fair share. Teachers would do well to remember that "students need colleagues and mentors for discussions, reflection, and dispute to help them work through solutions to their problems" (Adams & Burns, 1998, p. 13). The old adage of playing well together holds especially true in management of remote sites.

The key factor in maintaining the proper learning environment at any remote site is the palpable presence of a facilitator. This cannot be said enough. Facilitators maintain control and keep students on task merely by their presence. They can handle questions during group activities and promote cohesiveness. Instructors should meet with their facilitators during the preparation for any course as suggested earlier, and should meet with them during the school year as well.

The teachers and the literature indicate that presentation skills are very important. These skills fall into several categories. Mucciolo and Mucciolo (1994) list the first four as the room, the audience, the presenter's presentation style, and the presenter's voice. To these, the teachers add the instructor's personality.

Instructors should know the room they will be teaching in and its inherent limitations. Knowing what can be seen or not seen from which locations within the room provides the instructor with physical limits to movement. Knowing what the camera can see and which cameras see what provides critical information in the creation of visuals. In all cases, becoming proficient with the technology improves the entire distance teaching experience. The teachers recommend practicing working on the computer, switching cameras, using videotapes and audiotapes, and running pertinent software. Gosselin (1998) suggests never planning a demonstration or experiment that hasn't been done successfully several times in the actual distance education environment.

As stated earlier, preparation is the key to making the ICN classroom as much like a traditional classroom as possible. By making the technology transparent, everyone will find the atmosphere much more relaxed and conducive to learning. Practicing in the room where actual instruction will occur is extremely important. Because technology fails, a backup plan for any part of a presentation that cannot be omitted is critical to making the most impact in the limited class time available.

The second element to successful presentations deals with the audience. Students must obviously be made to feel part of the class, especially those at the remote sites. Instructors can provide this feeling of community by some simple acts. Looking at the camera establishes eye contact with students at remote sites and getting students to look at the camera when speaking will cause them to see each other as individuals. Requiring the use of students' names in conversation will decrease the sense of remoteness and pull students into the class. Simply smiling can make the use of the technology less intimidating to the students, increase the students' comfort levels and encourage them to participate in the class.

The third element to effective presentations is how instructors present themselves on camera. There is a need to alter presentational style for televised educational programming (Telg & Irani, 2000). In the television environment gestures must be controlled. Fast hand movements should be minimized as they can look jerky over the network and, while humor can ease tensions, it can also detract from the point being made. A suggested suitable rest position is one where the hands are at the sides and visible, body weight is evenly distributed with the feet shoulder-width apart and elbows and knees unlocked.

The teachers recommend avoiding the talking-head condition, that is, remaining fixed behind the podium. They suggest getting out from behind the equipment and not letting the layout of equipment restrict teacher movement (D. Paulek, personal communication, April 4, 2000). Using the wireless microphone can greatly assist in this effort. When the teachers do move, Telg and Irani (2000) recommend they move with authority and move with reason and purpose. Teachers should resist moving out of nervousness or it may become distracting. Sitting and standing are recommended alternatives.

Mucciolo and Mucicolo's (1994) fourth element is the instructor's voice. They suggest pacing the instruction so as to allow the teacher to catch their breath. Pausing more often than in a normal classroom will give remote students time to ask questions (D. Paulek, personal communication, April 4, 2000). Goldstein and Goldstein (1993) suggest thinking of the presentation in scenes, each with a point to make. The teacher can use intentional breaks in content to refocus, readjust or recover.

With the lack of visual cues, the students will rely on the tone of the instructor's voice. Malone, et al. (1997) recommend the use of proactive markers such as "look at this" or "watch me." They suggest stating each rule, law, and concept clearly and repeating content three or more times at spaced intervals to aid remembering. This is a perfect opportunity to involve students to do this.

One final cautionary note deals with the microphone. Teachers should perform a microphone check prior to each class or as part of the class warm-up or review. This is when the microphone should be adjusted if it is too loud or too soft.

The teachers agreed that instructors should insure their personality comes through during any course delivery. With the attitudes and behaviors of instructor being reflected by the students, the instructor must, at the very least, appear to be enjoying the experience.

Malone, et al. (1997) expect course design to build in the instructor's presence and personality. The teachers discussed what Clark (1995) calls involvement skills.

Every teacher claimed flexibility to be the most necessary skill. Being prepared to modify anything dealing with the class, from content to technology, was considered critical to reducing wasted time in an already time-conscious venue.

Spontaneity is the second skill here, but is more difficult to enact. Because of the time crunch, much of the course will be orchestrated to daily needs and expectations. But, the teachers suggest that within this constraint, reacting positively to spur of the moment events is quite possible.

Empathy is the next critical skill. The instructor must be very aware of the students' motivations, problems, and point of view of the course and the distance education environment. An open door policy in chat rooms or listservs can provide the means to obtain this vital information and to ease any tensions.

Compassion moves the instructor to not induce extensive stress into an already stressful situation. Being aware of the additional responsibility placed on the student should temper any requirements that overload the ability to respond.

For the questioning skill, Clark (1995) suggests the ask, pause, call (APC) method of interaction. Here he suggests asking the question, pausing long enough for students to think about the question, and then calling on someone to answer the question. The pause should be about 10 to 15 seconds during which the instructor can switch through remote sites and make a preliminary determination as to the general reaction to the question. This scanning also serves to remind the teacher that those in the originating room are not the only students involved in the class (K. Reed, personal communication, January 21, 2000). Questions can be directed to a specific students at a specific site which keeps everyone involved, or the question can be given to the class in general, with the answer coming from anyone.

Active listening is another excellent skill to develop. Because there are fewer visual cues in the distance education environment, instructors must be extremely aware of not only what was said, but also how it was said. This requires additional focus on the instructor's part, particularly if the audio system is not functioning up to par. Avoiding interrupting, providing multiple opportunities for students to speak, and managing the conversation rather than dominating it are all requisites to this key interaction process.

After receiving a student's input, the instructor can provide valuable feedback by rephrasing the response and asking if this was what was intended. The instructor can also ask for clarification or specification, or in-depth meaning of any student response. This skill offers reinforcement of both the thinking and vocal efforts of the student and provides opportunities for dialogue among sites.

The use of humor is highly recommended, but can sometimes be misinterpreted, especially early in the course when the instructor is somewhat of an unknown factor, particularly to remote site students (D. Paulek, personal communication, April 4, 2000). At the very least, teachers should show enthusiasm for the course (which can be difficult at times). Sharing personal experiences will create trust and humanize the experience as well as encourage students to interact.

Aside from the mechanics of teaching at a distance, some final points are offered. Personal experience suggests that clothing should avoid pure white, extreme light or dark colors, and small plaids/stripes. These tend to create visual havoc when viewed across the ICN. Also shiny jewelry causes sparkles on camera and should be avoided.

Not everyone is comfortable when placed in front of a camera, especially when they first see themselves on screen. To handle any stage fright, Telg and Irani (2000) echo an earlier suggestion to practice giving the presentation in the room that will be used for the actual class. This familiarizes the instructor with both the layout and the idiosyncrasies of the room. To assist here, instructors should videotape themselves and review those tapes with an eye toward improvement. A personal recommendation, also supported in the literature, is to script the presentation using two columns, one for camera switching, and the other for the learning event taking place along with any instructor's notes.

Implementation is obviously critical to the success of any distance learning program. Making the students feel involved in the class takes conscious design of the course elements and focused development of necessary execution plans and materials. However, unless the instructor is comfortable in the environment and is prepared to teach, and to react to adversity, the planning and creation processes will provide little solace to students. Instructors must practice their craft in this unfamiliar venue to make it more familiar and let their teaching come through.

The Evaluation Phase

While listed as a separate phase, evaluation actually occurs throughout the entire instructional design process. Because evaluation "should seek to improve both the processes and product of the activity" (Goodman, 1999, p. 4), this involves measuring the effectiveness and efficiency of the design process in general and each of the previously mentioned phases in particular. During evaluation each phase is reviewed to insure it is accomplishing what it is supposed to (Clark, 1995). Then the information gathered during evaluation is used to determine if the course needs modification or improvement or if the course should be continued or terminated (Gillespie, 1998).

Evaluation has two forms or levels. Formative evaluation occurs throughout the ID process and provides just-in-time awareness of course deficiencies. Summative evaluation occurs after completion of course delivery and provides grounds for determining whether the course needs major overhaul, minor modification, or discontinuance.

Formative evaluation is an iterative process that can be used to summarize knowledge about courses that can be used to develop a set of success factors for later application (Ruiz-Primo, Shavelson, & Baxter, 1993). It can occur at any stage of the instructional design process, up to and including the implementation phase. During the analysis, design and development phases, formative evaluation looks at the results of each phase and determines the efficacy of those results. These evaluations look at such questions as:

- Are the goals and objectives fitting for the grade level and experience level of the intended students?
- Are activities appropriate for the objective? Do they lead toward a skill?
- Are assessments valid for the objective? Do they measure the correct item?
- Are instructions in the syllabus clear and unambiguous?

- Are visuals effectively created? Can they be seen from the back of the room?

As answers are obtained, modifications to the current process can be made ultimately resulting in an improved course. Regardless of how much these evaluations improve the final version of the course, the proof of any course's mettle will rely heavily on the opinions of the students taking the course.

Therefore, formative evaluation also must occur during the implementation phase of the instructional design process. These evaluations can be used to control such things as the day-to-day content and pace of the course. Here the evaluation includes looking at student reaction to the course, level of learning achieved and the effect of the training. It depends on feedback from the participants to measure learner satisfaction, to ensure goal attainment, and to assess immediate student needs (Thomson & Stringer, 1998). Formative evaluation can even assist in determining the value of the media used in the learning process. An important function of formative evaluation during implementation is the necessary increase in teacher-student interaction. With students providing feedback, and being encouraged by the teacher to do so, the constructivsts suggest students will feel they have a hand in constructing their own learning.

However, many times students feel they should provide feedback that is expected for fear of consequences for saying something negative. To encourage all feedback, several options are available. Meikle (1999) suggests the use of index cards several times during the course. Without names being used, answers to one or two specific questions posed by the teacher can be placed on the front and the back of the card. Her questions include:

> How are you finding the course?
>
> What's good about the course? What's not so good?
>
> Any suggestions for improving the course?
>
> Are problem sets too difficult?
>
> Is the pace of the class causing difficulties?
>
> Are the readings facilitating you learning?
>
> I would like you to do more ...
>
> I would like you to do less ... (p. 1)

She also suggests one-minute papers where students can, at the end of each class, answer two questions:

> What was the most significant thing you learned in class today?
>
> What question is uppermost in your mind at the end of today's class? (p. 1)

Reviewing the answers to these questions can provide focus for the next class session and will certainly encourage students to participate in their own learning.

Another possible form of feedback is the use of student portfolios. These envelopes or folders can contain those items the students feels represents their best work in a specified list of content or skill areas. The student and teacher can continually update these. These will show proof of progress and encourage the student. They can also be used during parent-teacher conferences to provide improved interaction between teacher and parent and student and parent (K. Reed, personal communication, February 20, 2000).

As a means of self-feedback, the interviewed teachers indicated a preference to videotape themselves and then review those tapes with an eye toward improving their presentation skills. They also discovered that videotaping also shows some of the classroom dynamics they hadn't noticed in the heat of delivering the course. Videotape reveals things like overall content flow and what could or could not be seen or heard (K. Fredericks, personal communication, April 6, 2000; K. Reed, personal communication, February 20, 2000).

Lest we forget the technology, the use of email, chat rooms and listservs also provide forums for discussion of course and classroom issues. Posting questions for comment and reading the responses are obviously valuable tools for keeping in touch with student perceptions. These also provide interaction on a more abstract level, provide indicators of visual and writing skills, and can be used to develop those skills if part of the course's requirements.

In all fairness, some mention of the problems with formative evaluations must be made. A large problem with formative evaluation is simply getting it done. Too many teachers treat is "as a formality at best, or as an obstacle at worst, and make little serious effort to conduct a useful evaluation" (Beyer, 1995, p. 10). This means that some courses can go years without being overhauled. The interviewed teachers saw the need to update their courses continually because the ICN is such a dynamic learning environment (C. Larkin, personal communication, April 6, 2000). They suggest that no more than two years pass without changing supplemental materials. As the technology changes they believe the materials should match technology and keep current. These teachers insist there is a need for a commitment to promote change for the better (Nuhfer, 1996).

A second problem is one of sources of input. Beyer (1995) in his very useful book suggests getting opinions from content experts or colleagues, instructional designers, users, stakeholders such as parents, and others. On a day-to-day basis this is unlikely to occur due to the various restrictions placed on all these parties to handle their individual responsibilities. But, if opinions can be garnered from any of these people, those opinions would prove useful to the course designer. To that end, the teachers suggest regularly scheduled colloquia to increase the sharing of ideas across campuses and across disciplines. This would permit individuals to discuss what worked, what didn't, alternative methods, and transfer of traditional classroom techniques to the ICN (C. Larkin, personal communication, April 6, 2000).

Summative evaluations look back at a just completed course. These are designed to assess the overall effectiveness of the instruction. Thomson and Stringer (1998) believe these evaluations can gather student perceptions about assignments, course pace, content and the like and provide impetus to needed changes for future iterations of a course. Summative evaluations can also assess the value of the course in terms of convenience to students and (Welsh, 1999). Additionally, a summative evaluation can be used

> (i) to investigate the kind of contexts in which the materials are used, including modes of use, and to identify the contextual conditions which achieve best results;
> (ii) to investigate how the materials work when embedded into a variety of learning contexts;
> (iii) to established [sic] the perceived success of the products by students and staff under alternative conditions of use in relation to intended outcomes (Hewer, 1999)

These evaluations must be designed with some care to avoid questions that lead the respondent to obvious answers. For example, asking whether students like the tests is not as good as asking them if they felt the tests measured fairly and accurately their knowledge or skill level.

One teacher uses an ICN conference at the end of a unit to let students apply their knowledge to a different audience which helps them solidify what they've learned. This is also a perfect opportunity to evaluate the success of that unit of instruction (K. Reed, personal communication, February 20, 2000).

As a result of various evaluations, the teachers strongly urge others to do little things differently while retaining important content. This points out the contention of O'Neal, Fairweather and Huh (1996) who claim that "one of the most important contributions of ISD is the separation of content and strategy" (p. 5). Indeed, the teachers make the point to advise teachers to modify the methods they use to teach from iteration to iteration without varying too greatly the course content. They suggest creativity is needed to keep audience enervated with freshness. One teacher says

> To provide education, I need to continually educate myself. I have to look to learn. Then I apply that to the classroom, whether it be new techniques, new material, or whatever.

> You can't continually take one approach to education and leave it for a certain period of time. You have to mess with it to keep it working (C. Larkin, personal communication, April 6, 2000).

Of course, once any evaluation is done, action must be taken to deal with the items discovered. This is when the instructional design process becomes a tool of improvement. In keeping with the entire point of the process, repairs must be made. Updated content must be reacted to. New materials must be developed. New media found. The course must emerge in a new and better form. Quality does not happen by accident. Conscientious application of a consistent methodology can produce a distance learning experience that will benefit both students and teacher alike.

Miscellaneous Observations

Besides all of the insights into the course creation process supplied by the teachers in this study, they also provided several comments that are part of their philosophy of teaching. These are presented here in no particular order.

The first common thread that ran through the conversations with the teachers was the change they experienced after working on the ICN the first time. The dread of being in front of a camera caused an awkwardness to what had been natural before, so some teachers were very self conscious. A feeling of uncertainty and apprehension was normal at the beginning. Now, those feelings have changed. The teachers are comfortable with being on camera, and see teaching over the ICN as a normal part of what they do. One teacher relished the slight celebrity status she gained from being recognized outside of her hometown because of her being on the ICN. She also mentioned that this also brought a sense of connectedness to those other communities (K. Fredericks, personal communication, April 6, 2000). Another teacher suggested that, now, it was similar to a normal classroom, just more spread out to other schools and he was reaching more students (C. Larkin, personal communication, April 6, 2000).

Another common thread throughout the conversations with the teachers was the need for more interaction with colleagues. Teachers helping teachers can provide inspiration for moving forward and consolation when things do not progress well. There were several individual thoughts along these lines. Because of the amount of preparation required to deliver a distance learning course, many teachers are reluctant to start. District assistants or facilitators could perform much of the legwork, then a local team of teachers could handle the details, thus sharing the load (K. Reed, personal communication, February 20, 2000).

In a similar vein, another teacher suggests not using ICN to just provide classes not taught at any given school. Rather he suggests collaboration among teachers in the same subject, but with complimentary areas of expertise. Each teacher would provide depth in a specific area with in the subject thereby using teachers' strengths to support each other. Besides sharing the load, this approach also provides an excellent example of collegiality, which would be a positive learning experience for students (D. Paulek, personal communication, April 4, 2000).

With an increase in teacher-teacher contacts, cross-fertilization of ideas, methods, and successes would increase exposure to the ICN, which should lead to improved abilities. This mentoring process would decrease the number of teachers reluctant to embark on an ICN voyage. As the number of courses increased, fewer teachers will be reluctant to use the technology (C. Larkin, personal communication, April 6, 2000).

An online faculty lounge is recommended as a starting point for these ideas. A listserv is one method that could be used, but a web site with links to teachers' lesson plans, to subject area experts, to special interest areas, and the like could also be quite useful.

The teachers as a group recognize, and build into their courses, the opportunities to share among all sites. These opportunities promote a sharing of society and a sense of social community by allowing students to meet and talk to individuals with whom they were not raised. This is one of the few chances for teachers to foster camaraderie among schools rather than the normal competitive relationships that exist. Students are given assignments across sites and they must discuss topics with students who approach the subject with sometimes quite different perspectives. Confronting individuals who do not think like they do requires students to modify their behavior, accept others' ideas, become tolerant of the views not like their own.

When giving a presentation, the teachers suggest getting others involved. A fellow teacher or student can be used to handle the switching between cameras, for example. This will provide training to teachers and familiarize them with the technology in preparation for their own usage. It will train students in the technology, provide skills beyond the subject matter, and get them more deeply involved in the class. This can be an especially effective tactic during interactive projects (K. Reed, personal communication, February 20, 2000).

Another idea suggested by the teachers is moving courses out of the ICN classroom. Currently the technology forces the ICN room to be central to teaching. This should be broadened to other classrooms, and even out of the building. The use of remote cameras to stretch outside the ICN room can make this possible. Some local community colleges have such devices and may be inclined to share them.

Finally, all the teachers say, "Don't give up." They know it does get easier as skill levels increase. Good preparation and backup plans can erase much of the fear of teaching over the ICN. Individuals willing to do so can learn the necessary skills. Those concerned with purpose of teaching can learn the mechanics and overcome the fear (C. Larkin, personal communication, April 6, 2000).

Field Test Results and Analysis

The above materials were reduced in verbiage and gathered into an 80-page spiral-bound manual. Varying font sizes, bold and italics were used to highlight, separate and enhance the presentation format.

Teachers were sought out to perform the field test. Dr. Pfitzenmaier, Dave Paulek, Dr. Sharon Smaldino and Trista Pietzman provided the names of teachers, contacts at area education agencies, and two web sites that advertised courses being planned for future presentation over the ICN. From these sources a list of individuals around the state of Iowa was generated and copies of the manual were mailed to them.

Several Iowa teachers used the manual to create courses in microbiology, sociology, bioethics, methods and materials, biochemistry, and Spanish for delivery over the ICN. In addition to these individuals, the manual was reviewed by professors of education at the University of Northern Iowa, Texas Technical University and Indian Hills Community College, a NASA Education Workshop Educator Facilitator from the Johnson Space

Center, two Education Technology consultant at two AEAs, several K-12 teachers who had taught on the ICN, a high school principal and a elementary school principal.

The feedback form (Appendix H) was filled out by each individual. The following sections provide a summarization of the responses provided by the testing individuals.

Quantitative Results

Part one of the feedback form asked four questions that required an answer of from one to 10. The testers' responses are summarized in the accompanying table (see Table 1).

Field Test Responses				
	Q1	**Q2**	**Q3**	**Q4**
Mean	8.59	9.06	8.88	8.88
Median	8.00	9.00	9.00	10.00
Standard Deviation	1.28	1.30	0.99	1.73

Table 1: Quantitative Results

Question One asked the respondents to rate the usefulness of the manual. Answers ranged from a low of 5 to a high of ten with the average being 8.59. The one low score of 5 was tendered with comments that the manual was too general to be of assistance. However, the same respondent would recommend the manual to individuals who had never taught on the ICN before. As this was the intent of the manual, this score appears to one of misunderstanding rather than negativity.

Question Two asked respondents to rate the relevance of the manual. Again the answers ranged from a low of 5 to a high of 10 with the mean being 9.06. The low score of 5 is again from the respondent mentioned earlier.

Question Three asked respondents to rate the clarity of the manual. The answers here ranged from a low of 7 to a high of 10 with the average being 8.88. The low score of 7 was tendered as a result of the individual finding several grammatical errors in the manual. These were corrected.

Question Four asked the respondents to rate the completeness of the manual. The scores ranged from a low of 5 to a high of 11 with the average being 8.88. Two individuals rated the manual a 5 here, and one rated it an 11. The two fives were based on the lack of alternatives for failed technologies, and the lack of specific instructions for using the technology. Additional alternatives were included where necessary. But, specific instructions for using the technology were not added for two reasons. First, this was deemed a hands-on event better suited to practical exercises. Second, the manual was designed with course construction in mind rather than technological expertise.

The score of 11 was tendered by a first grade teacher who planned to provide a copy of the manual to several colleagues. She appreciated the encouragement to have back up in case of technical problems and to utilize different modes of involvement for students.

Overall, the results of the qualitative section of the feedback clearly indicated that the manual was well received and efficacious. These results showed that all levels of the educational system felt the manual was useful, relevant, clear, and complete to an extent that warranted its publication and dissemination to others.

Qualitative Results

The second part of the feedback form asked the respondents seven questions. These questions allowed the testers to comment on the manual with an eye toward improving the product. Most respondents included short statements under each of the questions. Three individuals provided an additional extensive review of the manual. The short responses and their impact on the manual are discussed first. This is followed by a discussion of the more complete evaluations.

Question 1: Is there anything missing from the manual that should be included?

A language teacher suggested a personal blurb from the author including who the author is and why teachers should listen to the advice in the manual (J. Alvarez, personal communication, December 28, 2000). Two short paragraphs were added to the preface.

Tom Cooley, the high school principal, said to “make sure you include the importance of having accurate contact information for the remote site close at hand. This needs to be more than their ICN fiber-phone number… email address, “regular” fax, phone numbers, name(s) of contact person, etc.” (T. Cooley, personal communication, January 15, 2001). His concept was added to Chapter 4, The Design Phase, under the subheading “Anticipate ICN Technology Failures.”

The K-12 Coordinator for the Star Schools Project, Trista Pietzman, suggested including “something about a teacher obtaining some trouble-shooting skills so that minor ICN problems will not appear to be a major catastrophe. A knowledge of new technologies or a gateway to them such as a listserv or magazine may also serve distance learning teachers well” (T. Pietzman, personal communication, May 22, 2001). Her idea was placed in the same section as Tom Cooley’s.

Kim Reed, a fifth grade teacher and one of the four Iowa teachers who provided the initial content for the manual, thought that the duties of a room facilitator should also include being a liaison with the instructor. He felt the facilitator should monitor progress, let the instructor know of any subtle problems/dynamics that are taking place in the room/course, and let the instructor know of any concerns the students might have. These were added to the manual in Chapter Two.

Other suggestions made at this point were not included in, nor added to, the manual. Some, such as including examples and tips on alternatives in case of system failure, or ideas on how to involve individuals at the remote sites, appeared to result from incomplete review of the manual. Several of these appear throughout the manual. However, a future edition might contain a specific section with these titles to further clarify their inclusion.

Some individuals suggested more information about standards and benchmarks and the capabilities of the technology. As mentioned earlier one suggestion wanted specific instructions on using the technology. All these points were considered outside the intent of a manual designed for course construction. Additionally, there already exist materials covering these topics.

Several other suggestions were also not considered at this time. These included:

- Stronger emphasis on usage of ICN for educational experiences beyond the full course delivery
- Stronger emphasis on benefits of utilizing ICN to students, teachers and administration to assist in guiding policy decisions.
- A section on billing information.
- Sections which describe and discuss the history of ICN in Iowa

These fell outside the purview of this manual. The manual was designed with full course delivery in mind. Benefits of ICN usage, while important, are expected to be considered *before* a class is initiated. Billing is a district-by-district administrative task best left up to those administrators with financial responsibilities. And, finally, the history of the ICN would simply add bulk without adding course creation content.

One individual's comments elicited further conversation. In her initial response, after using the manual to create an ICN biology class, Sharon Padget, a high school science teacher, suggested the inclusion of some specific guidelines for science ICN classes. Subsequent email conversations produced a short list of ideas that, for the most part, were added to the manual. These included:

1. Discipline is hard to do long distance, so only students who can police themselves should be allowed to take classes (Chapter 2).
2. When a class is announced, whether for the first time or the twentieth time, the notification should include:
    - Homework policy
    - Assignment schedule
    - Makeup work policy
    - Test schedule
    - Planned no broadcast days
    - Grading scale
    - Suggested prerequisite classes
    - Curriculum (Chapter 2)

3. Permit students to do a lot of learning on their own, but be available to answer questions. Let students do projects that require many different resources. It puts a positive spin on the use of technology in the classroom and is more performance based (Chapter 6).

4. Do labs that are hands on and worthwhile. Ensure you have prepared facilitators in advance. Trust the students. Be flexible in the procedure part of the lab. Possibly enlist the help of a teacher at the remote site. If necessary, do the lab as a demonstration (Chapter 6).

Several other comments about staying flexible, maintaining a good sense of humor, trying to visit the remote sites just to meet the kids and the administrators, and having fun were already in the manual, but were highlighted for additional emphasis (S. Padget, personal communication, January 17, 2001).

Question 2: Were any parts of the manual unclear?

No one had any negative comments about the manual's clarity. Comments included:

> "No, because everything was broken down so that everyone had a good understanding of the material" (W. Alexander, personal communication, February 15, 2001)

> “I thought the information provided was clearly presented” (T. Cooley, personal communication, January 15, 2001)
>
> “All parts of the manual were very clear” (J. A. Watkins, personal communication, January 10, 2001)

One person saw the manual as “clear though at times it seems repetitive” (N. Maushak, personal communication, October 12, 2000). This repetition is intentional as a means to emphasize particular points as they apply to different areas of the course creation process.

Robert Reppert, an area education agency technology leader said,

> Everything was clear to me. However, I do have experience in using the ICN and have an extensive background in using technology in the classroom. That might effect my ability to analyze the clarity of the manual for someone who has little technology experience. -- To me the manual was very clear. However, a first time user of the manual might not be as familiar with some of the more technical aspects of teaching over the ICN (Personal communication, December 21, 2000).

And finally, Julie Tremmel, an elementary reading teacher, who only skimmed the manual during her usage of it, commented, “This is my normal way of approaching a manual for the first time. I read the parts relevant to my immediate needs and skimmed or skipped the rest. In this respect the manual was very clear and user friendly" (Personal communication, May 22, 2001).

Question 3: Which parts of the manual do you consider most relevant?

This question asked the respondents to consider the parts of the manual they felt most pertained to their efforts in creating classes for presentation over the Iowa Communications Network. Two comments highlight the overall feelings expressed by the field testers:

> "I thought the majority of the manual was relevant to the goal you have in mind." (T. Cooley, personal communication, January 15, 2001)

> "When undertaking an endeavor such as teaching on the ICN, it's ALL relevant." (J. Tremmel, personal communication, May 22, 2001)

As might be expected, the second section of the manual proved the most relevant to teachers creating courses. Within this section, several field testers commented more specifically on the manual's content. They expressed interest in:

- Having back up in case of technical problems
- Utilizing different modes of involvement for students.

(E. Allert, personal communication, August 3, 2000)

- The emphasis on being prepared to modify instruction
- Making sure to get the remote sites ACTIVE in their learning

(T. Cooley, personal communication, January 15, 2001)

- Those that offer tips!

(D. Else, personal communication, March 3, 2001)

- Parts that emphasize the difference in teaching in this environment and teaching in traditional environment.

(N. Maushak, personal communication, October 12, 2000)

- Teacher prep work before class starts
- Others to contact

(S. Padget, personal communication, January 17, 2001)

- Getting started developing ICN presentations/courses for the beginner.

(K. Reed, personal communication, August 29, 2000)

- Focus on what is important when planning to teach over the ICN.

(R. Reppert, personal communication, December 21, 2000)

- Tips on slides, colors, and graphics

(J. Swaby, personal communication, February 10, 2001)

Two individuals placed their comments in context. Julie Tremmel felt that planning and preparing in advance were especially relevant. She commented, “I think it is important that teachers and administrators know the importance of early planning and the essential need of preparing materials in advance” (J. Tremmel, personal communication, May 22, 2001).

The Star Schools Project K-12 Coordinator, Trista Pietzman, teaches K-12 teachers to use the ICN. She agreed with the idea that “subject matter should drive the technology” by saying,

> Absolutely! We have found this time and time again. Teachers who are “afraid of the technology, ICN room, etc.” are excited to be a part of ICN sessions where there is good content. They also comment about how easy

> it is to use once they have had to do so. “I thought it would be much harder, “ one teacher in our summer class stated. (T. Pietzman, personal communication, May 22, 2001)

It was interesting to note that some teachers greatly appreciated the first section of the manual, Administrative Guidelines. Their comments follow:

> The administration section is very good. I am going to share the manual, or parts of it, with my administration. They are trying to get a compensation policy together for teachers working over the network. (J. Swaby, personal communication, February 10, 2001)

> It's great and I’ll share it with my administrators (J. Alvarez, personal communication, December 28, 2000)

> Hopefully administrators will take your information to heart when thinking about the preparation involved in planning a course. (T. Pietzman, personal communication, May 22, 2001)

Janet Watkins, a college professor who teaches individuals heading for the ICN classroom, actually thought the administrative section was least relevant to her. But, she qualified this feeling by indicating she was glad the section was included and stating that the “manual is something that is needed -- particularly … by administrators” (J. Watkins, personal communication, January 10, 2001).

Question 4: Which parts of the manual do you consider least relevant?

The comments to this question revealed that the field test group felt, for the most part, that the manual in the whole was relevant to their efforts. Several field testers indicated that all parts of the manual were relevant to their efforts to prepare for teaching a course on the ICN. Two thought the administrative section was least relevant, however, as mentioned earlier, one was glad it was included.

One college professor thought that the material on lesson planning was not needed as “most teachers have this background and simply need reminders in this area” (N. Maushak, personal communication, October 12, 2000). Another thought the materials in Chapter 4, Design Phase, were “applicable to ALL teaching,” but didn’t think, “it would really help an experienced teacher who's training for ICN duty” (J. Swaby, personal communication, February 10, 2001). Because the intent of the manual is to assist beginning users of the ICN, these comments did not cause any revisions of the guide.

Tom Cooley (personal communication, January 15, 2001) expressed the concern that the selection of facilitators (Chapter 2) “is really out of the instructor’s control,” but that “remote sites would benefit from the information here.” (T. Cooley, personal communication, January 15, 2001). His concern was addressed by adding an entire paragraph to Chapter 1 stressing the inclusion of the instructor in the selection of facilitators. Administrators were admonished to invite the course instructor to participate in the selection of remote site facilitators whenever possible. Because instructors have intimate knowledge of course content, presentation methodology, student exercises and so on, they are most likely to understand which qualifications are more critical, or less critical, in a facilitator for the course. It was stressed that this participation is critical to successful course delivery.

Another individual, Trista Pietzman (Personal communication, May 22, 2001) looked at the selection of students for a distance learning class. She commented that,

> It would be nice if every teacher could choose the type of student who would do best in his/her class, but that simply isn’t possible. Teachers will find that all types of students are in the distance learning class just as found in the regular classroom.

The manual’s emphasis on student participation, individual responsibility, active participation, and self-reliance requires a careful analysis of which students are permitted to attend distance learning classes. Also, many of the classes offered over the ICN are optional in nature. These two factors insist that selecting students becomes possible rather than simply not possible. Prerequisites and class standing can focus the process on those students that meet the criteria and will have the best chance for success in the ICN environment.

Question 5: What did you like about the manual?

Responses to this question varied from comments about specific sections of the manual to general comments about the pertinence and relevance of the manual in the present day ICN atmosphere. The manual's high points mentioned most often included its being,

- Clear
- Concise
- Well organized
- Complete
- Containing no fluff
- Flowing well
- Easy to use

Specific areas that individuals liked were:

- The listings about the ICN instructor - presenter's voice, instructor personality

- Relevant research notations
- The tie to the design process
- The numerous examples, tips, and suggestions that are based on first hand experiences and current research.
- The specific technology tips

Julie Tremmel appreciated that the manual was broken down into sections that were each explained so it was easy to tell which parts were needed to be read to meet her immediate needs (Personal communication, May 22, 2001).

Joy Jones thought it was a very good technical manual. She had done ICN work before, but someone else ran the controls. The manual gave her confidence to do it herself. Also it made her aware of items and features of the ICN and gave her contact and troubleshooting ideas (Personal communication, June 27, 2001).

Trista Pietzman had this to say:

> The manual provides a framework for teachers to use when trying to set up a distance learning course. Too many teachers have had to do this on their own in 1-2 weeks just before school started without a guide such as this. I also like the mentor-like quality of some of the suggestions. Teachers like to

> learn things from other colleagues, so when you list things like the Feedback Options, these sound like good tips from others who have been there, done that (Personal communication, May 22, 2001).

The high school Spanish teacher was glad to see that “somebody else shares my opinions and clarified them” (J. Alvarez, personal communication, December 28, 2000).

And, finally, Jim Christensen, NASA Education Workshop Educator Facilitator for the Johnson Space Center and Western Hills Area Education Agency Distance Learning Consultant, summarized the majority opinion. What he most liked about the manual was “the fact that you sat down and did it. This is work that needed to be done” (J. Christensen, personal communication, June 22, 2001).

Question 6: What did you NOT like about the manual?

While several individuals found nothing to dislike about the manual, the most common complaint was the manual’s length. Many felt that in the form presented it appeared too long. With the manual in 12-point type and on single-sided pages, that was truly the case. The manual in that form used approximately 80 pages to present its information. The final edition presented to Dr. Pfitzenmaier was reduced in size.

The new edition is printed on both sides of the page. Its font size is reduced by two points for all text with the main font size being 10-point. The page size was reduced to 5-by-8 to create a pamphlet approach. This is the manual in Appendix F.

The second matter most commonly reported was the lack of visuals. Suggestions to use different modes of communication (web page, PowerPoint presentation, video demonstrations, etc.) were made. For this dissertation, the current layout is appropriate. However, the layout may be improved for actual publication and distribution through the use of graphics, photos, and concept maps to assist in understanding the process and the ideas within the content.

One last item was Julie Tremmel's problem with the "negative nature of the equipment requirements" (Personal communication, May 22, 2001). This was repaired to state things in the positive.

Question 7: What is your overall opinion of the manual?

For this section, a simple listing of the comments is most appropriate.

- Great Manual! (W. Alexander, personal communication, February 15, 2001)

- You obviously spent a lot of time putting this together. It is very good. (E. Allert, personal communication, August 3, 2000)

- I think the manual is very informative and has some good points. It's great and I've used it and will share it with my administrators. (J. Alvarez, August 30, 2000)

- I found the manual to be a good handle on how people can use the ICN for teaching a course. You did a good solid work that needs to be done for teachers throughout the state of Iowa. (J. Christensen, personal communication, June 22, 2001)

- Very well done. Thanks for sharing it! I plan to use it when preparing my next ICN course. (Colton, personal communication, September 10, 2000)

- Overall, I liked the manual and can see it being used by those considering ICN courses. I've found much of it to be right on target. Nice job! (T. Cooley, personal communication, January 15, 2001)

- Very good for those who have never taught on ICN. Helpful for those who have. (D. Else, personal communication, March 3, 2001)

- It is a good technical manual and would be very useful for beginners on the ICN. (J. Jones, personal communication, June 27, 2001)

- A good beginning. Nice organization. Would you mind if I shared this with my graduate students? (N. Maushak, personal communication, October 12, 2000)

- Very well done. I would like a final copy. (S. Padget, personal communication, January 17, 2001)

- I think that more and more teachers will be looking for a manual such as this to use as a framework for building their own distance learning classes. Reading a manual such as this one will give them a guide in planning the class start to finish as well as tips and ideas to avoid pitfalls that the pioneers in this industry have encountered. (T. Pietzman, personal communication, May 22, 2001)

- It seems to be a very thorough manual that both the beginner and "expert" can use to develop course/experience presentations on the ICN. With the state-of-the-art technology that is available when using the ICN, I hope this manual will help direct more and more educators to use the ICN more frequently in a wide variety of areas. (K. Reed, personal communication, August 29, 2000)

- This is great! I could have used the manual earlier in the year to share with the three teachers I am currently working with. It would have made their transition to teaching over the ICN a smoother and less frustrating process. I want to congratulate you on its content! (R. Reppert, personal communication, December 21, 2000)

- The book would probably be a good background for a person about to take ICN training. Administrators should <u>definitely</u> read the administration section! (J. Swaby, personal communication, February 10, 2001)

- Very helpful. (J. Tremmel, personal communication, May 22, 2001)

- This manual is something that is needed -- particularly by teachers who are just starting to teach over the ICN as well as administrators. (J. Watkins, personal communication, January 10, 2001)

Additional Commentary

Besides the comments provided for each of the questions on the feedback form, two respondents included additional, more detailed analyses of the manual. Their reviews are summarized in the following paragraphs.

Tom Cooley (Personal communication, January 15, 2001), principal of Odebolt-Arthur High School, provided a page-by-page review of the manual. At his suggestion, these changes were made to the manual:

Chapter 2

The suggested equipment list was expanded to include a computer with Internet access and presentation software (e.g. MS PowerPoint), VCR(s), one of which should have record capability, and available connections to add a DVD and/or videodisk player.

The reference to "specialized skills" was clarified by adding the sentence, "Presentation, movement, visual presence over the media, and microphone usage to name a few, are quite different from the normal face-to-face classroom experiences of most teachers."

Inservice schedules were added to the list of items to consider when scheduling classes to minimize conflicts.

Setting class guidelines regarding these conflicts was added in the form of a strong recommendation to schedule the classes to meet according to the originating site’s schedule with remote sites accommodating that schedule.

Chapter 3

Emphasis was increased on the teacher catching the visual cues because often the cameras at the remote sites can not be focused finely enough to “read faces.”

Because AEA mail isn’t always an option and depends on the location of the remote sites, this qualification was added to its usage.

Chapter 4

Minor grammar errors were corrected.

The point that failure of the technology has minimal impact at the sending site, but a huge impact at the receiving sites was added. To handle this eventuality two suggestions were added:

- Sending the remote sites presentation guides and/or handouts.
- The importance of having contact information for the remote site close at hand, such as the fiber phone number, regular phone numbers and the ICN technical assistance number.

Chapter 5

Examples were added to the color tips for colors that bleed and patterns that ripple.

Mr. Cooley also made several other positive comments about the manual. These have been included in earlier sections of this paper.

The second individual who performed an extensive review of the manual was Scott Slechta, a high school teacher providing ICN classes in writing and literature. His improvements to the manual included:

Chapter 3

The emphasis on being comfortable with the technology was increased from essential to crucial.

The importance of giving instructions only once, preferably by providing a handout was further emphasized. It was added that “this step in preplanning is an excellent resource for both the teacher and the student to clearly identify and explain the assignment for completion and evaluation.”

Chapter 4

To insure alternatives are ready for unexpected events, the syllabus content now includes:

- The word "tentative" or the phrase "Subject to change at the instructor's discretion" permits later flexibility.

- The lecture focus, the activities, the discussion, assignments, deadlines, and references to various materials distributed on the first day (guidelines, rubrics, etc.) which remove uncertainty.

The advice to have someone else who is not in the discipline read the syllabus to check on clarity, expectations, and so on was added.

When the ICN fails, the advice to get on the phone immediately is now included. The teacher is advised to contact the remote sites and the monitors and also to use the FAX to send simple explanations to alleviate anxiety.

The suggestion to have a back up, general lesson (1 page assignment) that would easily fit anywhere in the preplanned materials was added.

Getting graded papers back to students in a timely matter is challenging, so the use of an electronic grade book was added. All the scores and grades can be printed easily and given to the site monitors. The students can use the rubric or guide for the assignment and have some idea how they are doing until they get their specific paper back.

Three additional ideas about activities using the Internet were added:

- Have specific criteria and expectations before browsing,
- Have students find specific information within a half-hour
- Give students a half-hour to find a specific kind of item

A caution was added to the use of visual aids about if in doubt about using something, don't use it.

Chapter 5

The points about lesson plans were augmented to indicate they are more crucial and essential than regular classroom lesson plans.

Chapter 6

A new item, RELAX!, was added under presentation skills.

In the part about questioning, the advice to tell students that they will be given time to think and formulate an answer was added. This allows the reluctant student time to actually think and also prevents the overambitious student from clicking in with the answer too soon.

Mr. Slechta made numerous other comments about specific items in the manual. These were positive acknowledgements that indicated his familiarity with the precepts and concepts presented.

Finally, a few other modifications were made to the manual as a result of the field test. Its title was changed to the shorter “Guidelines for Creating ICN Courses.” This is clearer, more to the point, and more teacher-friendly. Section Two was retitled “Course

Development Guidelines" for consistency. The copyright was moved to the page after the title page to keep the format more in line with other published works. The preface was moved to after the table of contents, again to align the format with the standards for published works. The manual was reduced in size from its original 8.5 x 11 inches to 5 x 8 inches. Finally, the approximately 70-page manual was printed on back-to-back pages in booklet form.

Findings

The "Guidelines for Creating ICN Courses" manual summarizes the key findings of this project. The major headings within each chapter coincide with specific points that the teachers and the research materials provided during the manual's construction. A brief summarization is reiterated here:

Time is needed for planning purposes and to set up logistics

Support from administrators is essential

Advanced planning is crucial

Students must be ready for personal involvement and responsibility

Selection of facilitators at remote sites is critical

Coordination of class times must insure continuity

The instructional design process is an excellent tool to plan courses

Teachers can be successful in the distance learning environment

Students can be successful in the distance learning environment

There is help available for those who need it

Summary of Results

The guidebook was deemed a useful tool for teachers interested in developing courses for delivery over the Iowa Communications Network. The teachers and administrators who used the manual to create courses and those individuals who reviewed its content were all in agreement. This manual is needed.

Many professionals expressed the sentiment that the manual is something that has been missing from the curriculum for preparing teachers to use the Iowa Communications Network. They have deemed it worthwhile for first timers and experienced teachers alike. They expect it to be greeted with enthusiasm by teachers across the state of Iowa.

Chapter V

Summary, Conclusions, Implications, and Recommendations

Summary

This paper begins with a short history of the Iowa Communications Network, from its initiation as an educational television system in 1967 to the creation of the Iowa Telecommunications and Technology Commission in 1994 when it took on its current name. Today the ICN connects schools in all of Iowa's 99 counties with over 3000 miles of fiber optic cable.

The main purpose of this paper was established as

> To develop a guidebook of best practices to be used by teachers to create courses for delivery over the Iowa Communications Network

Earlier studies were shown to have not studied the quality of the education that students were receiving over the ICN, and none had generated a cohesive set of guidelines for course developers. Enough experience was deemed available to encapsulate it into guidelines so that new users could avoid obstacles and provide valid classroom experiences without repeating mistakes made by others. Such guidelines would lessen lead-time for course development and generate improved distance learning in a shorter time due to elimination of extensive trials.

Two research questions were investigated. The first question was "What is meant by quality of education?" To better select teachers providing exemplary education models, characteristics desirable in an exemplary model were determined. The second question focused on the means to measure quality. The various facets of quality education were examined and reduced to a reasonable group of quantifiable indicators that provided the basis for determining the extent of the quality. This set of indicators led to a list of 42 teacher characteristics used to select teachers whose various ICN course offerings were studied to determine why they were successful. The characteristics also provided the basis for the interview process.

This study was limited to the examination of several highly successful teachers offering courses over the Iowa Communications Network. These teachers were interviewed to capture key issues and solutions used to overcome barriers they encountered during course development. Additional information such as course content and pedagogical issues generated supplemental material for the manual.

The literature surrounding distance education, technology use in distance learning, and educational quality was reviewed to establish the background against which the study described in this paper was accomplished and to provide the context within which the guidelines were created. The review looked at where the technology was and its role in distance education. Studies performed by private and state and federal governmental agencies were covered and papers presented at conferences and workshops were examined. These materials provided data on such issues as whether teachers used technology in their teaching, what happens when they did and why more teachers didn't use technology. Also covered were how teachers learn about technology, teacher preparation to use technology, factors influencing implementation of technology in districts and schools, and the roles of all levels of government in these areas. Finally, these papers dealt with definitions and approaches to quality in education, including quality in technology.

The opinions of the various stakeholders in education were gathered from several studies. Views of teachers, administrators, parents and students generally concluded that technological innovations can engage Gardner's multiple intelligences, promote higher level critical thinking skills, encourage student-centered, cooperative learning, and expand the classroom walls into widening cultural venues.

Next the literature review examined materials directly related to the Iowa Communications Network. Numerous articles pertaining to the ICN described the concepts behind the ICN, provided the background of distance education in Iowa, summarized its goals and objectives and described the various state and local educational and government agencies involved. Papers also provided evaluations of practices and strategies for using the ICN as well as the impact of the ICN on Iowa's teachers and students.

The literature review then focused on the quality of education, the measurement of that quality, and guidelines for creation of courses that promote quality. Total quality education concepts, constructivism and the impact of technology led to quality of education being defined as:

> student-centered learning that is accessible to the widest range of learners. It uses stable teacher-student interactions with nonthreatening two-way communication to achieve educational outcomes. Change and growth occur through developmentally appropriate activities focused on specific learning results useful to the learner’s life.

Literature discussing the measurement of quality provided the process of identifying what was to be measured, how to measure those indicators effectively, and ways to report the findings in an understandable manner were covered. The list of 42 indicators developed for this project focused on teacher quality, the teaching process, the learning process, the classroom environment, leadership, and motivation.

The review of materials surrounding guidelines for creation of courses generated a conceptual basis for the manual. This part of the review supported the teachers' contentions and was intertwined with their observations in the finished manual. Articles reviewed various learning theories, connected those theories to the classroom, and provided methodologies for producing guidelines that integrate those theories into course development.

An action research approach was followed in the development of the manual. This approach, outlined in Isaac and Michael (1993), followed the steps:

1. Set the goal.
2. Review the literature.
3. Formulate strategies of approach.
4. Spell out the procedures to meet the objectives.
5. Establish means of acquiring useful feedback.
6. Analyze the results and evaluate the outcomes.

With the goal established of creating a manual for teachers to use to create courses for ICN delivery, and the literature reviewed, the approach to interview ICN-experienced teachers to synthesize their knowledge was outlined. The list of 42 characteristics of quality teachers was sent to education professionals and administrators statewide. These people submitted the names of 29 teachers who used the ICN and were felt to provide quality classes. Of these, four teachers were able to participate in this project. The knowledge required for the guidebook was gathered from their experiences in successfully delivering courses over the Iowa Communications Network for the past several years.

Collected through interviews, their knowledge formed the content of the guidebook. Responses were tape recorded and transcribed. Once the interviews were completed, the knowledge gained was coupled with information gathered from the literature and shaped into the guidebook.

The guidebook was divided into several sections with a total of eight chapters. The first chapter provides an introduction to the manual to explain its purpose and lists the objectives of the guidebook. Following the introduction, the first section focuses on administrative guidelines. Its Chapter Two provides guidelines to school district and AEA personnel to insure teachers are provided the proper scholastic environment in which to teach.

The second section has five chapters, each devoted to a step of the instructional design process. The interviewed teachers, while not adhering strictly to the principles of instructional design, did exhibit similar concerns and took similar steps when designing courses. So, a firm theoretical grounding on which to base the guidebook was established. Because the guidebook was designed to be non-technical, instructional design terminology was used sparingly in the final product.

A third section contains a chapter of guidelines that do not fit in the other sections. Finally, there are two appendices, one containing points of contact including teachers' names, and the other is a reference section containing pertinent articles, books, organizations, and web sites to consult during their efforts.

The guidebook's objectives were validated in two ways. The teachers assisting in the guidebook development and Dr. Pfitzenmaier were provided in-work copies of the guidebook for ongoing critique as it took shape. Feedback from these developmental reviews was incorporated into the development process. Then, the guidebook was covered and spiral bound as a Field Test Version. It was given to several Iowa teachers who developed and presented a course over the ICN following the guidebook's suggestions. They provided anecdotal feedback on the efficacy of the guidebook using a short form. In addition to these teachers, other education professionals and administrators reviewed the manual in light of their own experiences. College education professors, AEA technical advisors, and teachers who had delivered courses over the ICN provided additional critique of the manual's content.

The results from this field-testing were analyzed and final editorial changes were made. Numerous submitted comments added material to the manual, modified its approach in some areas, clarified ideas, and improved its overall appearance. One major change was the reduction in size from one-sided letter-size pages to 8x5 double-sided pages. This changed the impression of the manual's length from a ponderous book to a portable pamphlet.

The manual was delivered to Dr. Pamela Pfitzenmaier, Director of Educational Telecommunications for Iowa Public Television, who documented her acceptance in written form. Her letter documents the ongoing need for the manual and her anxiousness to distribute it statewide in the very near future.

This study, and its resulting manual of guidelines, validate the findings of Lawton and Bonhomme (1998) who list as necessary components for effective distance education:

Good communication

Technologically astute instructors

Effective facilitators

Planning and organizing skills

Efficient use of preparation plans

Flexibility

Experience

The manual emphasizes each of these. The last item, experience is the one that is most important. The relative newness of distance education to so many teachers makes mentoring a very realistic tool in their development. Throughout the life of the Iowa Communications Network there have been many individuals who have provided guidance to teachers preparing to teach distance learning classes. These efforts have resulted in a wealth of experience. It seems only wise to collect these experiences into a concise reference document.

These experiences have proven that, “when implemented with the same care as effective face-to-face instruction, distance education programs can be used to complement, enhance and expand education options for students ..." (Cavanaugh, 1999, p. 16).

As a final note, the manual has already met with some success. Through contact with the Star Schools Project K-12 Coordinator, it has been requested by, and sent to, a school district in Michigan. This bodes well for the positive acceptance of the manual as a useful, timely tool for course creation in the electronic distance learning arena.

Conclusions

There are several conclusions to be drawn from the materials described in this paper. The first deal with the concept of quality education. Others deal with the manual creation process and, finally, the manual itself.

Quality of education was shown to be an elusive concept. Thousands of papers written by hundreds of researchers each espoused the many facets of the idea of quality in education. This myriad of approaches simply proved that no single approach was conclusive. As these approaches were reviewed, a common thread was developed that attempted to unify several of them into a single definition that could be used for this paper. That process resulted in the quality education being defined as:

> student-centered learning that is accessible to the widest range of learners. It uses stable teacher-student interactions with nonthreatening two-way communication to achieve educational outcomes. Change and growth occur through developmentally appropriate activities focused on specific learning results useful to the learner's life.

Equally challenging was the determination of measurement criteria to demonstrate that quality education was being provided. Again, this proved to be a complex issue. Even armed with the above definition, it was discovered that many different concepts of what could be measured and what needed to be measured existed. Proponents, colored by their own perceptions of what constituted educational quality, provided numerous items to measure and numerous interpretations of those measurements. Review of this material resulted in the construction of a list of 42 indicators that focused on teacher quality, the teaching process, the learning process, the classroom environment, leadership, and motivation. This list proved useful to the administrators and education professionals who were instrumental in selecting the teachers who became the core advisors to the manual creation process.

Another conclusion drawn from this paper is that the teachers who had used the Iowa Communications Network had shared similar experiences. They proved that teachers embarking onto the ICN would most probably run into those same problems and situations. This lent credence to the initial premise that a set of guidelines could be formulated to assist novices at the outset of their distance learning adventures.

The next conclusion of this paper was the successful creation of the manual titled “Guidelines For Creating ICN Courses.” The manual was presented to Dr. Pamela Pfitzenmaier on July 11, 2001, at her Iowa Public Television office. She wrote a letter of acceptance (See Appendix H) that considered the project complete. She declared that the manual met her original intent. She now plans to distribute the manual throughout the state as part of the ongoing teacher education process.

The final conclusion reached is that teachers in Iowa now have a concise source of information to assist them in their efforts to create courses for delivery over the Iowa Communications Network. The manual provides needed guidance in a single location. It collects the experiences of teachers who have used the ICN into a set of guidelines that have been deemed useful and relevant by administrators and education professionals alike. The manual is a living document that is expected to be expanded as others become involved in its maintenance and growth.

Implications

There exist several small brochures developed by various state and educational agencies for use by teachers who were embarking onto the Iowa Communications Network. Each of these pamphlets focuses on the more general use of the technology rather than the differences between teaching in the traditional classroom and teaching in the distance learning environment. The manual created during this project shifts the focus from technology to teaching.

As with any technological advance, many times the “gee-whiz” excitement of the technology overwhelms the practical application of that technology to human endeavors. It seems that the State of Iowa fell victim to this phenomenon, at least partially. The idea of a fiber optic network connecting all the state’s schools was considered forward-thinking and innovative. While the altruistic goals for the ICN were well intended, the idea of being among the first states to construct such a network overrode the logistical considerations necessary to provide valid instruction using the technology.

Thereby, Iowa ended up with an exciting new technology in place, but with very little experience about how to effectively use it to provide valid educational experiences to the state’s students. Over the first eight years of its existence, Iowa learned how to use the ICN. Creative administrative individuals, dedicated educational professionals, and knowledgeable technicians cooperated to fill the gaps in the state’s educational system. Subjects previously not available were now being brought into schools that did not have teachers who specialized in those areas. Several schools could now provide a broader education to their students by utilizing a single teacher for the group, when individually they did not have sufficient demand to warrant hiring that teacher. And, the proximity of the schools was no longer a concern as the ICN brought schools together for the common good of the students across distances.

However, with the rush to provide education to so many with so few, a misunderstanding developed. Lack of experience in the area led many people to feel that developing a class for presentation over a distance learning network was not much different than the process historically used to prepare for the traditional classroom. They were wrong.

As has been illuminated in this paper, there are many differences between the two environments. Differences in logistics, differences in teaching methodology, differences in timing, differences in student expectations, and differences in preparation slowly became apparent as the ICN matured. These differences seemed to hinder teachers from accepting the challenge of teaching over the ICN. Administrators gave short notice to teachers who were ill prepared for the distance learning arena. Teachers were fearful of the technology. The technology failed, usually at the most inopportune times. The simple process of grading papers and returning them in a timely fashion became a logistical nightmare.

There was a need for some coherency. Individually, community colleges around the state began to provide classes to train teachers in the use of the technology. Area education agencies used technology consultants to assist teachers. Individual schools provided technology managers to handle ICN classroom equipment. This resulted in a reasonable level of success. But, because the focus was more on the technology, a lack of information about how teaching methods might be affected by the new environment was lacking. Moreover, none of this information was readily available in a single location. The manual created by this paper corrected this deficiency.

Now, novices in distance education have a single location from which to draw on the experiences of those who have gone before. They will benefit from the ideas, concepts, and proven best practices resulting from the efforts of the pioneers who were first to venture onto the Iowa Communications Network.

Recommendations

Several recommendations can be made as the result of the work done in this paper. Some represent the interpretation of the literature as it applies to teaching in a distance learning environment. Some deal with the current state of teaching on the Iowa Communications Network. Others deal with future considerations for continuing current successes and for improving opportunities for additional successes as the ICN matures.

The first recommendation is to insure the manual is available to all teachers embarking onto the ICN. To sustain the positive aspects of the ICN, "... good distance education programs are highly dependent on good planning (ISD), good instruction (presentation), and good organization and management (Cornell, 1995, Martin & Bramble, in press)" (Martin, Fosher, Moskal, & Bramble, 1996, p. 482). The manual will provide an excellent starting point for teachers to examine their planning processes, review their methodologies, and relate to the differences they will encounter.

“The new technologies for distance learning ... have the potential to provide a learning environment that can support active learning, but only if they are married to important shifts in teaching styles, content delivery, and learning activities” (Ben-Jacob & Levin, 1998, p. 58). Because the manual provides numerous suggestions in these three areas, teachers should find it quite useful before, during, and after they enter the distance learning classroom.

Secondly, it is recommended that administrators pay heed to the points raised in the manual’s second chapter. Scheffler and Logan (1999) showed that teachers need more preparation to teach with computers. They indicate that most important competencies for teachers are the knowledge and skills to make computers a seamless part of the school curriculum. Warner and Akins (1999) suggest that teachers need more time to develop skills working with new technology-based educational tools. These teachers must be convinced of their own successes, that new technological tools have an every day practical application and that parents and local infrastructures support the use of these new tools. Dealing positively with the manual’s suggestions will result in more teachers approaching teaching on the ICN with much less trepidation.

Another recommendation is to establish a common meeting ground for the state's teachers. Some sort of centralization of knowledge is needed because,

> teachers need more opportunities built into their daily schedules to engage in reflective thinking with other teachers to share new ideas, to revel and delight in the positive effects of their efforts measured by student progress in cognitive as well as affective outcomes (Spady, 1994), and to share new discoveries in the ever-changing world of technology. (Warner & Akins, 1999, p. 122)

The suggestion here is for the creation of an electronic knowledge base, a listserv for exchange of ideas, an annual conference for distance learning, or some other form of collaboration. In these arenas, teachers that are currently isolated from like-minded individuals across the state will find the means to share successes and learn from the experiences of colleagues firsthand. As Berg, Benz, Lasley and Raisch (1998) suggest,

> the expert teachers are very likely to be part of the informal leadership structure of their school districts; they are likely looked at as models and sources of advice by their fellow teachers. They may well be providing formal and informal staff development for others (p. 119).

In light of the commonalties discovered in this study, it is recommended that further input by the teachers using the ICN be gathered. This manual is not to be considered a static document. It should evolve, expand, and grow to include new experiences, new ideas, and new methods as experiences dictate.

Finally, future editions of the manual might be moved to an electronic medium such as CD-ROM. In this form, many of the manual's points could be illustrated with the addition of video clips, photographs, charts, and other images. Professional publication might also include the addition of color for emphasis.

Appendix A

Desirable Teacher Attributes

Desirable Teacher Attributes

TEACHER QUALITY:

-The teacher is committed to teaching
-The teacher cares about their students
-The teacher has mastery of the subject matter
-The teacher has mastery of the teaching process
-The teacher understands student development within the learning process
-The teacher is passionate about their work
-The teacher believes all students can learn
-The teacher is knowledgeable about impact of technology on students and society
-The teacher willingly engages in personal development of technology skills

THE TEACHING PROCESS:

-The teacher carefully sets learning objectives
-The teacher designs course to meet objectives
-The teacher implements strategies to meet objectives
-The teacher seamlessly integrates technology with the subject matter
-The teacher uses technology for creative assignment design
-The teacher uses open-ended questions
-The teacher encourages students to test their own ideas
-The teacher provides daily feedback and assessment
-The teacher uses technology to facilitate interaction
-The teacher involves remote site students
-The teacher gives structure to learning

THE LEARNING PROCESS:

-The teacher provides sufficient time on task
-The teacher provides opportunities for trial and error
-The teacher uses student input to drive lessons
-The teacher encourages self-analysis
-The teacher creates an active learning environment

CLASSROOM ENVIRONMENT:

-The teacher promotes a climate where all feel free to participate
-The teacher fosters a climate that is open to innovation
-The teacher reduces anxiety through 2-way nonthreatening communication
-The teacher accommodates a variety of learning styles
-The teacher encourages the use of technology to locate new information
-The teacher promotes a learner-centered atmosphere
-The teacher provides opportunities for deep learning
-The teacher encourages higher order thinking skills
-The teacher focuses on creative problem solving
-The teacher requires and models high standards of work and behavior
-The teacher makes social and ethical development part of the curriculum

LEADERSHIP:

-The teacher collaborates with colleagues
-The teacher shares expertise with colleagues and students

MOTIVATION:

-The teacher encourages participation beyond the minimum
-The teacher seeks out and uses student questions
-The teacher promotes student leadership and collaboration
-The teacher actively removes barriers (learning, social, behavioral)

Appendix B

Exemplary User Request

Exemplary User Request

Using the attached list of desirable attributes as a guide, please list at least one K-12 teacher in each of the three areas provided below. Teachers selected should

1. Have overcome their initial technophobia.
2. Have worked around the preliminary barriers they encountered.
3. Be experienced, both as teachers and as users of the technology.

==

AREA 1: Collaboration (Individuals who are working/teaching as part of a team)

AREA 2: Individuals teaching a traditional distance learning class

AREA 3: Elementary or middle school teacher (who uses technology)

Please return your responses in the enclosed envelope. Thank you.

Gary F. Hasman
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Lamoni, IA 50140
(515)784-5291

Appendix C

Study Objectives

The purpose of this study is to gather expertise from teachers who have used the ICN to present courses and then to use that expertise to construct a guidebook of best practices for future course developers. General objectives include:

1) Determine the background of each teacher for comparison purposes.

2) Delimit the skills necessary to teach any K-12 course.

3) Determine the any additional skills necessary for course delivery over the ICN.

4) Determine the steps followed by teachers to create a K-12 course.

5) Determine any special or additional steps needed for ICN delivery.

6) Identify ICN-specific obstacles/difficulties encountered during the course creation process.

7) Enumerate the processes used to overcome each of these obstacles.

8) Determine any special materials necessary for ICN delivery.

9) Determine types of activities to incorporate into ICN courses that differ from "normal" course activities.

10) Enumerate tips, techniques, and methodologies that have proven successful in delivering courses over the ICN.

Appendix D

Initial Interview Questions

Background

1.How many years have you been teaching?

2. What is your educational background?

3. How many years have you used the ICN for delivery of instruction?

4. What grade level(s) do you teach in a traditional classroom?

5. What grade level(s) do you teach in the ICN classroom?

6. How many years of computer experience do you have?

7. What kind of computer experience do you have (Mac, PC, creating courses)?

8. Which course(s) do you teach most often in the traditional classroom?

9. Which course(s) have you taught most often over the ICN?

10. If the previous two answers are different, is there any reason they are different?

11. Have you ever been a student in an ICN class?

12. Did you ever receive any training specific to the ICN?

13. Did you ever receive any training specific to distance education?

14. Is there any other background information that you feel I should know?

Experience/Behavior

1. Describe the process you follow to produce a course you intend to present over the Iowa Communications Network.

2. How does this process differ from what you would do to develop a traditional course?

3. Which tasks are most critical?

4. Which tasks are less critical?

Opinions/values/feelings

1. What is your philosophy of education?

Appendix E

Follow-up Interview Questions

Knowledge

1. Teaching skill set

    a. What skills does a teacher need to produce a course for delivery over the ICN?

    b. Where did you obtain these skills?

    c. How does this skill set differ from ordinary classroom production?

2. Who controls course content?

3. Are subject matter knowledge requirements different in the ICN setting? How so?

4. Instructional design methodologies

    a. To what extent do you have knowledge of instructional design methodologies?

    b. To what extent are they applied to your course construction process?

5. Knowledge of available materials

    a. What materials do you need to implement the traditional course design?

    b. What additional materials are needed for the ICN?

    c. To what extent are documents needed for an ICN course?

    d. Is the need for documents different from traditional courses?

6. Course activities

    a. What types of activities do you normally incorporate into your traditional courses?

    b. How does using the ICN modify these activities?

7. Constructivist teaching practices.

    a. What kinds of constructivist activities do you use in the traditional classroom?

    b. Are these practices amenable to the ICN?

Experience/Behavior

1. Is there any change in your organization of instruction versus the traditional classroom?

2. How do you measure outcomes?

3. Classroom management

   a. What is your usual style in the traditional classroom?

   b. Does it work on the ICN?

   c. What modifications were necessary?

   d. How do you accommodate students outside of class time (private questions, help, etc.)?

Opinions/values/feelings

1. If you were about to start planning a new unit in a course, to what matter would you *first* give attention?

2. Do student skills that result from the ICN experience differ from those obtained in conventional classrooms?

   a. Are they built into the course?

   b. Do they extend beyond subject matter?

3. Are there teaching strategies that enhance ICN learning?

4. What is the role of the teacher in the ICN environment?

   a. Has it changed from the conventional classroom role?

5. What changes will you make in future ICN offerings?

6. What were your first impressions of ICN teaching?

7. How have those first impressions changed as a result of your experiences?

8. What were the most difficult aspects to implement?

9. What recommendations would you make to teachers embarking on ICN course development?

10. Is there anything you learned using the ICN that you brought back to your traditional classroom?

Miscellaneous questions

1. Do you collaborate over the ICN?

    a. How does collaboration with other teachers impact what you do over the ICN?

    b. How does the ICN impact collaboration with other teachers?

Appendix F

Guidelines For Creating ICN Courses
(The Manual)

GUIDELINES FOR CREATING ICN COURSES

Gary F. Hasman

Guidelines

For

Creating

ICN Courses

Table of Contents

Preface

This guidebook is a work in progress. It is meant to provide encouragement to those teachers who have looked at distance learning and have wanted to try it, but were discouraged or daunted by the apparent complexities of distance education. I have gathered perspectives from numerous resources including books, articles, and web sites. More to the point of the Iowa Communications Network (ICN), I have interviewed teachers who use the ICN and included their wisdom in these pages.

Anyone wishing to contribute to this manual's content is encouraged to do so. Simply, contact the author at

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About the Author

Gary F. Hasman holds a PhD in Computing Technology in Education from Nova Southeastern University, a Master of Industrial Engineering degree from Oklahoma State University and a Master of Science in Computer Science degree from Rochester Institute of Technology. This manual was part of his doctoral work.

Mr. Hasman taught undergraduate chemistry, physics and computer science for over 25 years. He established and directed the Help Desk for the Iowa Communications Network from 1993-1995. In this capacity he provided courses over the ICN to teachers who were beginning to use the technology. He currently works as a software engineer in embedded systems.

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And finally, but certainly not least, the following Iowa teachers provided experiential inputs to humanize the theoretical foundations of the manual:

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Curt Larkin	Victor, IA
Sharon Padget	Eldon, IA
Dave Paulek	Keosauqua, IA
Kim Reed	Cedar Falls, IA

Numerous Iowa teachers and administrators also reviewed the manual for content and validated its premises through field-testing. Their feedback proved invaluable in improving my initial effort. They included:

William H. Alexander
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Jim Christensen
Brad Colton
Tom Cooley
Dave Else
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Nancy Maushak
Trista Pietzman
Robert Reppert
Scott Slechta
Janet Swaby
Julie Tremmel
Jane A. Watkins

Chapter 1
Introduction

This manual provides some useful guidelines to those teachers interested in creating a course that will be delivered over the Iowa Communications Network (ICN). It extracts material from the prevailing literature and adds the experiences of several Iowa teachers who have used the ICN to teach their courses. Among the high school courses referenced herein are German I and II, Biology, Environmental Science, Career Directions, English Composition, English Literature, and Writing. A fifth grade curriculum is also included.

The guidebook is broken down into four sections:

Administrative guidelines,
Course development guidelines,
Miscellaneous tips, and
Reference materials

The administrative section provides some recommendations for establishment of a learning environment. These are felt to lie outside the purview of the teacher and are suggested to be handled by those administrators who have the responsibility and power to affect positive outcomes.

The teaching section provides recommendations for successful quality course development. It follows a general instructional design process as found in the literature. These theoretical guidelines are colored with the experiences of the Iowa teachers who assisted in this project. Their experiences provide valuable insights into what has worked for them and what has not.

In the section containing miscellaneous tips are those insights that did not fit in any particular category of advice, but were considered relevant to this manual. They are grouped where such grouping seemed appropriate, otherwise they are offered in no particular order of significance.

The final section of this manual contains reference materials. Here the reader will find journal articles, web sites, teachers' names, and other information that can be used to assist in the development of a course expected to be delivered over the ICN.

Section I

Administrative Guidelines

Chapter 2
Administrative Guidelines

Before a teacher can be expected to provide quality education over any distance education infrastructure, there must be some agreement as to the environment that will be provided in which to conduct the learning experience. In Iowa, the administrators within each school district in conjunction with the applicable Area Education Agency are tasked to ensure that this environment exists. The following points are recommended to assist in ensuring a positive learning situation.

The technological infrastructure must be in place

After basic connectivity between sites is in place, individual classrooms must contain all the necessary equipment to guarantee teacher-student real-time interaction. Minimally, both telephones AND facsimile machines are required to meet this need. The computer must have Internet access and presentation software (e.g. MS PowerPoint). Multiple VCRs are recommended, particularly one with record capability. Also, connections should be available to add a DVD and/or videodisk player or other devices deemed necessary for the course.

The technological infrastructure must function properly

After all the necessary equipment is in place, it must work correctly. Proper steps must be taken to insure:

- Television screen images are steady during transmission
- Videotapes are clearly visible over the system
- Sound is being heard and is ungarbled
- Excessive static is minimized during voice transmissions
- Colors are consistent and not bleeding into one another

Reliability of the equipment is obviously critical to any environment that depends on that equipment to provide information, continuity, and control. Any malfunction detracts from the flow during a session and produces negative results. The technology should be transparent to the content being delivered.

Prepare teachers to provide distance education

Preparing teachers to provide distance education is unmistakably critical to a quality learning experience. Prepared teachers will experience fewer problems, and those problems that are encountered will be handled more efficiently. Well-trained and well-prepared faculty understand the relationship between the medium and course design and instructor delivery methods (Wolfe & Harris, 1998). Distance education requires specialized skills, abilities, and training for effective teaching. Presentation, movement, visual presence over the media, and microphone usage to name a few, are quite different from the normal face-to-face classroom experiences of most teachers. Adequate training prior to the distance teaching experience contributes to the long-term success of any distance education program

Training goes beyond simply providing a short meaningful experience to introduce a teacher to the classroom and its technology. Anxious faculty must be introduced to the technology and, equally importantly, must be provided with the opportunity to practice using that technology prior to any actual classroom endeavors. Only when they realize what the process of teaching with it will be like will they discover how the technology affects their teaching process (Hsu & Sammons, 1998). Learning the intricacies of the medium, overcoming the awkwardness of using it, and dealing with its impact on education quality is of paramount importance to anyone associated with distance education.

Provide preparation time for teachers <u>before</u> a course is given

Once teachers are adequately trained to perform in the distance education arena, they must be provided sufficient time to do so. Distance education requires a great deal of up-front time from teachers to prepare for classes (Telg & Irani, 2000). Planning a course for distance learning is significantly different from planning a course for the traditional classroom and requires increased lead-time for preparation. Additionally, a change from a traditional, teacher-centered classroom setting to a learner-centered one is time- and labor-intensive (Adams & Burns, 1998). The latest a teacher should be assigned an ICN course, or any distance learning undertaking for that matter, is the school year prior to the expected offering. Monetary compensation is not sufficient. Money does not remove the burden that lack of time to adequately prepare a class incurs.

Provide preparation time for teachers <u>during</u> a course

Time also becomes critical during the school year such a course is presented. Handling the logistics of several classrooms at various locations outside the immediate control of the teacher requires additional time on the part of the instructor. Teachers must be prepared for network problems, classroom technology failures, sickness, and so on, if the students are to be properly served (Rutz & Hajek, 1998). Making additional daily preparation time a part of the teacher's contract is highly recommended.

Select qualified facilitators for remote site management

Facilitators (monitors) can not be simply "placeholders" at the remote sites. They must be seen as a critical part of the learning environment. Competent facilitators who understand the training objectives and the content will greatly assist the distance learning initiative (Goodman, 1998). Successful projects place a trained aide at the receiving site that offers an opportunity to enhance learning for students in the remote classroom (Kirby & Driscoll, 1997). Facilitators should act as liaisons to the instructor and perform duties such as:

- Supervising the remote classroom
- Managing instruction locally
- Motivating students
- Monitoring student progress
- Informing instructor of any student concerns
- Keeping instructor informed of classroom dynamics or problems
- Distributing materials
- Collecting homework, and
- Proctoring tests (Kirby & Driscoll, 1997)

Facilitators should have no additional duties during class so they can provide the required assistance to the course instructor. At worst, facilitators should simply monitor classroom activity to ensure a positive, controlled learning atmosphere. At best, they should have knowledge of the subject matter and actually participate in the class. With a positive attitude and a display of enthusiasm, facilitators should be an integral part of the teaching team.

If facilitators are not providing this type of classroom presence, should a course be presented to that remote site? What is the point of transmitting to a site that has so little concern for their students that they won't support what the instructor is trying to do? If there is genuine concern about what the students are getting out of what the instructor is doing, then selection of proper facilitator is critical to quality learning. If this is not done, then the consequence will be student failure, which is the history of many students who don't have proper supervision at the remote site. Administrators, and parents, **must** be concerned about this.

A final point needs to be made here. The course instructor **MUST** be invited to participate in the selection of remote site facilitators whenever possible. The instructor has intimate knowledge of course content, presentation methodology, student exercises and so on. Therefore, the instructor is the individual most likely to understand which qualifications are more critical, or less critical, in a facilitator for the course. Because a good facilitator is critical to successful course delivery, the instructor should be given every opportunity to participate in this individual's selection.

Carefully select students for distance learning classes

ICN classes require students who can work with minimal instructor intervention. The student role in distance learning is largely dependent on the learner. Discipline is hard to do long distance, so only students who can police themselves should be allowed to take classes (S. Padget, personal communication, January 17, 2001). The teacher will encounter problems if the student has a motivation problem. Students must be aware of their responsibilities in the ICN environment and be prepared to shoulder more of that responsibility than they might in the traditional classroom. Students who are performing below expectations in other classes should not be placed in ICN classes as a remedy for their recalcitrance. It is wise to permit the teacher of the class to establish minimum entry requirements, including prerequisite courses, grade-level, and course-centric performance standards. AND, it is equally important for administrators to uphold those requirements.

Control enrollment levels of distance learning classes

Administrators must ensure instructors are not unduly challenged with enrollment numbers (Glascott & Stone, 1998). Keep the number of sites to a reasonable level. The logistics of dealing with too many sites, each with several students, greatly reduces the quality of the educational experience, both for the teacher, and for the students. It is easy to see, but sometimes not easy to recognize, that five sites of 10 students exceeds the normal class limit for a traditional classroom. Couple this with the delivery of materials to each site in a timely manner and the problem is exacerbated.

Schedule classes to minimize conflicts

There must be, at a minimum, some standardization of the school year schedule and inservice schedules within a district or districts participating in distance education. It does no good for the student to miss days and weeks of classes because schools have different start, ending, and holiday schedules. If the school that is originating the class has spring break the first week of April and one or more of the remote sites (within that school district) have it the second week of April, students miss two weeks of material. This places a heavier than normal burden on the instructor to "catch up" those students. Failure to coordinate this results in loss of class days, lower student performance, and higher failure rates.

Within schools, the scheduling of assemblies, fire drills and other classes must examine their impact on the ICN classes being offered. Some real effort must be made to make those periods of ICN classes inviolate to these events or, again, the quality of learning will suffer. These events interrupt the normal flow of learning and dilute the educational experience, limit continuity, reduce class cohesiveness, and require repetition of material. *A strong recommendation here is to schedule the classes to meet according to the originating site's schedule with remote sites accommodating that schedule.*

Announce the Class

When a class is announced, whether for the first time or the twentieth time, the notification should include:

- Homework policy
- Assignment schedule
- Makeup work policy
- Test schedule
- Planned no broadcast days
- Grading scale
- Suggested prerequisite classes
- Curriculum (S. Padget, personal communication, January 17, 2001)

Summary

It should be clear from the foregoing discussion, that while teachers bear the brunt of the distance education experience, it is in the best interests of the students that administrators become interested in more than the amounts of money distance education brings to a particular school district. Equally, they should be aware that providing quality education involves consideration of the impact their decision has on teachers' ability to provide that education. They must be prepared to train teachers, to provide sufficient lead time for class development, to allow preparation time during the school year, to select and train qualified facilitators, and to revise scheduling to minimize disruptions. Without these minimum steps being taken, the resulting educational experience has a real chance of being flawed.

Section II

Course Development Guidelines

Chapter 3
The Analysis/Planning Phase

The analysis, or planning, phase provides the foundation for the rest of the course creation process (Braxton, Bronico, & Looms, 2000). This phase can consist of several parts including analysis of instructional needs, analysis of learner characteristics, development of instructional objectives, analysis of tasks, analysis of literacy requirements, and selection of tasks to reach instructional objectives. Because administrators of various educational agencies at the state and local levels normally identify the need for instruction, the other tasks in preparation of the course will be dealt with here.

Subject matter, not technology, determines course direction

In most cases, subject matter content for ICN courses will not differ greatly from the traditional classroom. K-12 curricula are fairly prescriptive and teachers can select activities that will accomplish the coverage of that material. Also, there is a need to keep both ICN and non-ICN classes in the same relative position as the school year progresses. Applying the same rules in both environments ensures the quality basis of the curriculum.

Determine goals and objectives for each unit of instruction

Consider the primary concepts and fundamental themes around which the course is to be organized. Specify subject-centered objectives and goals, keeping in mind some general objectives and goals such as "how to: Precisely put questions, define contexts and purposes, pursue relevant information, analyze key concepts, derive sound inferences, generate good reasons, recognize questionable assumptions, trace important implications, and think emphatically within different points of view" (Lunenberg, 1998, p. 76).

Consider also such items as depth of presentation, time limitations, available materials, previous experiences and expected outcomes. Time limitations directly affect the depth to which content can be presented. Available materials influence which parts of the content get increased emphasis. Previous experiences color current efforts. Expected outcomes are needed to measure satisfactory student progression.

Examine the characteristics of students who will take the class

While teachers cannot strictly control which students take their classes, some minimal entry standards are recommended. Remember, student motivation has a high premium in this learner-centered environment.

Clearly understand the distance learning environment

Its impact on teaching strategies is critical. Insist on solid teacher preparation in the form of early training and inservice training. Then experience can be of immense value.

Consider the following points:

Distance learning is a visually oriented medium

Thinking through activities with this in mind is a prime consideration during course development. Understand multimedia and its impact on ICN learning. Be more aware of visual cues provided during class interaction. Often the cameras at remote sites can not be focused finely enough to "read faces". Experience suggests that over the ICN up to 50 percent of these will be missed which makes gauging class progress much more challenging. Practice changing camera views from site to site, and within the originating classroom to improve scanning students, which in the traditional classroom is instinctive. Also this manual manipulation keeps you aware of all the members of the class, not just the local ones, and makes the remote sites feel included in the class.

Interaction is critical

Interaction in the distance learning classroom is the cornerstone of successful distance education (Lehman & Dewey, 1998; Berge, 1998; Goodman, 1999). Active methods to gain and maintain attention keep remote site students involved in the class (Baker & Stark, 1998). If they are involved their interest level increases, which increases their interaction. The level of instructor participation is directly related to student responsiveness (Jiang & Tin, 1998). Include activities such as discussion, both intra- and inter-site, direct and nondirect questioning, writing exercises sent in by facsimile machine, and public speaking. Remember that, initially, students can be shy about using the microphones and seeing themselves on a screen thus causing physical responses to be slower. Be aware of this and provide additional time for responses (Rita, 1998). Also, because keying the microphone cuts off the instructor from being heard, the teacher must be more aware of aural inputs and allow for them.

Working with technology comfortably is CRUCIAL

Faculty need to be comfortable working with the technology because "organization, planning, teaching strategies, creativity, and instructional technology vary considerably from the regular classroom" (Thoms, 1997, p. 2). For faculty, switching cameras, using the microphones, using the computers and videotape machines, are obviously critical. **PRACTICE, PRACTICE, PRACTICE.**

Encourage students to use the technology as part of their course activities by giving short presentations, verbally and electronically (Connell, 1998).

Logistics must be considered

Logistics are extremely critical in the distance learning environment. It is one of the most difficult aspects to implement. More remote sites result in greater complexity. Logistical foresight is required to insure that materials reach remote sites so that the class period does not turn into a study hall. Materials must also be provided to cover alternative teaching strategies in case of technology failure, scheduling conflicts, or other foreseen and unforeseen events. Increased organization is mandatory here, including the transfer of materials to the teacher and back to the student for purposes of grading, class exercise closure and the like. Even when available, AEA mail has not proven to be 100% reliable. Therefore, take advantage of other technologies such as fax, email, and web sites (both student and faculty) to provide materials in a timely fashion to all parties. If possible, send single copies to remote site facilitators who can make sufficient copies to handout to the students at their respective sites.

Time limitations are inherent

The ICN imposes time limitations on any teacher, especially the scheduled start and stop times for each class. Over the course of a school year, this means there is very little leeway to adjust content and presentation. Organize the content of courses against this limitation by condensing material without diluting it and thus increase the content of the available contact time. About a 20 percent compression is a good rule of thumb.

To compensate for time restrictions, use quicker warm ups, fewer spot checks of student progress, keep discussions on point by avoiding prolonged divergences into parallel topics, combine topics to provide a concentrated overview of some areas, and increase external reading exercises.

Avoid treating sites individually. Give instructions only once, preferably on a handout for specific tasks or in a course syllabus for those of a general nature. This step in preplanning is an excellent resource for both the teacher and the student to clearly identify and explain the assignment for completion and evaluation (S. Slechta, personal communication, September 1, 2000). This will also handle disruptions caused by various scheduling conflicts.

Student responsibility is increased

Learning in distance education places increased responsibility on the students. A high degree of self-motivation is necessary. Self-direction and learner control should be expected and encouraged (Berge, 1997). Use a first day face-to-face group meeting at the host site to emphasize this point. If this is infeasible, try to visit each remote site before the course begins (Urven, Yin, & Bak, 1998; Thoms, 1997), especially if school start dates are not identical and the schools are not too distant from each other. This contact permits the instructor to stress the students' individual roles in their own success. The teaching becomes personalized as students' personalities are revealed and the several groups become aware of each other. Teachers become familiar with each student and the students become familiar with the teacher's expectations and standards (Neill, 1998). This meeting also provides a single opportunity to clarify any initial misconceptions.

Alternatives must be prepared

Plan alternatives to be used whenever situations arise that disrupt normal class flow. **Versatility** and **flexibility** are the bywords. Expect technology failures and scheduling conflicts. Put instructions for such events in the materials sent to the remote sites in preparation for that day's class.

Think about alternatives to group discussion, videotape failure, and missed classes. Backup plans are crucial (Adams & Burns, 1998).

Use constructivist teaching practices

Tying the current topic to previously covered material is important. This permits students to connect the new material with their earlier experiences and generate their own understanding of the topic. Teachers can reuse materials created earlier and can use materials created for other courses to connect content across the curriculum and to save development time.

Create contact arrangements for out of class questions

Make some arrangements to provide contact time outside class time. Use email, post telephone hours in the syllabus, or use web sites to handle the most common needs (Willis & de Montes, 1998). Other possibilities include online discussion groups, listservs, chat rooms, and bulletin boards (Hatch, Tuason, & Hatch, 1998).

Summary

The interviewed teachers agreed that detailed planning well in advance of delivering a course is the key to success. As one teacher put it, "Good things don't happen by accident" (D. Paulek, personal communication, April 4, 2000). Establishing clear objectives with specific beginning and ending points, planning activities that focus on attainment of those objectives, and measuring the degree of attainment must be accomplished with a clear understanding of the distance learning environment. Anticipating what might go wrong and being prepared to handle adversity will reduce anxiety, decrease down time, maintain flow, and make the experience much less strenuous.

Chapter 4
The Design Phase

During the design phase results of the previous analysis and planning are used to outline the strategies that will be used to actually develop and deliver the instruction. As in the analysis phase, several sub-processes take place during this phase also. Here, "the learning objectives are refined, the training media specified, the syllabus is generated, and the individual lesson designs are specified" (O'Neal, Fairweather, & Huh, 2000). Design involves "answering fundamental questions about what the students will learn, how they will demonstrate what they have learned, and how the learning will occur" (Gillespie, 1998, p. 46).

Specific learning objectives yield better results

Produce specific learning objectives from the goals outlined earlier. Kemp, Morrison and Ross (1994) suggest three important functions that objectives perform:

> 1. They offer a means to design appropriate instruction, specifically to select and organize activities and resources that will facilitate effective learning,
>
> 2. They provide a framework for devising ways to evaluate student learning by guiding the design of relevant testing items and procedures, and
>
> 3. They guide the learner by identifying skills and knowledge that student must master.

Move from general goals to more specific objectives. Break down a large goal into smaller, more easily obtainable objectives. This detail allows the development of materials to be coupled with the appropriate delivery mechanisms to accomplish learning and, secondly, it will now be possible "to measure students performance to determine when the objectives have been reached" (Gagne', Briggs, & Wager, p. 26).

Find more specific approaches to the course material because of the time compression the ICN places on the teacher. Increased focus is very necessary. Refined objectives will dictate the depth of presentation necessary to properly cover the content. Each objective should include a section that helps students understand why they are learning the material.

Design instructional strategies to meet objectives

Develop "a plan for assisting the learners with their study efforts for each performance objective," (Gagne', Briggs & Wager, p. 27). Leslie (1998) defines an instructional strategy as "a methodology for how to present stimulus material to learners so it will be maximally effective in helping them master instructional objectives" (p. 535). Proper sequencing of content and associated activities is critical.

Kemp, Morrison and Ross (1994) offer three different kinds of sequencing: learner-related; world-related; and concept-related. Learner-related sequencing deals with the manner in which students approach content. This covers such styles as:

Identifiable prerequisite - learn a skill necessary to perform another skill

Familiarity – start in known territory and proceed to the unknown

Difficulty - begin with the easiest and move toward the more challenging

Interest - start with topics that are expected to be the most interesting

Development - become proficient before moving on (an apprenticeship approach)

World-related sequencing deals with the manner in which the content is seen in the real world and includes:

Spatial - a directional approach (left to right; top to bottom; north to south)

Temporal - an historical approach (timeline)

Physical - physical characteristics (hardness, color, size)

Concept-related sequencing approaches content in a manner that is consistent with its logical organization. Included here are:

Class relations - cover general characteristics before looking at specific cases

Propositional relations - show examples first, then the theory

Sophistication - begin with simple, concrete ideas and move to abstraction

Logical prerequisite - teach concepts in logical sequence (add before multiply)

Combine these sequencing methods to provide a necessary variety in covering course content. Insure there are both starting and ending points for each unit of instruction. This will then dictate the flow of work in that unit.

Focus classroom activities on specific learning objectives

There must be a variety of activities in each area. Passive performance is quite undesirable, so Interaction is the key.

Keeping students involved and interested can provide the impetus for them to expand their boundaries and become aware of the world outside themselves. Engage the students. "Creative teaching has a definite role in effective teaching at a distance" (Baker & Stark, 1998, p. 485).

Kuntz (1998) suggests that each learning objective contain activities that address five components:

Preparation - put student in mood to learn by creating context for new learning

Presentation - provide content in 15-20 minute chunks

Participation - students process new information actively; deepen comprehension

Practice - reproduce a new skill with appropriate instructor or peer feedback

Performance - assess the degree to which students have attained new skills

A list of suggested activities:

- Discussions
    - Speaking in a variety of situations
    - Listening in a variety of situations
- Hands-on activities
    - Working alone
    - Working with partners
    - Working in small groups - across sites using the technology
    - Working in cooperative learning groups of 4-5 students (Depending on the subject)
- Singing
- Listening to tapes (comprehension)
- Map recognition (locations)
- Interactive (site-to-site) interviews

- Interactive dialogues using set scenarios
- Handling objects and describing them
- Reading newspaper article and explaining what has been read
- Writing a dialogue between two designated types of people
- Field trips
- Writing essays
- Presentations in front of class (15-30 minutes) using different media
- Using students at originating site to demonstrate content points
- Walking through case studies

Recognize the impact of the ICN

Audiotapes can be hard to hear at other sites especially if there are background noises or another class going on in the back of the room. Any delays can break continuity. The time limits are more constricting. It can be difficult to “go around the room” for sharing when dealing with multiple sites.

Anticipate ICN technology failures

Alternatives should be at hand. Always have a backup plan. Obtaining some trouble-shooting skills so that minor ICN problems will not appear to be a major catastrophe is strongly suggested. A knowledge of new technologies or a gateway to them such as a listserv or a magazine may also serve well (T. Pietzman, personal communication, May 22, 2001).

Failure of the technology usually has minimal impact at the sending site, but HUGE impact at the receiving sites! This provides support for sending the remote sites presentation guides and/or handouts. It is **VERY** important to have contact information for the remote site close at hand (e.g. fiber phone number, regular phone numbers), as well as the

ICN technical assistance number (T. Cooley, personal communication, January 15, 2001).

If and when ICN failure does happen, get on the phone to your sites and immediately contact the sites and the monitors. Use the FAX to send simple explanations. Have a back up, general lesson (1 page assignment) that would easily fit anywhere in the materials that you preplanned (S. Slechta, personal communication, September 1, 2000).

Match media usage with the objective

This is not a separate step. It must be part of the design of the activities. The media should suit the needs of the class and its selection should come after content has been decided upon (Telg & Irani, 2000). Examine how the technology can assist/expand what is done in the classroom. Use only that technology that will get the job done, or the point across (Berge, 1998).

Never use the media to simply entertain. Choose tools based on the objectives and activities (Friscia, 1998). Remember, "nontechnological tools are valuable real world tools that enhance and make learning possible" (Adams & Burns, 1999, p. 47).

Suggested media include:

- Course texts – but not all subjects require textbooks.
- Internet web sites
  - To provide content
  - A learning activity of sorting valid material from invalid information
  - Have specific criteria and expectations BEFORE browsing
  - Find specific information within 1/2 hour about a subject
  - Give the students 1/2 hour to find a specific item

- Visual aids – use the best available (IF IN DOUBT – DON’T)
- Multimedia
- Films
- Remote overhead cameras - show student work to all sites
- Videotapes
- Professional samples
- Audiotapes
- Guest speakers - professional topical experts, collaborating teachers
- Documents - needed to one degree or another
  - Alternatives to mailing documents
    - Using the overhead to see actual items
    - Faxing or scanning materials for viewing computer imagery
    - Sending a single copy to remote sites for reproduction.

Guarantee the existence of backups for whatever media was used. Always be prepared for some sort of failure.

Design lesson plans with logistics in mind

Think about the day to day operation of the class. What needs to be where and when? Prepare remote sites to receive "special stuff" (video, handouts, satellite feeds, etc). Be aware of the time it takes to get materials in place at remote sites. Proper lead-time for creation of materials and their delivery must be a prime factor against which is weighed the need for that material. Use the technology to transfer materials to remote sites.

Getting papers to the instructor for grading and back to the students in a timely fashion can greatly influence a student's satisfaction with an ICN course. Because mail delivery times vary from site to site, the papers will get to their destination eventually. Use an electronic grade book where all the scores and grades are shown. It can be easily printed and FAXed to various other sites at a specified time so that students can use the rubric or guide for the assignment to measure how they are doing until they get their specific paper back (S. Slechta, personal communication, September 1, 2000).

Generate a syllabus

Produce a syllabus for every class. Provide every student with a clear idea of where they are going, and how they will get there. Outline each class (Telg & Irani, 2000). Eliminate mysteries and surprises. With a schedule of daily events that includes what to do, when to do them, and where to be, each student can take on some additional responsibility for their own learning. Remember to include the word "tentative" or the phrase "Subject to change at the instructor's discretion" at critical locations to insure later flexibility (S. Slechta, personal communication, September 1, 2000).

The syllabus should contain course goals, objectives, activities, media, instructions, and so on. Provide a clear picture of what is to come. Use it for review at the end of the course. At the upper grade levels, an included reading list can allow for skipping some depth in the time constrained ICN environment.

Details of the syllabus for each class may vary, but it might include: the lecture focus, the activities, the discussion, assignments, deadlines, and references to various materials distributed on the first day (guidelines, rubrics, etc.). Have someone who is not in your discipline read it to check on clarity, expectations, and so on (S. Slechta, personal communication, September 1, 2000).

Vary outcome assessment according to learning objectives

Devise assessment to match the specific course objectives. (Ehrlich & Kommel, 1998). Was the objective of the unit reached? Was the content covered in sufficient breadth and depth to provide the students with opportunity to meet the objectives? Were all objectives met so that the goal was reached? Did the student obtain the skills to do the unit? To what degree did the student master the content? Can they perform the required steps? What can they not do as a result of this unit?

Assess students over the duration of the course using such methods as take-home exams, written reports, projects, peer evaluation of group activities, or student self-evaluation (Telg & Irani, 2000). Vary outcome assessment according to learning objectives to examine with reasonable accuracy the attainment of those objectives. Assessment can provide stimulus for continued learning on the part of the student. Variation accommodates the various learning styles of individual students and permits them to prove their successes in ways in which they are most comfortable. Assessment should add to the learning process and allow students and teachers the opportunity to share what was learned.

Summary

So, the design phase of the instructional design process creates clear objectives and related activities that can lead directly to student success (Egan & Gibb, 1997). With strategies outlined, materials decided upon, media selected, and logistics prepared for, the next phase, development, will be a much simpler task.

Chapter 5
The Development Phase

The purpose of the development phase is to "generate lesson plans and lesson materials" (Braxton, Bronico, & Looms, 2000), develop the necessary media or software, and create any supporting documentation. Here is a good place to review current materials to determine which may be re-used in the new course. Also, it is here that instructors should "validate the instruction to ensure it accomplishes all goals and objectives" (Clark, 1995).

Insure a curriculum guide exists

In some instances this document already exists in a form dictated by the state and/or the local school district. If it does not exist, create one. A curriculum guide gives teachers ideas for the level and knowledge students in the course should acquire. It will also provide direction for writing and implementing specific lesson plans (Roblyer, 1996). This document should contain sections such as:

Aim - an overarching reason the course exists

Goals - meeting these succeeds in meeting the aim

Philosophy - the reasoning behind the course's existence

Objectives - the ways to attain the goals

Activities - the means to attain the objectives

Resources - materials to be used during the activities

Competencies - skills to be gained by completing the course

Outcomes - what the student can expect to comprehend, know, and do

Evaluation - how the outcomes will be assessed for success

Create lesson plans

These written documents will map out the day-to-day objectives and the activities to achieve those objectives. They are crucial and essential in the ICN environment. Sections include:

Overview - explain the overall point of the lesson

Purpose - explain the why and what of the lesson

A competency list – identify skills that will need validation

Evaluation criteria – indicate what is to be measured and how

Materials needed - include media and documents

Develop supporting media and materials

These are developed in parallel with the instruction. Possibilities include:

- Learning guides and/or modules with actual instructions for teaching
- Presentation plan - map out the course
- Instructor's notes
- Assignment sheet - for handout
- A checklist to indicate progression - both course and students
- Milestone questionnaires - better known as quizzes
- Materials for each lesson:
- Documents

- Visuals
- Case studies
- Role playing scenarios
- Simulations
- A competency profile

(Windschitl & Andre, 1998; Hoskisson, Stammen, & Nelson, 1999; Malone, et al., 1997)

What to include in the lesson plan for the first day of class

Purpose: To prepare the students for the distance learning experience.

Where: Make every effort to have this first meeting face-to-face.

Events:

1. Establish reasonable student expectations
2. Promote the concept of a learning community where students are to learn from each other should be promoted (Egan & Gibb, 1997).
3. Delineate the parameters of learner responsibility in such an environment. Outline the rules of the classroom.
4. Provide advanced warning that the student-teacher relationship is going to be altered (Mottet, 1998, p.12) and how this difference will be handled, by emails, phone hours, chat rooms or listservs.

Examine past materials for reusability

All materials should be devised to "try to make the greatest impact in the amount of time available (K. Reed, personal communication, February 20, 2000). Look for previously used materials. Look for previously created materials, both your own and commercial. These items are already pilot-tested and reduce development time.

Select videotapes with caution

Copyright laws that cover usage over an educational network are not well established. Therefore, an inordinate amount of lead-time is required to get permission from authors or publishers. Some videotapes seem to be unplayable if not on some arbitrary list of approved tapes. Check with school districts and/or the AEAs.

Prepare visuals with care

Simple visual materials "can improve the retention level of attendees by 50%" (Goldstein & Goldstein, 1993, p. 1). With the need to condense content, "the use of computer generated graphics and text, usually maximizes the effective information density on a video monitor" (Gosselin, 1998, p. 127). Whether the materials are presented over the video part of the ICN or as hardcopy handouts makes little difference. Student study guides, instructions for projects or experiments, and the like will, when produced correctly, increase understanding and retention and increase efficiency of communication resulting in better results for the student.

Tips for Preparing Slides

Condense course content to some form of outline. These outlines can serve as both instructor notes and as the basis for visuals.

Color Tips

- Color should ensure readability.
- Select background and foreground colors that emphasize contrast
- Avoid colors that bleed into each other (yellow and red, for example)

- Avoid patterns that "ripple" on the screen (thin stripes, for example)
- Limit the use of different colors on a slide to no more than two.
- Use a consistent background color to connect the slides in a series
- Use color to affect viewer mood, interest, motivation and perception
- Use colors as emphasis keys and to signify associations
- Group categorically related elements with the same color
- Use similar colors to denote relationships between elements
- Link color change to dynamic events
- Use the brightness of color to indicate action levels or priorities
  (Gosselin, 1998; Downs & Clark, 1996; Thoms, 1997; Fu & Ouyang, 1997; Clark, 1995; Mucciolo & Mucciolo, 1994)

Text Tips

- Font sizes should aid readability by being at least 24 points
- Limit the number of fonts
- Use sans serif fonts
- Keep the number of lines per screen between five and eight
- Use white space generously, especially around the edges of the slide
- Use headings and subheadings to organize content
- Use uppercase and lowercase lettering
- Use keywords and phrases

- Be aware of the red/green color problem (colorblind students) (Thoms, 1997; Gosselin, 1998; Fu & Ouyang, 1996; Downs & Clark, 1996).

Graphics Tips

- Charts and images reduce information content to a single event
- Graphics should be relevant to topic
- Avoid cute graphics
- Use photographs rather than simple drawings
- Realism makes a heavier impact than just words
- Images are better than words for memory tasks
- Do not push images to the edge of the slide
- Keep about a 10 percent border around all slide materials
  (Goldstein & Goldstein, 1993; Thoms, 1997; Gosselin, 1998; Fu & Ouyang, 1996; Downs & Clark, 1996)

General Tips

- Focus on one topic or concept per screen
- Balance information - not all left justified
- Vary the position of information and images
- Bring information onto the slide in pieces - use builds

Test slides for readability using the ICN room monitors not a computer screen. The slide's colors, text sizes, and all the previously mentioned points will appear differently on the two very different video screens.

Prepare electronic materials

Validate the existence and availability of email, listservs, newsgroups, and chat rooms at each of the sites where the class is to be offered. These are especially relevant in the ICN environment where communication methods that differ greatly from those used in a traditional classroom are required. Remember, "interaction does not have to occur in 'real time' to be effective (Russell, 1994a)" (Telg & Irani, 2000, p. 4). Alternative methods should be created to provide maximum opportunity for students to interact with the teacher and with each other. Create learning communities where there are

> opportunities for students to teach one another, to clarify course-related questions and assignments, to receive academic and social support, and to develop relationships that extend beyond the duration of telecourses (Egan & Gibb, 1997, p. 36).

Obtain the necessary knowledge to use these. Visit the technology specialist near you. Allow sufficient preparation time to set them up properly.

Locate and test appropriate software

Determine its suitability. Schedule its availability. Examine cost factors. Look for special educational offers from various companies. Don't be afraid to use the Internet or software as simulations.

Locate and schedule guest speakers

Guest speakers can greatly personalize and enhance the course content.

Lay the groundwork for field trips

Field trips can be either physical or electronic. They require quite a bit of coordination. Arrange the site of the trip. Prepare students well in advance.

Validate the instruction

Ensure that the instruction accomplishes all goals and objectives. Conduct a formative evaluation to review and revise those parts of the course that appear insufficient before the class is given. This review also provides an overall look at the class for items such as flow, meaningfulness, and appropriateness for the grade level.

Summary

The development phase is never done. It is a constant, ongoing create-use-review-revise cycle that results in increasingly better courses. A course does not have to be completely revamped at each iteration. Parts of the whole can be done as time and inclination allow.

Chapter 6
The Implementation Phase

The implementation phase involves the actual delivery of instruction. The focus here is "the effective and efficient delivery of instruction" (Braxton, Bronico & Looms, 1995). This phase promotes student understanding of material, supports student mastery of objectives, and ensures student transfer of knowledge through carefully choreographed use of cameras, computers, facsimile machines, and telephones (Kuntz, 1998).

Expect more from the students

Treat distance education students with increased expectations and require them to take a great deal of responsibility in their own learning. Expect a high degree of involvement on the part of the student. Instill this philosophy on the first day of class. Tell students that the ICN situation is unique and different and requires more attention and more effort on their part (D. Paulek, personal communication, April 4, 2000). Model appropriate behavior and encourage students to self-regulate their own behavior in favor of the group. Remind students that they can not simply show up for class. Induce them to participate in various discussions, engage in teaching each other, role-play, or whatever else is required to promote learning. in group exercises, instruct them to do their fair share. The old adage of playing well together holds especially true in management of remote sites.

Understand the new role of the teacher

The teacher's role changes to that of guide, stimulator, and modeler of usage (K. Fredericks, personal communication, April 6, 2000). The teacher becomes "more a conductor, a facilitator, and a manager than a deliverer of knowledge" (Jiang & Tin, 1998, p. 17).

- Provide a positive climate in which learning can occur.

- Don't provide all the answers
- Don't control all the content
- Establish structure to launch student exploration
    - Set and keep curriculum goals
    - Assessment
    - Manage classroom activities
- Question skillfully
- Monitor discussions
- Establish rules
- Model reasoning and thinking
- Identify and restate student beliefs and understandings
- Support student-teacher, teacher-student, and student-student dialogue
- Provide feedback (Adams & Burns, 1998)

Solidify the learner profile

Outline students' prior skills, experiences, and goals as they become known.

Maintain student motivation

Use the previously designed audiovisuals, learning guides, activities, and checklists to bring the course content alive. "Personalizing the activities in each lesson can increase student motivation" (Adams & Burns, 1998, p. 31). Winfield, Mealy, and Scheibel (1998) also suggest relating content to real situations using case studies and simulation that mirror some aspect of the students' lives. Instructors should give students autonomy to pursue their own questions (K. Reed, personal communication, February 20, 2000) then require them to share the results of their investigations with the class.

Teach in "chunks," or 15-minute pieces

Intersperse activities to engage the students. Use different audiovisual techniques, or color-coded slides, to segment the presentation. Plant a "flag", or make an exact point, in each segment to wake up wandering minds and bring the class back on task (Goldstein & Goldstein, 1993). Enforce interaction. Don't let students feel they are simply watching television (K. Reed, personal communication, January 21, 2000).

Promote learning outside the classroom

Use independent practice to extend content recently taught. Move content into the real world. Permit students to do a lot of learning on their own, but be available to answer questions. Let students do projects that require many different resources. It puts a positive spin on the use of technology in the classroom and is more performance based (S. Padget, personal communication, January 17, 2001).

Expect to modify teaching practices

Not everything that works in the traditional classroom will be successful on the ICN.

Involve the site facilitators in the class

The key factor in maintaining the proper learning environment at any remote site is the palpable presence of a facilitator. Expect facilitators to maintain control and keep students on task. Let them handle questions during group activities. Meet with facilitators during the preparation for any course. Meet with them during the school year as well.

Key on presentation skills

The room

Know the room used for teaching and its inherent limitations. Know what can be seen or not seen from which locations within the room. Be aware of the physical limits to movement. Know what the camera can see and which cameras see what to create proper visuals. Become proficient with the technology. Practice working on the computer, switching cameras, using videotapes and audiotapes, and running pertinent software. Gosselin (1998) suggests never planning a demonstration or experiment that hasn't been done successfully several times in the actual distance education environment. Preparation is the key to making the ICN classroom as much like a traditional classroom as possible. Practice makes the technology transparent.

Technology fails! Have a backup plan for any part of a presentation that cannot be omitted.

The audience

Make students feel part of the class, especially those at the remote sites. Look at the camera to establish eye contact with students at remote sites. Get students to look at the camera when speaking. Make them see each other as individuals. Use students' names in conversation to decrease the sense of remoteness and to pull students into the class.

SMILE!!

RELAX!!

Presentation style

Alter presentational style for televised educational programming (Telg & Irani, 2000). Control gestures. Minimize fast hand movements as they can look jerky over the network. A suggested suitable rest position is one where the hands are at the sides and visible, body weight is evenly distributed with the feet shoulder-width apart and elbows and knees unlocked.

Avoid the talking-head condition. Do not remain fixed behind the podium. Get out from behind the equipment. Don't let the layout of equipment restrict teacher movement (D. Paulek, personal communication, April 4, 2000). Use the clip-on wireless microphone. Move with authority. Move with reason and purpose. But don't move out of nervousness Maintain a sitting or standing position only for short periods of time.

Presenter's voice

Pace instruction to allow yourself to catch your breath. Pausing more often than in a normal classroom will give remote students time to ask questions (D. Paulek, personal communication, April 4, 2000). Goldstein and Goldstein (1993) suggest thinking of the presentation in scenes, each with a point to make. The teacher can use intentional breaks in content to refocus, readjust or recover.

Beware of tone of voice. Lack of visual cues will cause students to rely on the tone of the instructor's voice. Malone, et al. (1997) recommend the use of proactive markers such as "look at this" or "watch me." State each rule, law, and concept clearly. Repeat content three or more times at spaced intervals to aid remembering. This is a perfect opportunity to involve students.

Perform a microphone check prior to each class or as part of the class warm-up or review.

Instructor's personality

Let personality come through. The attitudes and behaviors of the instructor are reflected by the students. At least, appear to be enjoying the experience. Clark (1995) describes involvement skills:

Flexibility. Be prepared to modify anything dealing with the class, from content to technology.

Spontaneity. Can be difficult to enact. Because of the time crunch, much of the course will be orchestrated to daily needs and expectations. But, within the time constraints, reacting to spur of the moment events is quite possible.

Empathy. Be **very** aware of the students' motivations, problems, and points of view about the course and the distance education environment. An open door policy in chat rooms or listservs can provide the means to obtain this vital information.

Compassion. Do not induce extensive stress into an already stressful situation. Be aware of the additional responsibility placed on the student and temper any requirements that overload the ability to respond.

Questioning. Use the ask, pause, call (APC) method of interaction. Suggest the question. Tell students that you are going to give them time to think and formulate an answer. This allows the reluctant student time to actually think and also curtails the overambitious student from clicking in too soon (S. Slechta, personal communication, September 1, 2000). Pause long enough (10-15 seconds) for students to think about the question. Call on someone to answer the question. During the pause switch through remote sites and make a preliminary determination as to the general reaction to the question. This scanning also serves to remind the teacher that those in the room are not the only students involved in the class (K. Reed, personal communication, January 21, 2000). Questions can be directed to a specific students at a specific site which keeps everyone involved, or the question can be given to the class in general, with the answer coming from anyone.

Active listening. Fewer visual cues in the distance education environment, require awareness of not only what was said, but how it was said. Place additional focus on listening, particularly if the audio system is not functioning up to par. Avoid interrupting, provide multiple opportunities for students to speak, and manage the conversation rather than dominating it.

Feedback. Rephrase the response and ask if this was what was intended. Ask for clarification, specification, or in-depth meaning of any student response. Reinforce the thinking and verbal efforts of the student. Provide opportunities for dialogue among sites.

Use humor cautiously

Highly recommended, but can sometimes be misinterpreted, especially early in the course when the instructor is unknown, particularly to remote site students (D. Paulek, personal communication, April 4, 2000).

Share personal experiences

This creates trust and humanizes the experience as well as encourages students to interact.

Clothing and jewelry

Avoid pure white. Avoid extreme light or dark colors. Avoid small plaids/stripes. These tend to create visual havoc when viewed across the ICN. Avoid shiny jewelry as this causes sparkles on camera.

Handling stage fright

Practice giving the presentation in the room that will be used for the actual class. Become familiar with both the layout and the idiosyncrasies of the room. Videotape sessions and review those tapes with an eye toward improvement. Script the presentation using two columns, one for camera switching, and the other for the learning event taking place along with any instructor's notes.

Performing demonstrations

Do labs that are hands on and worthwhile. Insure you have prepared facilitators in advance. Trust the students. Be flexible in the procedure part of the lab. Possibly enlist the help of a teacher at the remote site. If necessary, do the lab as a demonstration (S. Padget, personal communication, January 17, 2001).

Summary

Implementation is obviously critical to the success of any distance learning program. Making the students feel involved in the class takes conscious design of the course elements and focused development of necessary execution plans and materials. However, unless the instructor is comfortable in the environment and is prepared to teach, and to react to circumstances, the planning and creation processes will provide little solace to students. Instructors must practice their craft in this unfamiliar venue to make it more familiar and let their teaching come through.

Chapter 7
The Evaluation Phase

While listed as a separate phase, evaluation actually occurs throughout the entire instructional design process. Because evaluation "should seek to improve both the processes and product of the activity" (Goodman, 1999, p. 4), this involves measuring the effectiveness and efficiency of the design process in general and each of the previously mentioned phases in particular. During evaluation each phase is reviewed to insure it is accomplishing what it is supposed to (Clark, 1995). Then the information gathered during evaluation is used to determine if the course needs modification or improvement or if the course should be continued or terminated (Gillespie, 1998).

Formative evaluation - occurs throughout the instructional design process and provides just-in-time awareness of course deficiencies.

Summative evaluation - occurs after completion of course delivery and provides grounds for determining whether the course needs major overhaul, minor modification, or discontinuance.

Formative evaluation

This is an iterative process that can occur at any stage of the instructional design process, up to and including the implementation phase.

During the analysis, design and development phases

Formative evaluation looks at the results of each phase and determines the efficacy of those results. These evaluations look at such questions as:

– Are the goals and objectives fitting for the grade level and experience level of the intended students?
– Are activities appropriate for the objective? Do they lead toward a skill?
– Are assessments valid for the objective? Do they measure the correct item?
– Are instructions in the syllabus clear and unambiguous?
– Are visuals effectively created? Can they be seen from the back of the room?

During the implementation phase

These evaluations can be used to control such things as the day-to-day content and pace of the course. Here the evaluation looks at:

– Student reaction to the course
– Level of learning achieved
– The effect of the training.
– Learner satisfaction
– Goal attainment
– Assess immediate student needs
– Determining the value of the media used

An important function of formative evaluation during implementation is the necessary increase in teacher-student interaction. With students providing feedback, and being encouraged by the teacher to do so, students will feel they have a hand in constructing their own learning.

Feedback options

1. **Index cards** – use them several times during the course; without names being used; questions like:

How are you finding the course?
What's good about the course?

What's not so good about the course?
Any suggestions for improving the course?
Are problem sets too difficult?
Is the pace of the class causing difficulties?
Are the readings facilitating your learning?
I would like you to do more...
I would like you to do less...
(Meikle, 1999, p. 1)

2. **One-minute papers** - students can, at the end of each class, answer two questions:

> What was the most significant thing you learned in class today?
> What question is uppermost in your mind at the end of today's class? (Meikle, 1999, p. 1)

Reviewing the answers to these questions can provide focus for the next class session and will certainly encourage students to participate in their own learning.

3. **Student portfolios** - envelopes or folders containing those items the student feels represents the best work in a specified list of content or skill areas. The student and teacher can continually update these. These will show proof of progress and encourage the student. They can also be used during parent-teacher conferences to provide improved interaction between teacher and parent and student and parent (K. Reed, personal communication, February 20, 2000).

4. **Videotape yourself** - review the tapes with an eye toward improving presentation skills. Videotaping also shows some of the classroom dynamics not noticed in the heat of delivering the course. Videotape reveals things like overall content flow and what could or could not be seen or heard (K. Fredericks, personal communication, April 6, 2000; K. Reed, personal communication, February 20, 2000).

5. **Email, chat rooms and listservs -** forums for discussion of course and classroom issues. Posting questions for comment and reading the responses are valuable tools for keeping in touch with student perceptions. These also provide interaction on a more abstract level, provide indicators of visual and writing skills, and can be used to develop those skills if part of the course's requirements.

Summative evaluation

This is a look back at a just completed course. It is designed to assess the overall effectiveness of the instruction. Gather student perceptions about assignments, course pace, content and the like and provide impetus to needed changes for future iterations of a course. Summative evaluations can also assess the value of the course in terms of convenience to students and (Welsh, 1999). Additionally, a summative evaluation can be used

(i) to investigate the kind of contexts in which the materials are used, including modes of use, and to identify the contextual conditions which achieve best results;

(ii) to investigate how the materials work when embedded into a variety of learning contexts;

(iii) to establish the perceived success of the products by students and staff under alternative conditions of use in relation to intended outcomes (Hewer, 1999)

Use an ICN conference

At the end of a unit let students apply their knowledge to a different audience. It will help them solidify what they've learned. This is also a perfect opportunity to evaluate the success of that unit of instruction (K. Reed, personal communication, February 20, 2000).

Problems with evaluations

1. **Getting it done**. Too many teachers treat it "as a formality at best, or as an obstacle at worst, and make little serious effort to conduct a useful evaluation" (Beyer, 1995, p. 10). This means that some courses can go years without being overhauled. Teachers need to update their courses continually because the ICN is such a dynamic learning environment (C. Larkin, personal communication, April 6, 2000). No more than two years should pass without changing supplemental materials. As the technology changes the materials should match technology and keep current. There is a need for a commitment to promote change for the better (Nuhfer, 1996).

2. **Sources of input.** Try to get opinions from content experts or colleagues, instructional designers, users, stakeholders such as parents, and others. On a day-to-day basis this is unlikely to occur due to the various restrictions placed on all these parties to handle their individual responsibilities.

> **Use regularly scheduled colloquia** to increase the sharing of ideas across campuses and across disciplines. Discuss what worked, what didn't, alternative methods, and transfer of traditional classroom techniques to the ICN (C. Larkin, personal communication, April 6, 2000).

Do little things differently while retaining important content

Instructional design separates content and strategy. So, modify the methods used to teach from iteration to iteration without varying too greatly the course content. creativity is needed to keep audience enervated with freshness. One teacher says

> To provide education, I need to continually educate myself. I have to look to learn. Then I apply that to the classroom, whether it be new techniques, new material, or whatever. You can't continually take one approach to education and leave it for a certain period of time. You have to mess with it to keep it working (C. Larkin, personal communication, April 6, 2000).

Take action

Of course, once any evaluation is done, action must be taken to deal with the items discovered. This is when instructional design becomes a tool of improvement. Repairs must be made. Updated content must be reacted to. New materials must be developed. New media must be found. The course must emerge in a new and better form.

Summary

Quality does not happen by accident. Conscientious application of a consistent methodology can produce a distance learning experience that will benefit both students and teacher alike.

Section III

Other Guidelines

Chapter 8
General / Miscellaneous Guidelines

Besides all of the insights into the course creation process supplied by the teachers in this study, they also provided several comments that are part of their philosophy of teaching. These are presented here in no particular order.

Have fun!

The dread of being in front of a camera, the awkwardness, the uncertainty and apprehension **will go away**. They will be replaced by comfort being on camera. You will see teaching over the ICN as a normal part of what you do. A celebrity status is gained from being recognized outside of your hometown because of being on the ICN. It brings a sense of connectedness to other communities (K. Fredericks, personal communication, April 6, 2000). It will become similar to a normal classroom, just more spread out to other schools and reaching more students (C. Larkin, personal communication, April 6, 2000).

Be flexible!

TRUST ME – things will go awry. Be ready to deal with adversity in a calm, reassuring manner - reassuring to your students and to yourself.

Collaborate

Teachers helping teachers provides inspiration for moving forward and consolation when things do not progress well. Develop district assistants or facilitators to perform some of the legwork, then create a local team of teachers to handle the details (K. Reed, personal communication, February 20, 2000).

Foster collaboration among teachers in the same subject, but with complimentary areas of expertise. Each teacher would provide depth in a specific area with in the subject thereby using teachers' strengths to support each other. Besides sharing the load, this approach also provides an excellent example of collegiality, which would be a positive learning experience for students (D. Paulek, personal communication, April 4, 2000).

With an increase in teacher-teacher contacts, cross-fertilization of ideas, methods, and successes would increase exposure to the ICN, which should lead to improved abilities. This mentoring process would decrease the number of teachers reluctant to embark on an ICN voyage. As the number of courses increases, fewer teachers will be reluctant to use the technology (C. Larkin, personal communication, April 6, 2000).

Create an online faculty lounge

Share ideas electronically. A listserv is one method that could be used, but a web site with links to teachers' lesson plans, to subject area experts, to special interest areas, and the like could also be quite useful.

Build in opportunities to share across sites

Promote a sharing of society and a sense of social community by allowing students to meet and talk to individuals with whom they were not raised. Foster camaraderie among schools rather than the normal competitive relationships that exist. Give students assignments across sites and insist they discuss topics with students who approach the subject with sometimes quite different perspectives. This interaction will develop social skills, modify behavior, and teach tolerance of the views of others.

Get others involved in the course

A fellow teacher or student can be used to handle the switching between cameras, for example. This will provide training to teachers and familiarize them with the technology in preparation for their own usage. It will train students in the technology, provide skills beyond the subject matter, and get them more deeply involved in the class. This can be an especially effective tactic during interactive projects (K. Reed, personal communication, February 20, 2000).

Move your course out of the ICN classroom

Currently the technology forces the ICN room to be central to teaching. This should be broadened to other classrooms, and even to outside the building. The use of remote cameras to stretch outside the ICN room can make this possible. Some local community colleges have such devices and may be inclined to share them.

Don't give up

It does get easier as skill levels increase. Good preparation and backup plans can erase much of the fear of teaching over the ICN. Individuals willing to do so can learn the necessary skills. Those concerned with purpose of teaching can learn the mechanics and overcome the fear (C. Larkin, personal communication, April 6, 2000).

Appendix A

Points of Contact

The following individuals were instrumental in the creation of this manual and may provide assistance, encouragement, or sympathy, not necessarily in that order!

Kathleen Fredericks HLV Community School District P. O. Box B Victor, IA 52347-0902 kfredericks@hlv.k12.ia.us	German I-IV 8th grade exploratory German. Her ICN classes are German I and II
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Sharon Padget Cardinal High School 4045 Ashland Rd. Eldon, IA 52554 padgets@aea15.k12.ia.us	Microbiology, Bioethics, Biochemistry
Dave Paulek VanBuren High School Rt 1, Box 39C Keosaugua, IA 52565-9801 paulekd@aea15.k12.ia.us	Soph - Honors English Jr - Honors Composition, American Literature, and Speech & Writing Sr - Speech & Debate, AP Comp (Language and Literature), Mass Media
Kim Reed Madison Elementary School 1341 Woodside Dr. NW Cedar Rapids, IA 52405 kreed@esc.cr.k12.ia.us	4th and 5th grades

Appendix B

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Appendix G

Field Test Feedback Form

Please answer, as completely as possible, the following questions as they apply to your use of the manual titled "Guidelines for Creating Courses for Delivery over the Iowa Communication Network."

1. Did you use the manual during the development of a course?

   [ ] YES

   [ ] NO

2. Would you recommend this manual to a colleague?

   [ ] YES

   [ ] NO

Part I.

1. On a scale of one (low) to ten (high), how would you rate the usefulness of this manual?

2. On a scale of one (low) to ten (high), how would you rate the relevance of this manual?

3. On a scale of one (low) to ten (high), how would you rate the clarity of this manual?

4. On a scale of one (low) to ten (high), how would you rate the completeness of this manual?

Part II.

1. Is there anything missing from the manual that should be included?

2. Were any parts of the manual unclear?

3. Which parts of the manual do you consider most relevant?

4. Which parts of the manual do you consider least relevant?

5. What did you like about the manual?

6. What did you NOT like about the manual?

7. What is your overall opinion of the manual?

Appendix H

Letter of Acceptance

Iowa Public Television

A Resource for Iowa's Future

6450 Corporate Drive • P.O. Box 6450 • Johnston, IA 50131
Phone: 515-242-3100 • Toll free: 800-532-1290
Web site: www.iptv.org

July 16, 2001

Gary Hasman
325 W. Third Street
Lamoni, IA 50140

Dear Gary:

I am in receipt of the manual "Guidelines for Creating ICN Classes" and have reviewed the document. I am pleased to accept the document as a completed project.

The manual meets the original goals that you and I discussed in our previous meetings. It provides a concise source of information needed by teachers and their administrators in their efforts to deliver distance education via the Iowa Communications Network (ICN). I believe that the manual will serve as an impetus for distance learning educators as they share their insights and experiences in using the ICN.

I intend to share the manual with various audiences. First of all, members of the Education Telecommunications Council (statewide 18-member education advisory board) will receive electronic copies. Second, members of the 15 Regional Telecommunications Councils will receive electronic copies. Third, I will distribute to all the Area Education Agencies (the intermediate agencies servicing K-12 schools). I anticipate that the document will also be used by others in our state such as higher education institutions and state agencies as they prepare educators for use of the ICN.

On behalf of Iowa distance learning educators, my thanks for your work in creating this document. As we all recognize, there are new teaching assignments every school year and many of our ICN teachers will experience distance learning for the very first time. This document will be very useful for them.

Sincerely yours,

Pamela Pfitzenmaier

Pamela Adams Pfitzenmaier, Ph.D.
Director, Educational Telecommunications

P4211.doc

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