A design for implementing a simulation for training school principals in decision-making utilizing videodisc technology

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A DESIGN FOR IMPLEMENTING A SIMULATION FOR TRAINING SCHOOL PRINCIPALS IN DECISION-MAKING UTILIZING VIDEODISC TECHNOLOGY

by

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in the Department of Educational Services at the University of Central Florida Orlando, Florida

August 1993

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ABSTRACT

The purpose of the study was to design a simulation using a personal computer-based authoring system that could serve as a vehicle for investigating decision-making styles of educational administrators. The program was designed to be used at the graduate level for students seeking advanced degrees in educational leadership. The simulation makes use of simulation techniques for controlling presentation of material and data collection for subsequent analysis about information search and utilization procedures of administrators.

The study was undertaken to demonstrate that nontechnical personnel using state-of-the-art technology could develop affordable and effective multimedia simulations. The study was also designed to demonstrate that technology was sufficiently advanced that time to develop such a program would not preclude its use.

Data were gathered from seven graduate students attending a introductory graduate course. Other sources of data included practicing university professors, district administrators practicing principals. Data were gathered using a survey and personal interviews.

Results of the survey indicated that respondents found that the technical approach was innovative and could be
useful in teaching graduate students how to be better principals. District administrators expressed interest in using the program to evaluate candidates for beginning principalships.
DEDICATION

This dissertation is dedicated to my family, especially my wife Marie, for their patience and understanding while I pursued this arduous but rewarding task.
ACKNOWLEDGMENTS

I wish to express my appreciation to Dr. William C. Bozeman for his support and assistance throughout the duration of this study. I am also grateful to Professor Kysilka for the time she spent assisting me.

Finally, I would like to give special thanks to my wife, Marie, who encouraged me to continue during periods of extreme frustration and my sons, Travis and Brad for their understanding and tolerance of a sometimes impatient father.
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CHAPTER I

INTRODUCTION

New demands are constantly being placed on educational leaders by the community, local, state and federal governments, and special interest groups. Each of these forces has the potential to make educational governance increasingly complex. Demands for fiscal accountability and improved educational performance are forcing school administrators to make difficult decisions; however, decisions are often based on insufficient or inaccurate information. Not only is information critical to the decision-making process, but it is also one of the most difficult variables to describe and understand. Administrators must identify relevant information required in order to arrive at an informed decision, given the specific situation.

Researchers have attempted to discover relationships between information and decision-making by field and laboratory studies. Problems associated with both methods make their findings and use controversial. Often, field studies are hindered by informal information sources that are extremely difficult to identify or evaluate. Laboratory studies require trained observers to evaluate subject performance and can be an expensive process.
This study was concerned with the development of a simulation using a personal computer authoring system that could serve as a practical tool to evaluate training effectiveness of a given program of instruction; serve as a practical application during a course of instruction; and lastly, serve as a vehicle to evaluate decision-making techniques. To help in the development of this simulation, features from three existing simulations were particularly valuable. These simulations were:

1. Selected materials from *Principal as Chief Executive Officer* by Dubin (1990).


3. Test issues from *A Comparison of Affective Reactions Exhibited by Participants in Administrative Simulation* by Stahl (1968).


This chapter outlines the simulation design indicating the purpose of the study and states major problems involved. In addition, Chapter I identifies the significance and limitations of the study and includes definitions of major
terms, a description of the simulation and an overview of the remaining chapters.

This simulation was designed to provide a fully documented procedure for using current multimedia software and hardware. The simulation also demonstrated that technology is sufficiently advanced for educational administrators to use in developing their own programs economically.

**Purpose of the Study**

The purpose of the study was to design a simulation using a personal computer-based authoring system that could serve as a vehicle for investigating decision-making styles of educational administrators. The program was designed to be used at the graduate level for students seeking an advanced degree in Educational Leadership, or by newly appointed assistant principals or principal interns. The program made use of simulation techniques for control presentation of material and for data collection or for subsequent analysis about the information search and utilization procedures of users.

**Statement of the Problem**

The simulation was developed to satisfy three objectives. The first objective was to provide a practical application of the simulation technology in conjunction with a course at the graduate level in decision-making and
educational administration. This simulation could be part of a course that is exportable to other sites to train assistant principals or other administrators. To satisfy this objective, the simulation was designed to present a typical problem that an educational administrator might encounter. The simulation presented the problem in a non-threatening manner and was designed to be a training vehicle used instead of real-world situations thus avoiding potential legal, financial, emotional and administrative problems that could arise in the event that incorrect decisions were made in actual cases.

The second objective of this simulation was to provide a means of evaluating results of learning after a block of instruction was provided on decision making. The simulation was designed to provide feedback to subjects and instructors based on subjects’ responses. Feedback can be used to evaluate which decision-making components were used by subjects and to identify what information sources were used and what decisions were made. Based on how the class was structured, spontaneous feedback could occur as subjects selected various information sources and as information was provided. Also, feedback could help instructors in evaluating curriculum and modifying courses to reflect the level of student cognition.

The instrument was designed to present an administrative situation in a coherent manner. Subjects were given the
opportunity to seek additional information before making their decisions. The instrument was designed to record the information request, the sequence for each subject in each scenario, and subjects’ decisions.

The third objective was to explore the latest multimedia technology available to educators, the feasibility of using multimedia, costs and time involved, and to provide a well-documented procedure for using this technology. This objective was achieved by providing a literature review, functional flow block diagrams, project schedule, actual costs and source code. This objective was also met by discussing decision-making theory.

Decision making is the process of receiving information from one or more sources, analyzing the information and then making a conscious decision to take some form of action. Decision making is a major reason for administrators’ existence.

The design of the simulation was based on its inherent data collection capability to provide a means to examine decision-making in several key areas. Inherent in the decision-making process is the ability to collect and analyze information. As the situation develops, the subject begins seeking information to make an informed decision. For purposes of this simulation, information may be obtained from any or all the following sources: files, teachers,
students, parents, subject matter experts and policy manuals.

Once the decision-making process begins, the subject can make a decision without further input or can search for additional information until he/she is satisfied that either sufficient information was presented to make a decision or no additional information is available. As part of this process, several information characteristics impact both organizations and administrators:

1. Who does the subject talk with to get additional information? That is, does the subject seek information from peers, subordinates, students, parents, files or subject matter experts? Some subjects will habitually use the same sources despite the situation while others will use different sources based on facts as the subject understands them. Therefore, information concerning sources used by the subjects was captured by the software.

2. What sequence will the subject use in seeking information? That is, does the subject go to peers first, subject matter experts second, files third, etc.? If there is a pattern of sources sought, what is this pattern? Therefore, sequence information also was captured by the software program.
3. How much information is sufficient to make a decision? Some subjects will gather all the information available and ask for more, while others will use very little information available and rely on their experiences, while others will ask for an amount of information somewhere between these two extremes. Therefore, quantity of information sought also was collected by the software.

4. What decision was made? In this simulation, there are six forced responses: (a) do nothing; (b) give a written reprimand; (c) give a verbal warning; (d) fire the teacher; (e) send the problem to the superintendent; and (f) give a written warning. The choice each subject selected was recorded in the software program. The information recorded in the software program was reviewed to identify trends based on the subject's background, years of education, sex and present job.

Decision making is influenced by such factors as attitude, moral values and community pressure. Also, the decision maker is influenced by intelligence, experience, biological variables and needs disposition. While these variables will be discussed, investigation of these variables is beyond the scope of this study.

Lipham (1976) defined decision making "... as a process, influenced by information and values: whereby a
perceived problem is explicitly defined, alternative solutions are posed and weighed, and a choice is made that subsequently is implemented and evaluated" (p. 2). Lipham's operational model is presented in Figure 1.1 and identifies the following concepts: process, problem awareness, information, values, perception, alternatives, choice and estimated outcomes.

An objective of this study was to develop a simulation vehicle that recorded from whom participants sought information for a scenario, what information was sought, and what sequence for data collection was used by the decision-maker before making a decision. Lastly, the decision on a course of action also was collected. To accomplish these goals, the following activities were required:

1. Develop a scenario to present to subjects. The scenario was unique, yet a typical problem faced by school administrators.

2. Build a database consisting of a videodisc and computer monitor presentation of information to be provided participants based on their requests for information.

3. Develop a videodisc-based feedback scenario for the problem. The presentation briefly identified kinds of information that participants should have gathered, questions that should have been asked and some issues to consider before reaching a decision.
Figure 1.1. Model of the Decision-Making Process

4. Develop a means to capture decision-making information for each subject. This included capturing such things as subject name, age, sex, years of education, previous years of experience, present position, sequence of data collection, quantity of information collected and the selected solution. Some of this information was captured by the computer program before the scenario was presented. The sequence of data collection, quantity and solution were captured as the subject worked through the decision process.

5. Develop a user manual for the simulation that made the instrument an exportable package.

Technical activities were supplemented by the following educational objectives:

1. This simulation was designed to provide training opportunities for current and future educational leaders as part of a graduate course. This was accomplished by providing a realistic scenario that an administrator could expect to encounter at a school. The scenario was selected after discussions with practicing middle and high school principals in central Florida. Using this simulation and appropriate decision-making principles learned during the course of instruction, subjects will select an appropriate decision based on partial
situations presented. This simulation should provide some understanding of the decision-making process and identification of relationships between the information search and retrieval processes and the decision-making process. The simulation can be used to introduce a course of instruction, be a follow-up to points made during a class, serve as the central focus of a course, be a wrap up or conclusion to a course, or as a final assessment.

2. This simulation can be used to provide current and future administrators with a baseline to identify search procedures and decision-making skills with their predecessors and peers.

3. This simulation can serve as a test bed for evaluating current curriculum and delivery processes for decision-making techniques, or the impact of new instructional delivery techniques.

Based on feedback resulting from each objective, subjects can adjust their decision-making processes in order to take advantage of available information and to improve their decision-making skills.

**Significance of Study**

Organizations are influenced by decisions that leaders make. According to Hallinger and McCary (1991), "... research conducted over the past 20 years and the informed observations of practitioners suggest that principal
leadership is critical to school improvement" (p. 89). Yet, the decision-making process is little understood and difficult to simulate. Many theoretical studies and models have been undertaken to describe the process. Results of these studies reveal that information, or lack of it, significantly affects the quality of the decisions made. Hallinger and McCary (1990) stated:

Analyses of principal preparation programs have identified serious deficiencies. These include inadequate skill development, poorly designed opportunities for practicing leadership tasks, limited course work related to teaching and learning, and dysfunctional socialization that renders the aspiring administrator helpless in the real world of school administration. These shortcomings in administrative preparation programs have been cited as a contributing factor to the inadequate curricular and instructional leadership provided by many principals. (p. 90)

The significance of this research was further supported by Wilburn (personal communication, September 3, 1992) who stated that little work was done to develop decision-making simulations for educational administrators.

Information can be divided into information relevance, flow and amount. Hallinger and McCary (1990) reported that information relevance is the value that the information takes. That is, is the information important because it can prevent loss of life, limb or other catastrophic damage to people, facilities or records, or is it routine or even unimportant? Flow refers to the source of the information. Lastly, amount refers to how much information the subject
received. This can be measured in terms of number of pages, number of important points or time to read and comprehend.

The three variables lead to information acquisition and utilization processes. Generally, the greater the uncertainty, with other things such as time and external influences being constant, the more information is sought by the decision maker. The objective is to reduce the risk of making a wrong decision. If a decision maker knows how decisions are made, then it might be possible to design a simulation vehicle to improve the decision-making process.

**Limitations of Study**

The computer simulation developed for this study was designed to be a model for investigating information uses and decision-making processes of school administrators. An attempt was made to create realistic situations that administrators might encounter. The model was not designed to be a complete depiction of reality as there were too many variables to accomplish this task. The following limitations applied to the study:

1. The database and videodisc provided only a subset of all the information that may be available for the situation presented. This may channel the true information search technique which subjects use in a particular direction.

2. The simulation subject was removed from the normal school setting. This new location may adversely
impact the decision-making process by removing stress normally associated with making decisions in a real life environment.

3. The information available to the subject was easier and faster to obtain than could be expected in the real situation. The ease and speed with which information was provided may adversely affect outcomes of the simulation because subjects may review more information than under similar real-time situations.

4. Subjects were provided only a few programmed choices. These limited choices may not adequately reflect all possible decision solutions.

5. This simulation was not designed to be an ultimate simulation for evaluating educational leaders. It was used to demonstrate that a simulation could be created and used effectively to evaluate results of training, to provide a practical application in a coordinated block of instruction concerning decision-making, and lastly, to evaluate student learning outcomes.

Definitions of Terms

The following terms are critical to this study:

1. Authoring software--LinkWay (Kheriaty, 1990), the authoring software used for this study, is a commercial software package designed to create
multimedia applications that can be used to create interactive courseware for education and training on an IBM compatible personal computer. LinkWay, Version 2.01 was selected because it has powerful applications, meets capability requirements for developing software and was available. This program can run on a 286 central processor unit without Windows. Schools that have IBM compatible computers would be able to run this program on their equipment. Additionally, LinkWay's run time files and distribution license are included so that distribution of the final application within educational circles can be provided at no charge.

MS/DOS Version 5.0 was also used.

2. **Multimedia**--According to McCarthy (1989), interactive multimedia can be defined as the integration of text, audio graphics, still images and moving pictures into a single computer controlled product. The goal of multimedia is to present information in a synergistic manner so that learning occurs. Neither quantity nor the types of multimedia tools used in teaching is significant. The important point is that the media selected presents the instruction such that the student can learn. Multimedia includes not only software, but
such materials as videotape, videodisc, computers, film, CD-ROM and slides.

2. **Simulation System**—A system consisting of the authoring program and the following hardware components: personal computer (PC) (286 CPU minimum) with keyboard, mouse, color monitor, controller cards, and associated cables. The delivery and recording systems consisted of a 286 or better PC with a 40 megabyte hard drive, one megabyte of random access memory, a standard 101 keyboard, mouse, VGA monitor, videodisc player with monitor and a printer. The PC has appropriate controller cards and cables to drive the printer and videodisc player. The videodisc player was a Pioneer, Model 2400 videodisc player used to present the various scenes on the separate monitor.

**Simulation Description**

The simulation program has five main sections: Introduction, Biographical Data Collection, Scenarios, Database and Decision Analysis. Appendix A contains flow charts for the simulation; Appendix B contains source code listing and screens; Appendix C contains the sample run; Appendix D contains the sample questionnaire; Appendix E contains the consent form. Appendix F contains the script. The diskette and videodisc are in Appendix H. The following
paragraphs briefly describe each of these five main sections.

**Introduction**--This section provides subjects basic information about the school environment to help understand the scenario to be presented later. This section also contains necessary user information such as how to start, stop and replay the simulation system. Instructions include information on mechanical operation of the simulation system.

**Biographical Data**--This section consists of collecting information such as subject name, age, experience, education level, current job title and years in position. This information was used to identify respondents as a part of the after-action review process and to identify trends in leadership styles.

**Scenario**--The scenario is the heart of this simulation. This section contains the problem statement that requires subjects to seek information and make decisions concerning what additional information to seek and what decisions to make.

**Database**--This section contains data necessary to process information for the scenario. Subjects can conduct information searches during this phase of the program by selecting short vignettes that provide additional information from a peer teacher, problem teacher, union representative, students, concerned parents and a committee.
Their selections, selection sequence and decision are recorded in this database.

**Feedback**--This section provides visual and aural critiques of actions subjects should have considered in the decision-making process. This section was recorded by actors on the videodisc to represent a group of subject matter experts that briefly identify salient points in the scenario to help in the decision-making process.

The sequence for the simulation was as follows: Upon initialization, subjects were provided basic information on the computer and peripheral equipment that was used in the simulation. Following the introduction, biographical data were collected. Data collection was accomplished by presenting questions on the screen and collecting responses through subject input on the keyboard. These two sections were presented only once to each subject. Biographical data were collected and stored in a data file and a computer printout to be accessed by the instructor after the program was completed.

The scenario section started with the problem situation being presented to subjects using the videodisc and monitor. Subjects were instructed to review the scenario and then to follow instructions on the monitor. At this point, subjects had several options. One option was to collect information from the following sources: parent, problem teacher, committee, problem student, peer teacher, peer student,
union representative, teacher records or policy manual. During this phase, three other options were presented: (1) to make a decision, (2) return to the beginning of the scenario or (3) return to the beginning of the program and then exit the program. When the subject selected "make a decision," the program presented six choices: (1) do nothing; (2) give a verbal warning; (3) give a written reprimand; (4) fire the teacher; (5) give a written warning; or (6) send the problem to the district superintendent. All decisions were mutually exclusive. Results of the information search and the decision selected were recorded in the database for later review. Each choice, except "do nothing" resulted in a short video sequence that provided possible results of that choice.

The scenario consisted of a situation where complaints about a beginning teacher came from parents, students and the department chair. The subject was expected to make an information search to find additional information that may help in the decision-making process. Following the information search, the subject was asked to pick one of six actions. The selection was made via keyboard input. Then, a videodisc scene appeared to provide the reaction to the decision. The subject's response was recorded at this time. This concluded the scenario.

The last part of the simulation was the feedback phase. This phase provided a means of reinforcing salient points of
the decision-making process and provided feedback to the subject concerning what information should have been gathered. Feedback consisted of a brief videodisc sequence with comments by two actors representing subject matter experts. The sequence of information searches, personnel contacted and the decision choice selected were monitored to identify styles of subjects' decision-making behaviors.

Attempts were made to classify decision makers according to information acquisition and procedures they used. According to Barrett (1972), heuristic decision makers use trial and error procedures to obtain information and tend to take immediate action rather than to analyze the situation thoroughly. Analytic decision makers tend to use clearly defined information search patterns and try to find all possible solutions to a problem before taking action.

Schmidtlein (1975) separated decision makers into comprehensive/prescriptive and incremental/remedial classifications. The first classification used operations research techniques while the second group was more concerned with social implications of decisions. The second group was more concerned with the stability of the organization and ensuring that unwanted behaviors did not result from the decision.

Personality factors that affect decision-making ability are confidence, self-esteem and dogmatism. Reitz (1977) reported that confident people with high self-esteem tended
to differ from less confident people in the way information was processed. People with high confidence tended to make decisions faster than those with lower confidence levels. Researchers have long suspected that there are differences between highly dogmatic people and people that are less dogmatic. Yet, the evidence about effects of dogmatism is not conclusive. Research suggests that the differences concerned acceptance of information. High dogmatics tended to accept information because it was endorsed by experts while low dogmatics tended to reject expert opinions.

These efforts established a close relationship between information processing and decision-making behaviors. This study was essentially designed to demonstrate that multimedia could be used effectively to teach administrators how to make decisions and to observe decision-making behaviors used by administrators.

Overview of Chapters

Chapter II provides a review of literature relating to simulation and its applications in the fields of government, business and education, and details important simulation instruments. Chapter III provides a comprehensive description of the simulation program and details data collection and reporting procedures. Chapter IV presents a historic description of the simulation development. Chapter V contains summaries of user comments depicting how well objectives of the study were accomplished, concluding with a
statement concerning implications for further research and study.
CHAPTER II

REVIEW OF LITERATURE

In this chapter, a review of literature relating to simulation is provided. First, the term is defined, then a classification of simulations is presented. In addition, this chapter contains a discussion of simulations used in government, business and educational environments; the use of computers in simulation development; decision theory and research applications of simulations. The chapter concludes with an enumeration of advantages and disadvantages of simulation.

Definition of Simulation

According to the American Heritage Dictionary (1976), to simulate is to have or take on the appearance, form, or sound of; imitate; and a simulation is the act or process of simulating. According to the International Simulation and Gaming Association (1986), a simulation is "a working representation of reality; it may be an abstracted, simplified or accelerated model of the process. It allows students to explore systems where reality is too expensive, complex, dangerous, fast or slow" (p. 10).
According to this definition, simulation can range anywhere from a game, to role play, to a computer simulation. Indeed, several researchers talked about gaming and simulation, or role playing and simulation or simulation and gaming (Butler, 1988; Heitzman, 1987; Henson, 1982; Locatis & Atkinson, 1986). Jones (1987a & b) defined simulation as "... the untaught events in which the participants have roles and are required to accept the responsibilities and duties of professionals" (p. 17).

There is no clear definition of simulation. Each author defined simulation in an unique way, but all definitions take the form, "Simulation is an _________ of a ______________." The two blanks may be filled in with different words or phrases, but with similar meanings. The first blank is typically a process, such as a research technique or a decision-making exercise, and the second blank indicates an entity, such as an organization.

According to Jones (1987a & b), simulation dates back to Spartan war games and continues to serve the military as a means of investigating problems and practicing the art of waging war. Recent interest in simulation identified many factors that are of interest in simulation. The ever-increasing complex societal structure, the environment, the aircraft industry, military and business all used simulations to try to model reality and estimate the impact of proposed actions. Perhaps, one of the most familiar uses
of simulations is in the aircraft industry where it is used to train pilots without placing them in life-threatening situations.

Although early simulations were used primarily as training tools that enabled people to acquire skills that would be dangerous to learn, hazardous to the environment, or too costly to do, simulation is not limited to these functions. Indeed, much research exists that discusses using simulations in government, business, and education.

Simulation in Government

According to Jones (1987a & b):

The first organized use of simulation is usually attributed to the Prussian army in the nineteenth century. It occurred for behavioral reasons. The Prussian army had been dissatisfied with the recruitment of officers, and decided that the interview and the pen and paper tests were not enough. Consequently, they devised simulations to test behavior. Instead of asking 'How would you cope with situation X?' the idea was to place the person in that situation, as far as was practical and desirable, and see what happened.

The idea was later taken up by the British Army. All sorts of behavioral situations were derived in which the candidate had roles - officer, survivor, agent, engineer. These were tests that revealed varying degrees of ingenuity, co-operation, leadership, courage and other aspects of military life. The simulation techniques were also widely introduced into military training. At one time, all simulations in the army were military action simulations, but recently management simulations have been introduced in Britain, West Germany and some other countries. Army officers participate in simulations that deal with such matters as the design and procurement of weapons, and participants may take the role of officials in the Ministry of Defense, commercial companies that manufacture weapons and so on. (p. 19)
Specific examples of the military’s interest in simulators goes back to the first simulator built to teach pilots how to fly airplanes built during World War II. This simulator was designed to teach pilots how to use the controls in the aircraft that they were learning how to fly. This simulator fit the classic definition of a simulator in that it taught people a job that was too dangerous and costly to learn in the real world.

The success of this simulator led to development of other war games and simulations designed to teach pilots not only how to fly, but how to use tactical maneuvers in air-to-air combat. Results of these efforts can be seen in the success of the Link aviation trainer. The Link trainer was a training device designed to train pilots to fly airplanes and was built by the Link Company for the Navy during World War II. With the development of high resolution graphics and faster computers, the world of flight simulators has expanded to a multi-billion dollar business.

The military used simulations to train soldiers in the art of war using such simple devices ranging from a sand box with stick figures to such sophisticated simulations that include global warfare simulations played on Cray computers. As technology provided the capabilities, the military was quick to lead in the development of simulations to train personnel how to fight (combat simulators), how to repair equipment (maintenance trainers) and how to operate
equipment (driver trainers, conduct of fire trainers, flight trainers, ship trainers). All simulators were designed to provide effective, realistic training at reduced cost and in a safe environment.

Simulators such as the Battalion/Brigade Simulator (1986), Division Battle Simulator (1986), Corps Battle Simulator (1986) and the Close Combat Tactical Trainer (1989) were designed to teach units how to fight together on the integrated battlefield. The Navy has both shipboard and dock side trainers that provide training opportunities to crews while at sea or while in port. Simulators range in size from several personal computers with enhanced graphics capabilities to large mainframe VAX computers with over 100 work stations.

Other simulators were designed to teach crew skills. These included such simulators as aircraft simulators discussed previously, the Army’s Conduct of Fire Trainer, various driver trainers and various maintenance trainers. Each simulator was designed to teach part of the tasks or skills that soldiers need to do their jobs.

With ever decreasing budgets, the military found that simulators can be a low cost, highly effective means of providing adequate training for highly technical tasks and for command and control of large forces. Indeed, during Desert Storm, the Army rushed several Conduct of Fire Trainers to Saudi Arabia so that tank and infantry crews
could practice gunnery before the war started. The military also used simulations to war game possible scenarios that could involve the military anywhere in the world. Simulations are used to find the best courses of action and anticipate what might happen given a possible situation. Results of these simulations help to develop foreign policy and force structure issues.

Simulations are also used by the military to train reactions to various situations. Examples include video taped scenarios that require the individual to react to a situation. Scenarios in the real world may be life threatening, while others may require no action at all, or a reaction somewhere between the two extremes. According to Dr. Cannon-Bowers, a Behavioral Psychologist at the Naval Training Systems Center in Orlando, Florida (personal communication, September 3, 1992), the military was very interested in using simulations to study how leaders and groups reacted to life threatening situations. Much of this work concentrates on information processing and rapid decision-making. For example, studies are being conducted by the Naval Training Systems Center to identify information processes used by a ship’s command and control center when under attack from a missile. The goals of the studies are to identify critical information sources and decision-making processes that will optimize the probability that the team
will make the correct decision in a matter of minutes or even seconds.

In summary, all branches of the military have relied on simulations extensively to train hard-to-train, hazardous or costly tasks. Other government agencies such as the Federal Bureau of Investigation use simulations to train agents to react to various situations that may be too dangerous or difficult to create in the real world. A primary purpose behind the simulations is to teach personnel how to make decisions in life threatening situations.

**Simulation in Business**

Moody (1960), Heinlein (1973) and Yelon and Desmedt (1988) wrote about how to create decision-making models and simulations. Thavikulwat (1988) discussed educational games that can be configured to allow changes in the structure of a business simulation. Hunt (1990) discussed design criteria and educational objectives of computerized business games when used as an adjunct teaching method to simulate the management environment. Both Kurfman (1977) and Kerchner (1990) discussed development of simulations to teach decision-making skills. There are many other examples of simulations that were developed or conceptualized concerning how to make decisions in the business sector. Some of this work focused on such areas as industrial and labor relations (Coghill, 1971), economics (Robinson, 1985), manufacturing (Law, 1991), decision support systems (Jauch,
1989), and personnel management (Arche y, Ziff & Walker, 1970).

Zuckerman's (1980) *The Guide to Simulation Games for Education and Training* is a definitive source of simulations for business, education and other topics. Business simulations can last only a few hours to several months depending on the topic and application. Likewise, a simulation can involve from a few subjects to an entire class of 30-50 students. Each simulation has the same purpose, to provide an opportunity for the subject to experience stresses and situational factors that occur in the real world but under controlled conditions.

Franklin (1990) in "Are Microcomputers Useful in Management Education" in the *Journal of Systems Management* argued that microcomputers will play an increasingly important role in learning as well as doing management. Hunt (1990) in "Developing a Design Philosophy for Business Games" discussed the design criteria and educational objectives of computerized business games. Hsu (1989) in "Role Event Gaming Simulation in Management Education: A Conceptual Framework and Review" discussed the role of management games in management education. Raybould (1990) described the design of an electronic performance support system to help sales and support personnel access relevant information to improve job performances. This included review of expert systems, databases, interactive video
discs, information retrieval techniques, HyperCard, computer-based training and simulations.

Simulations were designed to teach decision-making skills. However, other simulations were designed to measure flow such as transportation simulations and production flow exist. Flow simulations are used to predict the impact of modifying a particular aspect of the flow of the items under study. Flow simulations are also used to make decisions concerning mixture, location of machines or traffic patterns, etc.

Simulation in Education

Butler (1983) in Games and Simulations: Creative Educational Alternatives discussed the effectiveness of using simulations and games as alternatives to traditional approaches to learning. Butler discussed the use of games and simulations at the community college level that pertain directly to the business world. Jones (1985, 1987a & b) wrote several books on how to use simulations in educational settings from elementary through postbaccalaureate levels. Jones strongly recommended using simulation in elementary, high school and college courses. In addition, Jones believed that the basic reason for using simulations was to permit the subject to make mistakes. He reported that simulations were experiential learning, not programmed learning or a rehearsed event; it was not essential for simulations to have clearly defined objectives. According to Jones, some
of the most famous and effective simulations were educationally ambiguous; the process was far more important than the end product.

Cruickshank (1970) and others presented examples of simulations that could be used at all levels of education, as well as simulations that can be used to train teachers and administrators. Perhaps the best work in this area of what simulations can do to help teach teachers and administrators is Cruickshank’s (1970) *Simulation as an Instructional Alternative in Teacher Preparation*. Cruickshank discussed the use of simulations in preservice and inservice teacher education and identified advantages and disadvantages of using simulations in inservice and graduate education programs.

Much work was conducted by Amberton and Hooper (1988) in identifying roles and uses of hypermedia and hypertext in developing simulations and games that can be used in the classroom. Much of this literature was geared towards practical applications in elementary, and to a lesser extent, secondary school levels. Blanchard and Rottenberg (1990) provided introductory material concerning what hypertext and hypermedia were and how they can be used in the classroom. Franklin’s (1990) *A Bibliography on Hypertext Continues: HyperCard Stacks* provided an excellent resource for finding HyperCard resources that can be used to develop computer based simulations and games for students.
Friedlander's (1989) "Moving Images into the Classroom: Multimedia in Higher Education" discussed use of complex visual events in the classroom using videodisc and HyperCard technologies. Beck (1989) in "Hypermedia in Academia" briefly reviewed origins of the hypermedia concept and commented on its use in higher education. Pirolli and Russell (1990), Barker (1990) and other researchers discussed instructional design considerations and techniques to include detailed steps, discussion of advantages and disadvantages of various hardware components and various software tools.

Locatis and Atkinson (1986), in "Designing Instructional Simulations: Heuristics and Training College and University Faculty" provided recommendations for procedures to train college and university faculty in the fundamentals of simulation design using short training programs. Henson (1982) in "Simulation Games and Teaching" reviewed literature concerning advantages and uses of simulation games as a mode of instruction and offered guidelines on developing such simulations for classroom use.

All researchers addressed the use of simulations and games at various levels of the educational spectrum. Each presented the researcher's own perspective on what constituted a good simulation and good use of new technologies. Yet, no researcher addressed simulations with
a view to meeting needs of beginning principals or graduate students majoring in school administration.

According to Hallinger and McCary (1990):

Principals report that their academic coursework seldom prepares them for the problems and decisions they encounter in their work. On the contrary, they perceive on-the-job experience as their most important source of learning.

There is, however, no reason to believe that experience alone makes principals more effective. The nature of the principal’s work environment and job activities impedes the principal’s ability to learn from experience. As noted previously, school administrators work in organizations that are characterized by particular high ambiguity. Many of the most important problems principals encounter are ill-structured and involve uncertain information, shifting goals, and conflicting values.

These features of managerial work require principals to become problem finders, strategic thinkers, and problem solvers. Few administrative training programs, however, focus on the development of these skills. (p. 94)

Allison and Nagy (1991), "A Study of Principal Problem Solving: An Introduction to the Study" reported on administrative problem solving and listed types of problems administrators must solve and differences between educational administrators and nonexpert administrators in solving problems. The primary purpose of the paper was to compare these differences. Daresh’s (1986) Coming on Board: Characteristics of the Beginning Principalship also presented typical problems that first- and second-year principals encountered. One developmental need identified in this paper was the need for beginning principals to experience the world of administration before they assumed
duties and responsibilities associated with the position. Nilsson (1987) addressed this training need when he discussed similarities between training school administrators and business administrators in "Training School Administrators: Learning from Current Practices of Business and Industry".

Hallinger and McCary (1990) also discovered that:

. . . principals of instructionally effective schools (1) are more knowledgeable about school improvement and effective teaching practices, (2) employ a different problem-solving orientation, and (3) are better able to apply their domain-specific knowledge to improve schools.

Institutions charged with principals' training and development must find ways to teach information that makes the connections among research, theory and practice more evident and applicable to the practice of administrative leadership. Research has found that a traditional lecture mode of instruction is relatively ineffective at impairing knowledge that tends to be transferred across contexts. (p. 95)

Hallinger further stated that:

In order for transfer to occur, learners must also have an opportunity to examine how and under what conditions to apply the knowledge. This relates clearly to our concern regarding programs that seek to train administrators in behaviors that effective principals employ. Such programs teach what effective principals do, but tend to neglect how or why they do it.

This leads to the last factor we consider here with respect to transfer. Transfer is promoted when student have the opportunity to apply knowledge to relevant problems. Classroom problems are usually presented as clearly defined and well structured, with the alternatives and results necessary to solve the problems include in information provided. Real life problems, however, are seldom clear-cut. Often information is lacking, and critical features of the problem may not be immediately apparent. Transfer can be promoted by embedding knowledge and skill
acquisition in learning contexts that are similar in significant ways to the problems learners encounter outside the instructional context.

A recurrent problem in management education is how to design opportunities for students to apply their learning under conditions that promote transfer. Recent research and development efforts suggest the promise of problem-based approaches to learning in a variety of fields, including educational administration. (p. 96)

The need for a simulation to aid administrators in gaining experience before actually assuming their roles is apparent. Several efforts were developed in the recent past to satisfy this need. Birnbaum (1982), in "Games and Simulations in Higher Education," Tanner and Holmes (1985), in Microcomputer Applications in Educational Planning and Decision Making, and Tucker (1990) "Training University Faculty to Integrate Hypermedia into the Teacher Training Curriculum" provided part of the solution to this training need by discussing how simulations can be used to assist in training administrators, or how to include simulations in a traditional classroom environment.

Hallinger and McCary (1990) identified two key learning transfer features: knowledge acquisition in a situation close to real life, and using problem-solving to teach subject matter. According to Hallinger and McCary (1990), "... students were more likely to apply their learning to relevant problems when they had acquired new information in related problem-solving contexts ..." (p. 97). Also, according to Hawley and Rosenholtz (1984), "Research has
shown that larger achievement gains occur when computer programs compliment a teacher’s instruction rather than replace it" (p. 111).

Myren (1976) developed a simulation laboratory using Computerized Random Access Video Equipment (CRAVE) that served as a practical tool to investigate procedures of educational administrators. Myren’s work was designed to investigate the information search and utilization procedures of administrators. Myren modified an existing simulation called the Abraham Lincoln Elementary School Principal Simulation (ALES) to develop potential problems for his research. ALES was an attempt to duplicate administrative problems that principals could be expected to encounter. The simulation consisted of background booklets, in-basket materials, 16mm films and audiotapes. These materials provided the subject with background information and the problem statements that the subject was expected to solve. Myren’s program consisted of six main sections: user instructions, biographical data, in-basket materials, special problems, information bank and user action analysis. These sections together provided the user with the necessary information for the subject to identify the problem, gather information on the problem and solve the problem.

Myren’s (1976) study was important in identifying areas for further research and to identify a graphical presentation of the decision-making process. Technology has
advanced to such a degree since Myren's work that using mainframe computers is no longer necessary or practical. Myren's work served as a beginning point on which new, advanced methodologies can be used.

Wanless' (1984) work built on Myren's previous efforts, but looked at the effects of stress on decision making by the educational administrator. Wanless used Myren's CRAVE system to identify relationships of anxiety levels and other personal variables to the decision-making behavior of graduate students in educational administration and to investigate relationships between anxiety levels and information use in problem solving. Wanless used Myren's CRAVE simulation and added the State-Trait Anxiety Inventory to evaluate the effects of stress on subjects. Wanless used a two-group design that was evaluated using descriptive statistics, Pearson product moment correlation, factor analysis and stepwise regression analysis. Wanless' study provided additional insights in the decision-making process and additional sources for research.

Stahl's (1968) research into reactions to administrative simulation provided additional research questions and possible test questions. Stahl's work concerned evaluating whether more concrete modes of instructional simulation (i.e., printed modes of presentation) cause a different reaction than more abstract modes of presentation (i.e., audio-video modes).
Perhaps, the most innovative method is the videodisc-based instructional program as a part of the Principal as CEO by Dubin (1990). This simulation presented one real life scenario in which the viewer plays the role of principal in solving an allegation of sexual harassment at a high school. The simulation used a videodisc and a personal computer to present the situation. The simulation presents an audiovisual overview of the school and then presents the dilemma by means of a discussion at a staff meeting. The simulation then presents several options that included interviewing the teacher, interviewing the student, reviewing records, meeting with faculty or making a decision. Each choice can be repeated as many times as desired. Once the viewer is ready to make a decision, two choices are presented. Choices are to either counsel the teacher or to suspend the teacher. Once a selection is made, the videodisc presents the teacher’s reaction to the decision and the simulation ends. Objectives of the simulation were to provide a realistic scenario that administrators might be expected to face and permit them to use their decision-making skills via a simulation.

Advantages to this simulation were that it provided a means to present the situation in a non-threatening manner; the simulation can be recreated any number of times with exactly the same circumstances; it is relatively inexpensive
to produce; and it does not put the viewer in a potentially adversarial situation that could have long term effects.

Another advantage to this approach is that viewing the scenario in a classroom setting can lead to class discussions on the situation and broaden participants' knowledge base. A further advantage to this approach is that professors can modify their teaching to accommodate new or different decision techniques and, using this simulation as a baseline, could study effects of the new curriculum.

Disadvantages to the simulation were that it presented only one scenario and did not provide any feedback to the user concerning what issues were important in deciding how to handle the situation. This simulation did not provide a means to track viewer choices in the information-gathering stage, nor did it record the time the viewer spent between gathering information, nor did it record the actual decision. Capturing this information during the training session could provide insight into the decision-making process. This insight can then be used to provide feedback to the viewer concerning what information was most important, least important or irrelevant. Collecting information on what sequence was used in collecting data and what decision was made can be useful in identifying trends in the decision-making process. Lastly, providing some feedback to the viewer through the use of an expert panel after the decision was made could furnish the user immediate
insights into issues that the panel deemed important to consider in the situation. This could include key legal points to consider, current policy on issues, salient points made by actors that were cues on what the viewer should have done, etc. This feedback could reinforce the viewer's decision and provide a positive learning experience, or it can point out key issues that the viewer should have been aware of or heighten the awareness.

The review of literature also included evaluations of the products provided by the National Association of Secondary School Principals [NASSP] (1993). NASSP has over 100 titles consisting of audio cassettes, videotapes, films and filmstrips featuring experts in administration, curriculum, school law and other areas.

The University Council for Educational Administration [UCEA] (1993) has been active in developing simulations and models for over 30 years. This organization has used professional actors in its films. During the late 1960s and early 1970s, UCEA developed a large set of background data for a hypothetical school district. Resultant products consisted of in-basket drills. These drills were designed to provide the student with experience in making decisions based on data provided in a written format. Recently, the University Council for Educational Administration (UCEA) (1993) decided to develop a new simulation that will use problem-finding activities rather than the traditional
problem resolution approaches. UCEA believes that this approach more accurately reflects the other facets of decision making such as personal communication and discussion with subject matter experts. Another advantage to this approach is that viewing the scenario in a classroom setting can lead to class discussions on the situation and broaden participants' knowledge base. A further advantage to this approach is that professors can modify their teaching to accommodate new or different decision techniques and using this simulation as a baseline, could study effects of the new curriculum.

### Computers in Simulation

According to Jones (1987a & b):

While the present simulation and game explosion may lead one to conclude that the appearance of games is a contemporary phenomenon, in reality their origins can be traced back thousands of years. Ancient China had a war game entitled "Wei-Hai" (encirclement) and India had "Chaturanga" which is claimed to be the forerunner of chess.

Jones goes on to point out that:

After World War II, American business, impressed by the military use of simulated training techniques, developed several games for management training. It was during the 1960's that the potential learning value of simulations and games became recognized by teachers of elementary and secondary school students. (p. 5)

The use of computers in simulations initially began when large mainframe systems were available. These computers were cumbersome, slow, costly and difficult to program. As technology progressed and capabilities became
available, researchers and teachers began to see how computer simulations could be used to teach difficult concepts and provide cost effective training that was safe for the student and the environment in case the student made a wrong choice.

Using personal computers in simulations is a recent innovation which began in the mid-1980s. With the arrival of smaller, inexpensive and more powerful computers, new software, programs were easier to write. The use of personal computers to develop and use simulations in schools and colleges increased dramatically in recent years.

According to Maidment and Bronstein (1973), "Institutional social simulations first gained widespread popularity not at the college level, but at the elementary and secondary levels" (p. 13). Maidment and Bronstein (1973), also stated that:

The success of the student in a simulation game will not depend on how well he is able to memorize facts and principles but upon how successfully he can analyze information to arrive at rational decisions. Because a simulation is a dynamic process the student must continually plan, make decisions, analyze feedback and replan as the simulation progresses. One of the principle attributes assigned to instructional simulation is their ability to develop general decision making skills which are beneficial in a wide variety of school situations. (p. 25)

Maidment and Bronstein (1973) also believed that, "From what is known now, it appears that the principle strength of simulation games is found in their ability to motivate students" (p. 27). Maidment and Bronstein (1973) stated,
"Simulations have also proven their value in teacher training programs by exposing the novice to a wide variety of classroom situations, many of which he probably would not encounter in the traditional student teacher program" (p. 14). Maidment also developed a questionnaire to measure values of a simulation. See Appendix D for a modified form of this questionnaire.

Perhaps, the most recent and explosive use of computers in simulations was hastened by Apple Computer Company’s introduction of HyperCard and HyperTalk into their products. These programs made it possible to create images, and later include audio, in a personal computer. Teachers who were using these machines had a new tool to challenge and teach their students.

According to Cash (1990):

The development of interactive multimedia began in the late 1970s with the introduction of optical disk devices such as the laser video disc. Known first as laser disc technology, then interactive video, multimedia gained sophistication in the late 1980s with the introduction of CD-ROM, digital audio and digital video devices. (p. viii)

Gray (1989) described educational applications for HyperCard and highlighted programming languages, development of databases, school media center applications, telecomputing use in research activities and the need for computers in elementary and secondary schools. Rada (1989) described components of a hypertext system and discussed possible applications from the model of hypertext as a
writer plus reader. Corcoran (1989) described criticisms and issues involving the use of hypermedia. Seyer (1989) discussed the development of hypertext and described hypertext systems currently available for personal computers. Users of IBM compatible computers had to wait until programmers developed the same capabilities that Macintosh machines used. This technology became widely available in the 1990s.

IBM-compatible computer users are being rewarded for their patience with several products that boast the same capabilities as Macintosh users enjoy. Along with the capabilities, the ability to author a multimedia program is now available. Authoring systems allow educators to create computer-assisted instruction quickly and easily. There are many on the market, most of which will support interactive delivery. Authoring systems vary greatly in terms of the compromise between power and ease of use. In addition to several Macintosh and Apple authoring programs, there are four IBM PC authoring programs available at UCF. They are Linkway (Kheriaty, 1990), Linkway Live! (IBM, 1992), Multimedia ToolBook (Asymetrix, 1992) and Authoring (Interactive Image Technologies, Ltd, (1993). Review of the literature from both manufacturers indicated that ToolBook and Linkway Live! provided the desired capabilities better than Linkway. Yet, because ToolBook required such a large amount of random access memory (six megabytes) and Windows
only a few computers were available that had these capabilities. To make the program available to administrators in the central Florida area in a run-time version, hardware requirements resulted in selection of LinkWay as the system for this simulation.

**Decision Theory**

A great deal of research was conducted to illustrate how decisions are made. The purpose of this paper is not to discuss these theories in detail, but to identify the more popular theories as they relate to types of decisions administrators typically make. Garratano and Riley (1989) ascertained that:

One of the most significant results demonstrated by Newell and Simon was that much of human problem solving, or cognition could be expressed by IF THEN type production rules. A rule corresponds to a small, modular collection of knowledge called a chunk. The chunks are organized in a loose arrangement with links to related chunks of knowledge. Cognitive psychologists have used roles as a model to explain human information processing. The basic idea is that sensory input provided stimuli to the brain. The stimulus triggers the appropriate rules of long term memory which produce appropriate response. Long term memory is where our knowledge is stored. (p. 11)

Then, Garratano and Riley (1989) discussed the difference between long term and short term memory:

In contrast to long term memory, the short term memory is used for the temporary storage of knowledge during problem solving.

One theory proposes that short term memory represents the number chunks that simultaneously can be active and considers human problem-solving as spreading of these activated chunks in the mind.
The other element necessary for human problem solving is a cognitive processor. The cognitive process tries to find rules that will be activated by the appropriate stimuli. Only a rule which matched the stimuli will be activated. (p. 12)

In Sternberg and Smith’s *Psychology of Human Thought* (1969), Lesgold stated that:

These hypotheses lead us to an interesting view of problem-solving expertise: Experts are people whose problem-solving procedures and representations of problems overcome the three limitations discussed earlier.

Their procedures are compiled.

The load their procedures place on temporary memory activation is consistent with the limitations on memory dynamics. Because of their organizational structures of memory, the needed activation sequences still occur with greater reliability.

Their procedures are organized around an efficient strategy that can be driven by the goal-structuring process. (p. 200)

To illustrate these points, Lesgold (1978) reported that studies of chess players by de Groot and others suggested that: "Chess experts' problem solving, then, is based on rapid recognition processes that tap acquired knowledge rather than exclusively on conscious analytical thinking process" (p. 201). Lesgold also stated that:

... in more traditional school subjects, such as physics, a similar phenomenon has been observed: Highly competent performers are better than other at developing a good initial representation of the problem space. Good representation skills enable the knowledgeable physicist to solve routine problems rapidly and without much conscious deliberation. (p. 201)
This led to Lesgold's (1978) statement that:

The knowledge of experts and the mental representations they construct include information about the application of what they know. In general, competent individuals can be described as having knowledge that is organized into a fast-access pattern recognition or encoding system that greatly reduces their reliance on the vagaries of declarative knowledge. (p. 202)

Studying Air Force technicians, Lesgold (1978) found that:

... high- and low-ability people do not differ either in their knowledge of weak problem-solving methods or in their general knowledge of electrical or electronics principles. The differences lie exclusively in strategies and tactics that are specific to the kinds of troubleshooting they must do and in declarative knowledge relating to the specific levels of components about which they must make decisions. Nonetheless, our results at least support the general view that expertise is based mainly on one's store of knowledge that is very specific to the tasks one faces and not primarily on general aptitude, knowledge of weak methods, structural dynamics of memory and cognition. (p. 205)

Likewise, Anderson (1982) produced a learning theory in which competence and circumstances that produced learning undergo qualitative changes with learning. Anderson proposed three stages of learning: declarative knowledge, procedural knowledge and tuned procedures. The most important point of Anderson's (1982) theory was that practice is necessary if learning is to occur (p. 207). According to Lesgold, (1978) "... because the procedures one wants to develop for memorizing text, one should invest one's effort in problem solving, not just in listening to a teacher talk about it or reading about it" (p. 207).
This leads to the question of how to improve problem solving capabilities. According to Whimbey and Lochhead (1981), the following aspects of good learning should be practiced: "... positive attitude, concern for accuracy, breaking of the problem into parts, avoidance of guessing, and more mental activity" (p. 181).

Results of this research on problem solving according to Anderson (1982) suggested that "... practice solving the kinds of problems you would like to be able to solve more readily. Instead of merely reading books or listening to lectures about problem solving, try to solve problems" (p. 209).

The literature is replete in theory on decision-making and problem solving. For example, Yakes (1990) discussed the decision concept in detail. Yakes (1990) identified how people make decisions, and how to improve the decision-making process. Scandura (1977) discussed such topics as artificial intelligence; simulations; cognitive, educational and mathematical psychology; individual differences measurement; and educational design and development (p. vii). Gilhooly (1989) discussed problem solving from the perspective of comparative cognitive science in which differing information processing procedures followed by humans and machines may be compared and contrasted. This is a unique look at how humans and machines solve problems. Gilhooly (1989) discussed such topics as nonadversary
problem solving, adversary problem solving, machine and human expertise, inference and learning, and problem solving by human-machine interaction. According to Gilhooly (1989), given a sequence in time, the problem solver starts out by analyzing the task environment (i.e., the problem statement and the context in which it is presented) and constructs an internal representation of the problem solution. The product of this encoding step is a problem representation that includes:

... an individual's representation of the objects in the problem solution, the goal of the problem, and the actions that can be performed and strategies that can be sued in working on the problem. It also includes knowledge of constraints in the problem situation: restrictions on what can be done, as well as limits on the way in which objects or features of objects can be combined. (Greene & Simon, 1989, p. 4)

Gilhooly (1989) continued that:

Problem solving, then, by definition is the search of the correct sequence of operators, from the initial state to the goal state, within the problem space. Sometimes the problem space differs for different individuals. This may result from a number of factors. Usually, it is due to the solver's failure to encode one or more aspects of the problem into his or her representation. (p. 162)

This research is supported by Greene and Simon (1989), who wrote:

Present findings indicate that a major source of expert performance is the expert's ability to represent problems successfully, and that this results from the expert's having a well integrated structure of knowledge in which patterns of features in the problem are associated with concepts at varying levels of generality, enabling the efficient search for hypotheses about the salient features of
the problem that cannot be observed directly as well as methods and operations to be used in solving the problem. (p. 111)

From this analysis of problem solving and ways to enhance this capability, it is obvious that a simulation method that gives skill practice in decision-making can assist administrators in developing problem-solving skills. Therefore, the simulation as outlined in Chapter III should aid new administrators by giving them practice in making kinds of decisions they will be expected to make. The other advantage to this simulation was that as a part of this training the simulation simultaneously provided feedback in a non-threatening environment.

Simulation in Research

Simulations of various kinds were used to evaluate performance for several years. As mentioned previously, the Prussian Army used simulations in the selection process for their officers in the nineteenth century. More recently, computer driven simulations were used to help researchers study various issues.

For example, in *HyperCard in Educational Research: An Introduction and Case Study*, Bowers and Tsai (1990) described the HyperCard program and explained Hypertalk, the programming language it uses. Also discussed were implications for researchers of using HyperCard including software design and development, the concept of learner control and computer assisted instruction using videodiscs
and CD-ROM. Bowers and Tsai's work identified uses that this latest technology provided to researchers. In *Simulation Games and Development of Social Theory*, Coleman (1989) discussed the use of simulations in the development of social theory.

Motowidlo, Dumette and Carter (1990) included correlations between total simulation scores and performance ratings, means and standard deviations of simulation scores for the subjects involved in selecting entry level managers. Simulations done by Motowidlo, Dumette and Carter presented applicants with descriptions of several work situations and five alternatives for each situation. The subject was to select one alternative as the best solution. Results of this research indicated that samples of hypothetical work behavior predicted performance.

MacRides (1981) investigated relationships between psychological type and other personal variables to the decision-making behaviors used by graduate students in educational administration. MacRides also looked at the relationship between psychological type and information search patterns used to make administrative decisions.

Stolovitch (1990) explained a model that could be used for debriefing after a highly interactive training activity such as a simulation or role play. Saunders and Gunn (1990) discussed assessment and evaluation instruments associated
with observation and analysis of communication within groups involved in simulations.

Advantages of Simulation

There are several advantages to using a simulation that were mentioned earlier. These include cost effectiveness, rapid development, safety of use by subjects and non-threatening considerations. In addition, Cruickshank (1970) offered the following reasons:

1. Simulations are relevant.
2. Simulations permit the trainee to be oneself.
3. Simulations permit participants to engage in very serious encounters where they must make decisions and consider the consequences.
4. Simulations permit control.
5. Simulations are economical.
6. Simulations are psychologically engaging. (p. 22)

For all these reasons, simulations can provide the instructor, researcher and student with a very effective tool to perform their tasks.

Disadvantages of Simulation

Although advantages for using simulations are strong, Cruickshank (1970) identified some disadvantages. These included the following:

1. Simulations don't fit neatly into every problem.
2. Simulations often fail to provide empirically derived data.
3. Instructors are not well acquainted with or trained to use simulations effectively.

4. Simulations may not be well founded or valid. (p. 24)

Despite potential drawbacks, the use of a simulation for the purposes stated in Chapter I was the choice for this project.

Summary

This chapter contains a review of literature pertaining to simulation material designed to provide instruction in problem situations and to serve as a research tool for investigating situations. The simulation discussed in detail what was important because of unique features provided, some of which were incorporated in this study.

The literature review was most important in that it provided the researcher with a historical perspective of simulation developments and a framework within which simulation is applicable to research.
CHAPTER III

DESCRIPTION OF THE PROGRAM

This chapter contains the description of how the simulation program was developed and describes the sample from which data were collected and analyzed. This chapter is divided into two parts: part one describes the construction of the simulation; the second part describes the population and sample.

Construction of the Simulation

The simulation was designed using modular construction to simplify development and refinement. A complete set of flow charts is included in Appendix A and a source code listing may be found in Appendix B. According to Jones (1985), the task sequence for developing a simulation consisted of the following steps:

Define overall objective,
Define scope;
Identify key actions;
Determine actors' objectives;
Determine actors' resources;
Determine interaction sequence among actors;
Determine decision rules;
Identify external constraints;
Formulate scoring rules;
Choose form of presentation and manipulation. (p. 15)
Van Ments (1989) reported that the task sequence for games and simulations was more elaborate and included the following steps:
Define the instructional topic;
Construct a model to reflect the real life event;
Select a suitable game format;
Identify the major character, resources, and constraints;
Specify the overall game sequence;
Specify the termination rule;
Establish criteria for winning;
Design a sequence around each round;
Write a background scenario;
Assemble the prototype materials and equipment;
Test the game with players and revise;
Write the player's manual;
Test the game under "hands-off" conditions and revise;
Specify the outcomes of the game;
Prepare the administrator's handbook. (p. 68).
Discussions with Wilburn (personal communication, September 3, 1992) indicate that for a computer simulation, the following additional tasks must be performed:
Develop scripts for each scenario;
Shoot a rough video tape of the sequences;
Use and develop a presentable video;
Field test the product with a standard videodisc player to administrators;
Finalize the product;
Press the final, edited videodisc.

The five parts of the simulation program are:
Introduction to the Simulation, Biographical Data Collection, Scenario Presentation, Database and Feedback. Each of these parts are discussed in the following sections.

**Introduction to the Simulation**

The simulation’s introduction presented information to the subject concerning the simulation, and contained internal start-up procedures for the computer program. A self-test was run automatically when the computer was turned on to insure that the correct peripherals were connected and operational. This action was transparent to the user unless an error occurred (in which case the computer provided limited information to identify the problem to the user). The user was provided written instructions on how to load the program to a hard disk drive, or how to run the program from the diskette. Subjects also received a sheet describing the characters in the scenes and explained the decision choices.

At the conclusion of these actions, the first screen presented the title of the program and authoring trademark data. The next screen presented instructions concerning how
to answer user biographical data requests, how to input selections, get help and exit the program.

Biographical Data Collection

After the introductory screen, a biographical data request screen was presented where information about the subject was collected. These data were used in subsequent analysis and data reduction after the scenario was completed. Specific data collected from each subject included the following information: name, age, sex, experience, educational level, current job title and years in this position. Information was used to analyze results of the decisions made as part of the analysis phase of the simulation.

A. Subject name was used to identify the subject after the data analysis and as a method to track the number of times a subject used the simulation.

B. Age information was collected to present analysis of decisions which might be related to age but was not used in this analysis.

C. Experience information was used to identify any trends based on this variable.

D. Educational level in terms of years of education and type of degree(s) was used to identify how this variable affected the decision-making process.

E. Current job title information was used to identify trends.
F. Years in position information may have an impact on responses that the subjects provided, therefore, these data were also collected.

**Scenario Presentation**

This section of the simulation contained introductory information about the school and the scenario. The first scene presented on the videodisc was a brief vignette that identified the school environment. This scene provided visual cues of a typical high school along with a narrative description of the school’s social environment. Additional information concerning the fact that the principal has been in office since September and that the timeframe is now the first week in November. The school history department chair then presented the beginning teacher problem. The participant was then referred to the computer monitor to select the first of seven possible scenes.

The beginning teacher scenario was a situation where a principal receives complaints from parents, students and the department chair concerning a beginning teacher. This scenario was selected after a review of literature indicated that this was a typical problem faced by high school principals. A survey of 10 high school principals confirmed that they had experienced this problem and that it would be an appropriate training topic (see Appendix G). The subject was expected to decide what actions to take in response to the situation. The subject was also expected to make an
information search to find additional information that may help in the decision-making process. Information choices were: review teacher records and review policy manual, obtain input from student, obtain input from student peer, obtain input from teacher peer, obtain input from a new teacher committee, obtain input from a union representative and obtain input from affected teacher. Each choice could be viewed more than one time. Following the information search, the subject was asked to select one of six possible actions: (1) do nothing; (2) issue a verbal warning; (3) issue a written reprimand; (4) formally counsel the teacher; and send the teacher to a teacher improvement program; (5) fire the teacher; or (6) send the problem to the district superintendent. A written description of each choice was also provided for user review. The selection was made via keyboard input; each choice was mutually exclusive. After this selection was made, the choice was recorded by the computer and a videodisc scene played to provide the reaction to the decision. Next, a video sequence of a panel represented by two actors provided feedback to the subject via videotisc. The panel briefly discussed salient points in the scenario and listed issues the subject should have considered in reaching a decision. This concluded the scenario.
Information Sources

Data for each of the vignettes were contained in this database and included the following: obtain input from student, get input from parent, get input from peer teacher, get input from the student’s teacher, get input from student peer, get input from union representative, get input from policy manual and school records, and get input from new teacher committee. The records and policy manual selection provided a screen that directed the subject to these handouts: guide for student conduct, teacher classroom evaluations, history curriculum policy manual and copy of a recent teacher contract. Format and type of data were obtained from a central Florida school district. Each choice could be viewed more than one time. Personal data used for this simulation were fictitious.

When the subject received requested information, the simulation returned to the scenario’s information selection screen and stayed on until another information request was made or until the decision choice option was selected. The "peer student" choice provided the subject with a brief videodisc scene that presented the student’s perspective of the situation. The "obtain input from parent" choice presented a brief videodisc scene in which the parent’s perspective was presented. The "new teacher" choice presented the videodisc scene in which the beginning teacher’s input was presented. The "peer teacher" choice
presented a brief video scene in which a teacher peer provided input. The frustrated student, union representative and committee scenes likewise provided input. After selecting "make a decision," the screen changed to show six decision choices. Once a decision was selected and entered, a scene presented the affected teacher’s response or the superintendent’s response. No response scene was provided for the "do nothing" choice.

**Subject Database**

The subject database section recorded the subject’s biographical data such as name, sex, education level, job title and years of experience. The database was also used to record the sequence of information requests made by each subject and the decision made by each subject for the scenario. This database was the source to develop the analysis for this study. This information was available in paper copy to the simulation author for review at the author’s leisure. Initially, data were compared individually between subjects who completed the simulation. As more subjects completed the simulation, individual subject’s files were merged to provide a composite file for further subject analysis.

**Feedback**

The last part of the simulation was the feedback, or after-action review phase. The purpose of this phase was to
provide a means of reinforcing salient points of the decision-making process and provide feedback to the subject concerning what information should have been gathered. Feedback consisted of a brief videodisc sequence consisting of comments presented by actors representing a group of subject matter experts. This information was provided through literature reviews and discussions with 10 central Florida high school administrators. The actors briefly discussed information that should have been gathered, and why this information was important. The actors also identified the key points in helping a beginning teacher. These points included notifying the teacher of the problem, evaluating the problem, assisting the teacher, giving time to improve and termination.

Population and Sample

One purpose of this study was to decide if using a low-cost simulation could satisfy a need to provide decision-making experiences in a training environment. Therefore, it seemed appropriate to test the results of this study by providing it to five professors at two universities that teach educational administration and obtain their input on the study's utility. Since the results of this effort could be used by various county school districts as a part of their principalship training, input from four district new principal department administrators was collected. The simulation was also presented to five practicing principals
for their review and comments. Finally, input from seven graduate students currently seeking advanced degrees in educational administration was also solicited to determine receptivity of the product at the user level.

Each of these groups was provided with the simulation and asked to respond to the questionnaire included in Appendix D. Specific input solicited included comments on such issues as: clarity of instruction, ease of use by the subject, screen design, usefulness of the simulation, applicability of the problem to actual problems faced by school administrators, choices available in the simulation compared to real world choices, information (type and amount) available to the subject to make a decision and usefulness in learning. This information was collected and evaluated within each group and between groups to determine the overall effectiveness of the simulation from each group’s perspective and to find similarities and differences concerning usefulness of the simulation between groups.

Feedback results from the four groups served to answer the following questions concerning this simulation: (1) Does it satisfy a need? (2) Does it help the subject in conceptualizing a problem? and (3) Does it provide an effective alternative to existing methods of training future principals? These issues are important to educational administrators because reviews of literature disclosed that while much has been accomplished in business and the
military relating to using simulations, there is little work that has been done in education by comparison and even less work in educational administration.

The last area to evaluate was to determine if the technology currently available for non-technical personnel (i.e., people other than computer programmers and software engineers) was adequate to develop low-cost simulations using typical equipment and resources currently found in colleges and universities. Concurrent with this issue was the need to identify the costs and time required to develop the simulation.

The simulation package consisting of the computer software, videodisc, instructions and handouts, the release form and the survey questionnaire were provided to five college professors at two universities in Florida for their review and evaluation. Each professor selected was actively involved in teaching educational administration graduate students. Data collected by the questionnaire using a Likert-type scale included: suitability of the simulation to its task, ease of use, applicability of the chosen scenario to real problems faced by principals, suitability of decision choices presented, and how effective was the simulation in helping learning to take place. The five professors and four beginning principal coordinators were also asked to comment on whether or not they would use such
a simulation as part of their instruction if it were available to them.

**Procedures**

This simulation was developed as a proof of concept effort to identify procedures for using off-the-shelf multimedia tools and to demonstrate that administrators or others involved in educational leadership in academia or school systems can use multimedia tools to create effective, low cost training devices. This research also identified factors to consider in developing a simulation, costs and time frame for the effort. A sample run of the simulation was conducted in which subjects provided input on the video sequence, subject matter, method of presentation and the feedback information provided. Based on this preliminary analysis, modifications to the simulation were incorporated to improve the program.

The following topics were central to the analysis effort: identification of individuals or groups involved in the communication process, basic concern for action and decisions made based on input received. The same forced choice selections were available for all subjects. The information search database consisted of six videodisc sequences and appropriate documents such as teacher contract, policy manual, short resumes for each character, history curriculum and teacher evaluation records. These items were selected based on results of a questionnaire (see
Appendix G) sent to 10 practicing high school principals in Orange County, Florida. All 10 principals responded to the survey.

**Summary**

This chapter discussed in detail the simulation operating procedures describing different program modules and subject interaction requirements. Also discussed in this chapter was a description of video displays, data collection and reporting procedures developed for the simulation. This chapter proposed the method to use results of the treatment provided by the simulation.
CHAPTER IV

DEVELOPMENT AND EVALUATION

The purpose of this chapter is to review the computerized simulation. The chapter includes a discussion of simulation materials, the idea of the simulation, simulation design and development steps and modifications to the design based on test runs. It concludes with comments and evaluations from college professors, district principalship instructors, school principals and graduate students who participated in the test phase of the development.

The Development of the Simulation

The concept of developing the simulation began with viewing a simulation developed by Dubin (1991). Review of Dubin’s simulation resulted in the idea that administrators and professors could develop their own simulations. Therefore, one objective was to develop a simulation that could be designed and developed using low cost, user-friendly, hardware and software with minimal technical support. Therefore, it became apparent that another purpose of this study would be to define accurately the procedures used to develop this simulation so that nontechnical users
could learn to develop and effectively use this technology to create their own simulations and thus improve the knowledge and add capabilities to the field.

Computer Simulation Planning

Development of the simulation began with identifying the objectives of the simulation. The idea was to develop a scenario that would be presented to students and prospective administrators so that they could experience a typical problem that they would be expected to encounter as school administrators. Concurrent with this concept was the perception that feedback should be provided to the subjects based on their decision choice. This feedback feature was noticeably lacking from Dubin's work.

As research efforts continued to identify the scenario, concurrent efforts began to identify the computer hardware and software, the filming requirements, videodisc capabilities and funding requirements. Review of literature and discussions with practicing administrators resulted in selecting the beginning teacher scenario.

Simulation Development

With these constraints and objectives determined, the next task was to develop the functional flow block diagrams that would serve as the road map for the entire project. These diagrams are in Appendix A. They were developed using the EasyFlow flowcharting software program. Development
time was about 44 hours to create and modify the diagrams through the third level of detail. The following steps were sometimes done concurrently. Specific sequences that were required due to technical considerations are indicated. Otherwise, any sequence for these steps is satisfactory. The chart depicts the approximate time in weeks for each task.

The first step was to start learning how to use LinkWay (Kheriaty, 1990), the authoring language. This step helped to insure that when the script was ready, any coordination or unique software requirements were already known and considered. Most of the required code was provided in LinkWay. Writing the code for presenting demographic information requests was easy. Writing the code for interfacing between the software and the videodisc was more difficult. The documentation in Linkway was inadequate in providing detailed code to write data to a file. Writing this code required 16 hours of work by a computer programmer.

The next step was to select information to be presented in the video and then identify sources for this information. This included the input that the subject would receive, decision choices to be presented and video responses to use for each decision choice. The functional diagrams helped in keeping the project on track. Once each of these vignettes
<table>
<thead>
<tr>
<th>TASK</th>
<th>WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop Flowcharts</td>
<td>X----X</td>
</tr>
<tr>
<td>Write Script</td>
<td>X----X</td>
</tr>
<tr>
<td>Learn Linkway</td>
<td>X--X</td>
</tr>
<tr>
<td>Use Linkway Programming</td>
<td>X--X</td>
</tr>
<tr>
<td>Obtain Stock Footage</td>
<td>X</td>
</tr>
<tr>
<td>Rehearse Scenes</td>
<td>XX</td>
</tr>
<tr>
<td>Coordinate Filming</td>
<td>X----X</td>
</tr>
<tr>
<td>Film</td>
<td>X</td>
</tr>
<tr>
<td>Post Production</td>
<td>X</td>
</tr>
<tr>
<td>Combine Video and Linkway</td>
<td>XX</td>
</tr>
<tr>
<td>Simulation Testing</td>
<td>X----X</td>
</tr>
<tr>
<td>Revisions to Code</td>
<td>X----X</td>
</tr>
</tbody>
</table>

Figure 2. Approximate Time in Weeks for Each Task

was identified, the next step was to determine the time to allot for each scene. Since videodiscs can only handle 30 minutes of video and audio on one side, scenes had to be written within this time constraint. Videodisc players can play two sides of a videodisc, but the videodisc must be removed from the videodisc player, turned over and reinstalled into the videodisc player. Since choices were to be made by the subject as a part of this simulation, a
conscious decision was made to limit the use of the videodisc to one side.

Another consideration was the subject's view of the problem statement. Since the idea was to present various scenes to the subject, the scenes had to be written so that the subject could recognize that the principal had just asked some question to which the actor in the scene was responding. This step required research of the following topics: typical procedures that an administrator would follow; identifying sources of information the administrator would use; identifying typical questions the administrator would ask; and selecting typical decisions the administrator would make. This step also required careful consideration of the responses that were presented in each scene and the written information provided as a part of the simulation.

To provide representative information and add realism to the scenario, a questionnaire (Appendix G) was mailed to 10 high school principals in Orange County, Florida. Responses from this survey were used to determine appropriate responses, the documents to be provided to subjects, and the people that principals would most likely interview in their decision making processes.

With this information in mind, script writing was the next task. Although no scene lasted more than three minutes, writing and polishing the script was a long process. The script was reviewed by several subject matter
experts to include graduate school professors and practicing school administrators in Orange County, Florida, that were judged to be experts in the field. Their insights proved invaluable.

As scripting neared completion, efforts to identify actors and coordinate use of videotaping equipment and post-production facilities began. Assistance in videotaping and post production was available at the University of Central Florida. A local company agreed to press the videodisc.

A key point in the filming was to insure that the correct time codes were recorded on the video. Recording time codes during filming was critical because being off one frame in the film could cause video flicker in the videodisc and ruin the entire production. Therefore, it was imperative to capture correct time codes for each scene. Filming took 4.5 hours and involved 10 actors (students from the University of Central Florida theater department). The post-production phase required use of sophisticated equipment and a professional editor. Equipment included dual 3/4" videotape players, monitor and videotape editor. Skills required included ability to run videotape players, decide which scenes to save to the master videotape, and ability to track time codes. Depending on how well scenes were shot influenced how much time and money was spent in post-production, equipment and character generation. The services of a professional editor was needed to create the
titles and dub an audio track over a video track. This equipment was not available at UCF. For this project, post-production required 13 hours and cost $100.00.

Developing the software program was not difficult since the flow charts and the script provided the sequence for the program. LinkWay, Ver. 2.01 (Kheriaty, 1990) is a very user friendly program that can be learned in a short time. As the final steps were made to the software program, the videotape was being dubbed to the videodisc. This was done by a local company for $185.00. When the videodisc became available, the disc and the software program were combined to ensure that they worked together properly. This took about one hour to combine.

Once this was accomplished, the other materials including user instructions, policy manual extracts, teacher evaluations, written-user instructions and a written description of each character was developed. These tasks were done over a three-month period working part time on this project.

Total cost of this effort was: (LinkWay $100; disc press $185; filming $80; post-production $100; equipment $80; for a total of $545. Additional funds would be necessary if professional actors and a commercial post-production facility were used. Typically, a post-production facility runs about $200 an hour. Actor fees are too variable to accurately estimate.
Simulation Evaluation

This stimulation was initially presented to a group of graduate school professors for their comments and review prior to presenting this simulation to the sample group for evaluation. Results of the initial review by the graduate school professors and a subsequent review of these changes by this group were conducted to identify and eliminate any inconsistencies, errors or omissions. These steps were taken to provide the best possible simulation to the sample group.

Initial Evaluation

Once the simulation was put together and initially reviewed by the author, it was presented individually to several graduate school professors at the University of Central Florida, College of Education for their initial review and comments. Results of this initial review identified several omissions and modifications that improved the subsequent version. These omissions involved such things as identifying tasks and sequence required to load the software program onto a computer hard drive, including an interview with the beginning teacher, adding a copy of the current teacher contract and modifying some screen layouts to improve readability.

Achieving these adjustments required approximately three hours of work to accomplish. The instruction sheet was modified and expanded to include detailed step-by-step
instructions on how to load software onto the hard drive and how to run the program from either the "A" drive or "B" drive.

The software program was modified to include a video sequence representing a monologue by the beginning teacher. This video sequence was obtained from part of the footage already on the videodisc in another sequence.

Modifications to two screen layouts were performed to improve readability of information on the screens. This process involved changing words on two screens and repositioning one paragraph on one screen.

Second Evaluation

After modifications were incorporated into the simulation, the same graduate school professors reviewed the modified simulation. Additional comments concerning screen layout and development of a brief descriptive narrative for each character was suggested. Also, modifications to installation instructions were suggested to assist nontechnical personnel in setting up the videodisc player and connecting it to the computer. Modifications to the questionnaire were also made at this time. Lastly, modifications to the subject's biographical screen were performed that resulted in making it easier for the subject to answer questions. Also, it became apparent that additional videodisc drivers and printer drivers (software
files that cause the videodisc or printer to work with the computer) were also needed.

Changes to the screens involved highlighting key points, identifying various information sources by name on the information screen and adding brief descriptors under each name on the screen. The arrangement of decision choices was also modified so as to present information in a random manner. Changes were made with Linkway and required about two hours to incorporate.

A brief description for each character was created from the information provided to the actors as part of the script. This information was designed to help the subject identify the character and learn something about the character's background and relationship to other characters in the scenario.

Modifications to the questionnaire involved changing the Likert-type scale to include verbal descriptors to help the user understand the numerical choices available for each question. For example a value of "1" was assigned a descriptor of "Very Clear," or "Extremely Helpful." For a numerical value of "5," descriptors such as "Very Confusing," or "Not Helpful at All" were used.

Installation instructions were further modified to incorporate details on how to get help if the program freezes the computer, or if the user had some question about Linkway. Instructions on how to load a videodisc or printer
driver were also included. Copies of several common videot disc and printer drivers were also included on the diskette.

Final Evaluation

Once modifications to the program and the questionnaire were accomplished, the simulation was administered to four groups for their review and comments. These groups included: district beginning principal administrators responsible for the beginning principal program in their districts (N=4); practicing school principals (N=5); practicing graduate school professors (N=5) from two separate colleges of education and graduate students seeking advanced degrees in educational leadership at the University of Central Florida during the summer 1993 (N=7). Each group, except the students, were administered the simulation independently. Students viewed the simulation together as a group due to time constraints. Immediately after viewing the simulation, each participant filled out a questionnaire (Appendix D). Responses from the groups were 100%.

Decision-Making Characteristics

This simulation was designed to gather data on decision-making behaviors of educational administrators. This simulation provided a unique opportunity to obtain data on variables related to specific decision-making behaviors. The following input sources indicating the beginning
teacher's behavior were used in the study and could be accessed from the videodisc or hard copy as often as the respondent desired:

Union representative - a teacher at the school;
Jerry Kelly - the student whose parent complained to the principal;
Mrs. Kelly - the parent who made the complaint;
Committee - new teacher committee consisting of assistant principal for education, department chair and guidance counselor;
Sherri - a peer student;
Policy manuals - included paper copies of the following documents: policy manual, teacher contract, teacher record, and a short resume for each character including Jack Martin, the first-year teacher.
Mr. Jones - a teacher on the beginning teacher committee.

These screens are provided in Appendix B. There were six forced responses that the participant could select: issue a warning, issue a formal written reprimand, fire the teacher, issue a written warning, do nothing, and send the case to the school superintendent for resolution.
CHAPTER V

ACCOMPLISHMENTS AND RECOMMENDATIONS

Review of Purpose and Objectives

This chapter contains a review of the purpose of the simulation and its objectives, together with statements reporting accomplishments and recommendations for further development. There were four stated purposes of this simulation. The first was to design, develop, and produce a product using state of the art computer authoring software and associated hardware to show that non technical personnel could design, develop and use multimedia tools to provide effective training in management skills for future administrators. Other purposes included review of research in the educational administration field concerning simulations, detailed discussion of the processes and procedures to develop the simulation, and evaluation by representatives of prospective user groups to include educational administrators as to its utility.

To investigate the decision process, it was decided to use Lipham’s (1976) decision-making model in Figure 1. This model identified concepts such as information, values, perceptions, problem definition alternatives, choice,
implementation, and evaluation as important factors in the decision process. This model, except implementation and evaluation, served as a theoretical or conceptual framework during the instrument design for simulation treatment.

The simulation instrument was dependent on accomplishing four technical activities: (1) develop an information database to provide subjects with rapid access to important data; (2) produce a scenario designed to place subjects in an information deficient state; (3) develop a subject reporting procedure; and (4) develop a program to collect and store data related to a subject's activities. Besides identifying technical activities, cognitive and affective educational objectives were also considered.

The educational objectives were designed to provide subjects with a realistic administrative problem so that subjects could safely practice administrative decision making techniques. This simulation was also designed to provide subjects with an account of their information utilization tendencies so that they could be better users of information.

Accomplishments

The degree of success of this study must be considered in terms of how well the stated goals were accomplished. The measures of accomplishments were indicated in three ways: (1) operating specifications of the system indicating what was done and how; (2) subjective reasoning during field
testing of the simulation; (3) acceptance and use of this technology is promulgated in the field.

The first goal was to develop a simulation within the framework of decision making theory. This required that consideration be given to the information needs associated with problem analysis, information utilization, values and perceptions, decision alternatives and choices made during the simulation.

The concept of problem awareness was introduced into the simulation using the videodisc and computer program. Subjects were permitted to conduct information searches at any time and in any sequence. The program was designed to maintain a record of the requested information during a search. All data pertaining to the search were written into a file for subsequent evaluation. Using the collected data, one can identify the amount of information used by the subject when confronted with the problem, the flow of information and the type of information.

The subject’s values and perceptions are a product of many personal and professional characteristics. At the start of the simulation, each subject is asked to respond to a number of questions about his or her background. The collected data are written into a file with the data collected concerning information search patterns. These data were also available for subsequent analysis.
Decision alternatives were provided during the simulation by requesting the subject to choose from a list of those actions that closely correspond to procedures that an administrator would use to solve the problem. In addition, the required technical activities were done according to the following procedures:

1. The simulation information database was programmed using LinkWay and tied by time code to the scenes presented on the videodisc.

2. A scenario representing a typical problem that a school administrator could be expected to encounter was developed and scripted for presentation on the videodisc. Each scene was defined to present additional information on the problems viewed from the character's perspective and in response to a typical question that the administrator would be expected to ask. The information on the videodisc and in the handouts were available to the subject at any time during the simulation simply by selecting the appropriate scene. Scenes could be viewed multiple times.

3. The subject reporting procedure was developed using the computer's inherent database structure. A separate file was created for each subject's response to the sample project. This database was
created in a separate file for each subject to be reviewed later.

Data were collected from the following groups: district administrators, university graduate students, principals and graduate school professors. Data are tabulated in Table 1. This table presents the means of responses by each group to each question on the survey. Question number refers to the question number on the survey. Percentage of respondents does not equal 100% due to rounding error. Response choice code is: 1=Extremely Clear or Very Appropriate; 3=Clear or Appropriate; 5=Not Clear At All or Not Appropriate. Results indicated a mean of 1.94.

**District Beginning Principals**

Responses from district administrators in three separate districts revealed a great deal of interest in using this simulation as a part of their inservice training programs. Administrators from two districts indicated that they were looking for something to replace in-basket procedures currently used as a part of their training and selection processes. These individuals indicated that they would like to use this simulation, and a variation of it, for future programs in the coming year. All administrators reported that they were impressed with the technology and the concept. One district administrator asked to have a second
<table>
<thead>
<tr>
<th>QUESTION NO./CONTENT</th>
<th>UNIVERSITY STUDENTS (N=7)</th>
<th>DISTRICT ADMINSTR (N=4)</th>
<th>PRIN (N=5)</th>
<th>COLLEGE PROFS (N=5)</th>
<th>GRAND MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Instructions clear?</td>
<td>2.4</td>
<td>2.5</td>
<td>2.2</td>
<td>2.4</td>
<td>2.35</td>
</tr>
<tr>
<td>2 Problem interesting?</td>
<td>2.2</td>
<td>1.5</td>
<td>2.0</td>
<td>2.2</td>
<td>1.98</td>
</tr>
<tr>
<td>3 Problem realistic?</td>
<td>2.8</td>
<td>1.2</td>
<td>2.4</td>
<td>2.2</td>
<td>2.15</td>
</tr>
<tr>
<td>4 Decision choices realistic?</td>
<td>2.8</td>
<td>1.8</td>
<td>2.2</td>
<td>2.4</td>
<td>2.3</td>
</tr>
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<td>5 Information very clear</td>
<td>2.4</td>
<td>1.6</td>
<td>2.4</td>
<td>1.8</td>
<td>2.05</td>
</tr>
<tr>
<td>6 Simulation interesting</td>
<td>1.8</td>
<td>1.4</td>
<td>2.0</td>
<td>2.0</td>
<td>1.8</td>
</tr>
<tr>
<td>7 Helpful in studying administration?</td>
<td>1.5</td>
<td>1.4</td>
<td>1.8</td>
<td>2.2</td>
<td>1.73</td>
</tr>
<tr>
<td>8 Equipment easy to install?</td>
<td>2.1</td>
<td>1.6</td>
<td>2.2</td>
<td>1.6</td>
<td>1.88</td>
</tr>
<tr>
<td>9 Use in administrative course?</td>
<td>1.2</td>
<td>1.0</td>
<td>2.0</td>
<td>2.6</td>
<td>1.7</td>
</tr>
<tr>
<td>10 Handouts appropriate?</td>
<td>2.1</td>
<td>1.2</td>
<td>2.2</td>
<td>2.2</td>
<td>1.93</td>
</tr>
<tr>
<td>11 Useful in course for future administrators?</td>
<td>1.7</td>
<td>1.0</td>
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<td>2.11</td>
<td>2.09</td>
<td>1.94</td>
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<tr>
<td>Standard Deviation</td>
<td>.51</td>
<td>.42</td>
<td>.21</td>
<td>.36</td>
<td></td>
</tr>
</tbody>
</table>

Adminstr=Administrators
Prin=Principals
Prof=Professors
demonstration for her personnel department and principal selection committee.

Comments to the questionnaire from this group suggested that respondents perceived great potential in this approach and a desire to modify this program to meet specific district needs. Overall, this group felt that the simulation represented real life situations, that decision choices were appropriate, that the simulation should be used frequently in a course of instruction and at the district level, and that the equipment was easy to use. This group also felt that handouts were appropriate and somewhat helpful in making decisions. One administrator suggested that this, or a similar program, could be used to train teachers or guidance counselors in how to handle children, parents or teachers. Administrators agreed that the simulation had great potential and they were interested in pursuing the approach. This group believed that this simulation could best be used in a new principal training program.

Two administrators indicated that the equipment was not easy to use because they only had Macintosh computers and therefore, had no experience with IBM compatible computers. Two other administrators indicated that they did not have computer experience and that they would need assistance in setting up the program.
One administrator suggested that a screen be included to permit the subject to write a formal counseling statement, or formal reprimand, as a part of the simulation. This writing requirement could be used to assist in the training program and perhaps the selection process. All administrators agreed that this program would be best suited for beginning principals or those people currently in the principal selection pool. All administrators agreed that this simulation would not be appropriate for practicing principals. Reasons given for these views were that principals would not want to spend the time (approximately 15-30 minutes) and that principals had, in most cases, already experienced this situation. Therefore, no training benefit for practicing principals was apparent to the district administrators. All administrators agreed that this would be a good program for aspiring principals and students enrolled in advanced degree programs.

**Practicing Principals**

A total of five practicing principals reviewed the simulation and responded to the survey. Their responses indicated that they believed the simulation was realistic and that it would be beneficial to beginning principals. Overall, they like the simulation. Principals did not see a need for practicing principals to use the simulation since they already had experiences in solving this type of problem. This correlated with results from district
administrators. Principals felt that instructions were clear and that using the hardware and software was easy. However, since most of them had Macintosh computers and little experience with computers in general, they believed that they would need help in installing the program and connecting the hardware. Principals felt that the simulation was very appropriate for graduate students seeking degrees in school administration. This correlated to the comments and opinions of the district administrators.

**College of Education Professors**

Comments from five practicing college professors indicated that overall, the simulation was a good training vehicle and that they would use it in their courses. One professor teaching a beginning course in school administration indicated that she would use the simulation in a slightly different mode than was originally envisioned. Instead of running the entire program straight through, she would stop the program's videodisc after each scene was presented and then ask students to explain what was going on in the scene, and then describe what they would do to handle the situation. She felt that she would have difficulty in setting up the equipment and loading the software because she did not have any experience with computers. She said that the instructions were clear and that she believed that the simulation has merit. She expressed a desire to use
something similar to this simulation in her Fall and Spring courses.

Another professor felt that the colors on some screens should be changed to make the information easier to read. She also felt that the program should have been written using LinkWay Live!, an upgraded version of LinkWay. She suggested other improvements that would enhance the program. She has several years of computer and multimedia experience and has set up a multimedia center for undergraduate and graduate students. Many of her suggestions were incorporated in the program and resulted in a better product. One professor suggested that there should be more than one set of feedback for all choices and that there should be more options. This professor also believed that there was far too much literature available to the subject for review. This professor felt that this was an excellent use of multimedia and an excellent beginning. He also wants to use the program in his classes.

College of Education Graduate Students

Seven members of an educational administration advanced degree program also participated in the survey. This group was selected because they were enrolled in the beginning course of instruction on school administration at the graduate level. This course content discusses school administration, leadership and management. This is one of the primary target audiences for this program, therefore, it
was appropriate to obtain their review, comments and observations. Students were administered the simulation as a group due to time constraints. Because the simulation was administered to the group, the simulation was set up and ready to run before the group received operating instructions. Time constraints prevented each person from installing the equipment individually. Therefore, the group received a brief overview of the purpose of the simulation and instructions to help them in reaching a consensus for which sources to use and which decision to select as a group. Students were given all handouts. After students reviewed the literature and questions were answered concerning the hardware and software setup and the purpose of the simulation, instructions were given that the majority ruled when it came to deciding which source and in which order each information source would be viewed and which decision choice would be viewed.

During the simulation, there was much discussion concerning what information to get, what sequence to use and the tally marks on teacher evaluation forms. The group decided to observe input from the affected student, the student's mother, the peer teacher and the beginning year teacher. There was also much discussion within the group about the information provided in each scene. These discussions concerned rationale for selecting or not selecting the scenes that were viewed. After observing the
beginning teacher sequence, the group decided to make a decision. There was also much discussion of what the problems with the beginning teacher were and what courses of action to take. The group decided to select the "Counsel" decision because they felt that this would include sending the beginning teacher to a beginning teacher classroom management course. Students indicated that the selections were not clear about what the true outcomes would be. They suggested that a sheet be provided that would show in more detail exactly what each decision choice included or left out. This suggestion was incorporated in the handouts provided to other groups.

After seeing the after-action review presented by the "Experts," the group felt that material was superfluous since they had already discussed these issues before reaching a decision. They saw no value in the after-action review. This was insightful because this group would be expected to use reinforcement as part of their learning experiences since all groups members were teachers and since reinforcement is one of the best methods to ensure that learning occurs and is retained.

Other responses on the questionnaire from this group ranged from comments concerning better acting to better definition of the decision choices. Several members of this group told the researcher that they liked the concept. Two group members indicated that they would use this concept for
training teachers. Post survey discussions indicated that students thought there was a problem with the software when it asked for the baud rate and the communications port number. These questions were explained in the instructions and the appropriate default responses provided in the instructions. This indicated that either the students did not fully understand the instructions, did not know very much about computers or did not remember what they read in the instructions. If the students had used the simulation individually and had sufficient time to re-read the instructions, this issue may have been resolved without further discussion. This group felt that the "Counsel" decision choice included sending the beginning teacher to a master teacher or some other kind of classroom management program in addition to the formal counseling. Their comments indicated that the decision choices were adequate and appropriate. They did not have suggestions for other choices.

**Overall Observations**

Significantly, all groups found that the idea was sound, that the equipment was easy to use and that the program was suitable for its intended purpose and audience. It appears from the survey results that district administrators perceived this program as a vehicle to help them in training potential principals. Students did not appear to realize the training potential afforded by the group interaction or
the after-action review built in to the program nor recognize the learning that occurred because of the group interaction generated by their spontaneous discussions. This may be attributed to the group's lack of experience in training and adult education.

Other observations indicated that the program has some merit at the district level in working with personnel in a principal selection pool, and in colleges and universities as a part of an instructional program. This was supported by comments and questionnaire scores received from district administrators and college professors.

Recommendations for Further Developments

The administrative simulation development and discussions in this paper should be considered as a further step in the development of an instrument for investigating the interrelationships between information utilization and decision making. Concerning use of state of the art technology, this study can be considered a further step in showing that nontechnical personnel, educational administrators and college professors can use the technology and procedures outlined in this paper to develop their own training simulations.

Other significant findings were that the technology is sufficiently advanced to the extent that nontechnical personnel can adequately and confidently develop their own simulations using only technical assistance required in
filming and post production support. Another key element in this study is that if the hardware, software and film production facilities are available, then a videodisc-based training program of sufficient quality can be produced for about $500 excluding labor costs for development.

This study has laid out the procedures and shows that the technology is available to develop simulations in colleges, universities and in school districts. This research could result in increased use of this technology at all levels of education training.

**Implications for Theory**

It is important for theoretical statements to undergo continuous testing and reevaluation. Many procedures are available for testing. However, simulations are particularly well suited for this purpose. Simulations provide researchers with controls that are seldom available in the real world of administration. Recent improvements in simulation technology, computer graphics, videodisc technology and authoring software make it possible to increase complexity of various scenarios and for nontechnical people to develop simulations with confidence for small costs, given that the hardware and post production facilities are available.

This study reported on a computer simulation that was designed to investigate administrative decision making procedures using Lipham’s decision making model. Background
data were collected on each subject to investigate its effect on decision and information search parameters. Subjects were presented with a situation that required decisions on what information to gather and what sources to use in the data collection phase before making a decision. Data concerning the sequence and amount of data collected and the decision made by each subject were collected. Additionally, actors representing a panel of subject matter experts provided immediate feedback to each subject. This was done via a scene presented by actors in the videodisc in which salient points concerning facts and procedures to consider before making a decision were presented.

The simulation was designed so that other instrumentation examining procedures could be added that might concentrate on the subject's physical reactions to the simulation. This could be achieved by adding hardware components that could record a subject's pulse rate, blood pressure and perspiration, and a video camera to record facial expressions and verbal responses. These devices could put the resultant data into the subject's personal file during the simulation. This type of information could enable researchers to investigate the decision maker's frustration level and perhaps aid in developing decision making tools for administrators. Also, the program could be modified to permit the user to write formal letters of
reprimand or counseling statements. This information could be used to evaluate written communication skills.

**Implications for Practice**

It is important to identify the information needs and decision making styles of individual administrators. Dependable instruments that can provide an information decision making profile could be used as a training device to show students their strengths and weaknesses in specific areas. This would enable the student to develop skills in areas. The program can be used at the school district level as a training vehicle to give practical examples of circumstances beginning principals could be expected to encounter.

This study also showed that software and hardware tools are available to administrators and other non technical people so that they can develop their own simulations to help in training administrators or for other purposes. These tools can be used to develop practical applications that can be used in the classroom or in seminars for professional development.

Another application of a simulation would be to develop an administrative screening tool. This could be used as a part of the hiring process for positions that require keen decision making skills. This tool could be used as a part of a screening process by requiring a candidate for a position to participate in a number of simulations designed
to portray typical problems that would be encountered in the position. Based on the individual's participation and results of the decisions made for each scenario, a profile could be compiled that may provide insights into an individual's decision making style. This could then be used as one of many tools provided to the organization to assist in the solution process.

Conclusions

Administrative decision making is a complex process and depends on many obscure variables. Instruments for investigating this process also must be complex. The simulation developed in this study incorporates the flexibility of the computer with the power of visual display to produce realistic situations and collect important data concerning the participant's actions. Appendix H contains the videodisc and the software program diskette.
APPENDIX A

FUNCTIONAL FLOW BLOCK DIAGRAMS
Upon completion this loop returns to top level functional flow block diagram
Upon completion this loop returns to top level functional flow block
Upon completion this loop returns to the top level functional flow block diagram.
/*name field*/
var age(2); var filesize(80);
var port(2); var isprintr(5);
var name(25); var sex(1);
var job(25);
var educate(2); /*var lc(1);*/
var bytel(9); var txt(80);
object namef;
set name=" ";
/*var filesize(80),bytel(9);*/
set filesize=fsize("rob.txt");
if filesize=0
  set bytel=0;
else set bytel=filesize+1;
prompt "Enter your name";
var lc(80); var lr(80);
var arg(80);
set isprintr=TRUE;
if result>0 isprintr=FALSE;
do namef; set name=namef;

if trunc(name)=" "{
  msg "Must enter name";
  stop;
}
write "rob.txt",bytel,25,name;
set bytel=bytel+26;
if fsize("rob.txt")>470;
if port=1 jump portok;
if port=2 jump portok:
@portok
set lc="SP ":trunc port:
  chr(13);
write "Laserlink",0,len lc,lc;
read "Laserlink",0,80,lr;
if lr(1)="E" msg "errorprt",lc;

print "name":
set lc="TC 32":chr(13);

/*sex field*/
OBJECT SEXF;
set sexf=" ";
var sex(1);
prompt "Enter (M/F)";
do sexf;
set sex=sexf;
write "rob.txt",bytel,1,sex;
set bytel=bytel+1;
print sex;
set lc="TC 32":chr(13);
/*counsel scene*/
var byte1(9); var cons12(6);
var filesize(80); set filesize =filesize("bob2.txt"); if filesize =0 set byte1=0; else set byte1=filesize+1; print "counsel";
write "bob2.txt",byte1,6,cons12; set byte1=byte1+9;

var lc(80);
var lr(80);
var arg(80);
var sframe(80);
var eframe(80);

/*fill in next 2 lines*/
set sframe=21960;
set eframe=27520;

/*no need to change rest*/
set arg=sframe;

/*seek to beg frame*/
set lc="SE ":trunc arg:chr(13);
write "Laserlnk",0,len lc,lc;
read "Laserlnk",0,80,lr;
if lr(1)$="E" msg "ERRORS";

/*play til end time*/
set arg=eframe;
set lc="PS ":trunc arg:chr(13);
write "Laserlnk",0,len lc,lc;
read "Laserlnk",0,len lc,lc;
if lr(1)$="E" msg "error",lc;
/*age field*/
OBJECT AGET;
set agef=" ";
var age(2);
prompt "Enter years";

do aget;
set age=agef;
write "rob.txt",byte1,2,age;
set byte1=byte1+3;
print age;
set lc="TC 32":chr(13);

/*job field*/
OBJECT JOBF;
set jobf=" ";
var job(25);
prompt "Enter your title";

do jobf;
set job=jobf;
write "rob.txt",byte1,25,job;
set byte1=byte1+26;
print job;
set lc="TC 32":chr(13);

/*years on job field*/

/*years of education*/
object educate;
set educatf=" ";
prompt "Enter total years";
do educatf;
set educate=educatf;
write "rob.txt",byte1,2,
  educate;
set byte1=byte1+3;
print educate;
set lc="TC 32":chr(13);
print " ";
print " ";
go 4;

Mr: Printed Sun May 30 16:27:03 1993

var bytel(9); var jonesl(6);
var filesize(80);

set filesize=fsize("bob.txt");
if filesize=0 set bytel=0;
else set bytel=filesize+1;
print "mr. jones ";
write "bob.txt",bytel,
6,jonesl; set lc="\n32":chr(1)
3; set bytel=bytel+9;

var lc(80);
var lr(80);
var arg(80);
var sframe(80); /*start*/
var eframe(80); /*end*/

set sframe=16205;
set eframe=18845;

set arg=sframe;
set lc="SE ":trunc arg:
chr(13);
write "Laserlink",0,len lc,lc;
read "Laserlink",0,80,lr;
if lr(1)$="E" msg "error2";
set arg=eframe;
set lc="PS ":trunc arg:chr(13)
;
write "Laserlink",0,len lc,lc;
read "Laserlink",0,len lc,lc;
if lr(1)$="E" msg "error5",lc;
Welcome to Principal Decision Making!

This simulation is designed to give you some practical experience in making decisions that could be expected of a principal or assistant principal.

This simulation uses a computer, mouse, printer and a videodisc. Press the left mouse button once on the box you select. You can stop the program at any time by going to an EXIT box and pressing the mouse button.

Move through the program by using the mouse (or up and down arrows) to move the cursor.

To continue the program and answer the questions press BEGIN. To exit now press EXIT.

The following questions ask about you and your experience. This information will be used to keep track of how many times you use this program for statistical purposes only.

Press ENTER to begin the program and answer the questions. Press EXIT to quit the program.

<table>
<thead>
<tr>
<th>NAME</th>
<th>SEX</th>
<th>AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOB TITLE &amp; YEARS ON JOB</td>
<td>TOTAL YEARS OF EDUCATION</td>
<td></td>
</tr>
</tbody>
</table>

Enter your information below:
You are now ready to start the simulation. After you read this page, click on the ENTER box and watch the television monitor connected to the videodisc. You will get valuable information to help you make your decisions.

After the videodisc stops playing you will return to a computer screen and be given several choices. You can make your choices in any order. Indicate your choice by clicking on the appropriate box. A brief videodisc scene will play, then you will return to the computer screen.

If you choose Policy Manual and Records, follow the instructions on the screen. Good Luck!

EXIT

Wait for the videodisc to stop playing before proceeding. For more information choose one or more of the boxes. Press "Make decision?" when you are ready to decide.

(Old history teacher)  (Peer student)  (Concerned mother)
(New teacher committee)  (Union representative)  (Upset student)

Policy manual & records

Make decision?  Review directions?  EXIT

You have selected to look at various policies and records. This information consists of extracts from the County Personnel Procedures Manual, the local teacher's union contract, and extracts from selected student and teacher records.

These papers should have been provided to you before starting this program. If you don't have them, ask the instructor for them now.

After you finish the simulation please return all papers, videodisc and computer diskette to the instructor so that they will be available for the next person.

Press "enter" to continue.
Choose one of the following decisions. Indicate your choice by clicking on the appropriate box then watch the videodisc monitor.

- [ ] reprimand (written reprimand)
- [ ] counsel (written counseling)
- [ ] noaction (take no action)
- [ ] dismiss (formal dismissed)
- [ ] warning (verbal warning)
- [ ] superintendent (refer to superintendent)

You have made your decision. There are several things that you should have considered in your decision making process. To review these points that you should have considered, touch the box "EXPERTS" to see what experts would have considered before reaching a decision in this case.

You have just completed the simulation. I hope that this experience has been professionally challenging.

Should you have any questions or suggestions for new programs please contact me through:

College of Education
University of Central Florida
Orlando, FL 32816

Before you leave, please complete the questionnaire. This will improve the program for others. Use the mouse to press the box marked "The End". Thanks for using "Principal Decision Making".

[The End]
APPENDIX C
SAMPLE RUN
Herman Jones
m
32
teacher
6
15

1
2
4
reprimand
Please answer the following questions by indicating on the scale how much you agree or disagree with the statement. For example, to answer the question, "The picture was," on the scale below simply circle the number that most nearly represents how you felt about the hand writing.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>easy to draw</td>
<td>somewhat easy</td>
<td>impossible to draw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following questions refer to the Principal Decision Making simulation. Use the space indicated for additional comments.

1. The instructions for running the simulation were:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>extremely clear</td>
<td>clear</td>
<td>extremely confusing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

2. The principal's beginning-year teacher problem was:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>very interesting</td>
<td>interesting</td>
<td>very boring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

3. Decision choices or options presented were:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>appropriate and complete</td>
<td>appropriate</td>
<td>not appropriate at all, and incomplete</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

4. Information available to make a decision was:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>very clear</td>
<td>somewhat clear</td>
<td>very confusing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:
5. Did you find the simulation:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>exciting</td>
<td>interesting</td>
</tr>
</tbody>
</table>

Comments: ____________________________________________________________

6. As a student would you consider the simulation helpful in the study of administration:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>quite helpful</td>
<td>somewhat helpful</td>
</tr>
</tbody>
</table>

Comments: ____________________________________________________________

7. Did you find the equipment:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>easy to use</td>
<td>somewhat easy to use</td>
</tr>
</tbody>
</table>

Comments: ____________________________________________________________

8. Would you use this simulation in a school administration course or program:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes, often</td>
<td>maybe</td>
<td></td>
<td>never again</td>
<td></td>
</tr>
</tbody>
</table>

Comments: ____________________________________________________________

9. Were the handouts appropriate for this simulation:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
<td>somewhat</td>
<td></td>
<td>not appropriate</td>
<td>appropriate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>at all</td>
<td></td>
</tr>
</tbody>
</table>

Comments: ____________________________________________________________
10. Were the handouts helpful in making a decision:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>quite helpful</td>
<td>somewhat helpful</td>
<td>not helpful at all</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

11. Would a similar scenario using this technology be useful in courses or programs for future school administrators:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>quite helpful</td>
<td>somewhat helpful</td>
<td>not helpful at all</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

12. This question is OPTIONAL. Please provide any additional comments that would help to evaluate the usefulness of this simulation as a training or evaluation tool. This could include comments on the software program, the hardware used in the simulation, or other topics that you feel are important that aren't addressed elsewhere. Use the space on the back of this sheet or additional paper if you need it.
APPENDIX E

CONSENT FORM
RESEARCH STUDY
A DESIGN FOR IMPLEMENTING A SIMULATION FOR TRAINING SCHOOL PRINCIPALS IN DECISION-MAKING UTILIZING A COMPUTER AUTHORING SYSTEM WITH VIDEODISC TECHNOLOGY

Informed Consent Form

The research study in which you are participating is designed to describe and help explain certain aspect of the decision making process. Implications for the development of effective simulations will also be derived. Within the simulation a questionnaire will be administered to measure psychological variables of interest.

The anonymity of all participants is guaranteed. Any video tapes that are made will be destroyed once segments are edited and converted to disc. It is expected that the results of this research will have theoretical and practical value to the field of education and the public at large.

There are no known discomforts or risks associated with any of the procedures in which you will participate and such procedures are in conformity with accepted professional practice.

Any questions you may have concerning the procedures to be utilized in this study will be answered. You are free to withdraw your consent and to discontinue participation in this study at any time.

Please sign below to indicate your consent to participate in this study.

__________________________________________  _______________________
Name                                               Date
Scene 1

OPENING SCENE

(visual)
Scenes of the outside of a large suburban middle or high school showing buildings, students, athletics, students moving between classes, lunch hour, etc. as the audio builds. Can use stock footage of classroom instruction, students and faculty walking in the halls, etc.

This scene goes directly into Scene 2 with only a short visual of two teachers talking, Mona Gibbs is seen going into an office and closes the door. Cut to scene 2.

(narrative)
It is now 2 weeks before Thanksgiving and you have been the principal of Westridge High School since September. All the hiring decisions including new teachers were made before you took over. You have many responsibilities and opportunities to practice your management skills in making crucial decisions. You are faced with many varied and complex situations that require your time and best management skills. These situations include decisions concerning funding for the rest of the school year, busing problems, discipline, new teachers, and curriculum problems between the older faculty members and some of the new beginning teachers.

Since taking over at Westridge High School in September you have found that the school is a large multicultural institution that has a student mix from low and middle socio-economic backgrounds. Parent involvement varies depending on the activities and the desire for high achievement in academic excellence and extracurricular activities. You have had occasion to meet some of the parents in both cordial and not so friendly meetings. The Parent Teacher Association representatives have talked to you on several occasions about some of the new teachers and their progressive ideas for improving academics.

When you took over as the principal of Westridge High School the superintendent indicated that your objectives should emphasize academic excellence and cultural awareness. You quickly found out that although your school had a good reputation for academics, there were some problems with the faculty and the curriculum. The superintendent specifically said that you were expected to take a good school and improve its academic standings by increasing test
scores. The same professional development programs that the school district had last year were expected to be available again this academic year; however, the number of spaces for this training were expected to be cut due to funding cuts.

It is now mid November, since you assumed your new position in September the faculty and staff were already hired. You have met several times with your faculty and staff and formed your initial impressions of the school and the people you work with on a daily basis.

During the last few weeks you have met with representatives from each of the academic departments and the leaders of the Parent Teacher Association and concerned parents. Each of these groups have given you their vision for the direction the school should follow. You feel comfortable with the department chairs in each academic discipline. However, you haven't been able to really get acquainted with all the faculty as you would like because of pressing administrative details concerned with an expected influx of another 200-300 students during the next year.

It is now two weeks before the Thanksgiving holiday begins.

You have had 2-3 meetings with your department heads and discussed the status of each of the 8 beginning teachers at least once.

You have just completed a faculty meeting on Monday afternoon when your history department chair, Mona Gibbs, a well respected teacher, asks to speak with you privately.
Scene 2

(Visual)

Head shot of Mona Gibbs talking to the camera. Scene can be in an office with a chair for Mona and the camera at the other end of a table. Mona is conservatively dressed befitting her position as department chair and a professional. Mona is frustrated!

Scene ends as she glares at the camera after her monologue.

Mona speaks: I've had it! You've got to do something about Jack Martin, the new 9th grade history teacher that Mr. Waldon hired before he left. Like I told you in September and again last month I've been having a hard time getting Jack to follow the approved curriculum. Well, it happened again today. One of the students that I had last year came to me today in tears because of some things that Jack had said to her in his class. I don't know what else to do. I've talked to Jack several times but he just seems to want to do his own thing. Oh sure, he's bright, he's young and he tries hard. But really, what good is an approved curriculum if nobody follows it?

And this isn't the first time that students and parents have come to me about Jack's unorthodox teaching methods and his own view of history. I happen to know that some of those same parents have spoken to you about Jack, too. Just before this meeting I got a call from Mrs. Kelly, Jerry's mother, that she was organizing some of the parents to see you over this
latest incident. I tell you she is mad about this whole situation, and her husband is an important businessman in this community.

I've done everything that I can do. It's up to you to get this mess straightened out before you have a rebellion on your hands from a bunch of angry parents! Incidentally, you better have an answer to this before I have my department meeting to tell them why they have to follow the curriculum when they all know that Jack doesn't give a damn about anything but his own agenda!
Scene 3

Sherri

Sherri is a bubbly, space cadet about 15-16 that thinks everything is either cool or a real bumer. She talks all the time about anything.

Scene takes place in Principal's office with Sherri sitting across a table from the camera talking to the principal. This is another head shot.

This shot ends when the speech ends.

Sherri speaks:

I've never been in the Principal's office before; well, you called me in to ask what I thought of Mr. Martin my 10th grade history teacher? Oh, I think he's just a real grove, man. Like, I mean he's really with it, you know? He comes up with some of the craziest things. He really gets on some kicks sometimes. Some of the other kids don't like him because he yells and says they're dumb when they don't answer, but I think he's cool, you know? Like, he'll come up with some stuff that isn't in the book and just start talking about how, like you know, uh, why did the Spaniards steal from the Indians and kill them when they explored the New World? Like, man nobody ever asked questions like that before. It kinda makes you think, what was it really like then?
Scene 4

Another history teacher, Mr. Jones, has over 10 years of teaching experience and is a more traditional representative of a professional teacher, hair a little ruffled, shirt and tie, but the tie is loose around his neck. A good Joe that does his job. Scene is a head shot that takes place in an office with Mr. Jones sitting at a table.

Mr. Jones speaks:

Well, yes I'm on Jack's beginning teacher committee. What can I tell you about Jack? Well, he knows his history, especially early American history which is what he's teaching. But, you know, I teach next door to him during second period, and I can hear him through the walls yelling at the kids. I don't know what he's doing, but I don't think you need to raise your voice like he does to get your point across.

Yes, he's competent and wants to do a good job, but I know some of the students don't know how to relate to him. I've overheard their conversations in the hall and in study hall. They seem to be angry and frustrated with him.

I think he's really lost some of these kids. It's a shame because those kids won't like history after being in his class. But what can I do? I mean, I've talked to him once or twice, but he's got his own agenda. It's like he's got his own way of doing things and he's not interested in listening to anything anybody else has to say. I know some of the kids have left his class pretty upset. I'm surprised something hasn't happened already. I could've told you something was wrong with Jack. I'm just glad I don't have to face those parents.
Mrs. Kelly speaks:

I'm Mrs. Kelly, Jerry's mother and I want you to do something about that Martin! He's got my Jerry so upset that he can't study! He's so frustrated in that history class that it's starting to affect his other classes. Why does Mr. Martin have to yell at those kids, and where does he come off telling Jerry that he's a "typical dumb, white middle class male"? And another thing, where did he get those ideas about the early explorers in this country? I never heard such trash before! Listen, if you don't take care of Mr. Martin I'll make sure that you hear from my husband. He's on a lot of committees that give a lot of money to this school. He's got a lot of influence and you're going to regret it. All I've got to say is that you better get that jerk out of here, or else! And I'll tell you something else too. I'm having a meeting with a group of concerned parents tonight and we're going to be watching you to see what you're going to do about this!
Jerry is a bright, athletic student that tries hard in everything he does. He's inquisitive and yet he has also been molded to meet his father and mother's view of the world. He's a serious student that can go places if he wants to. To some extent he has his own opinions but is still being molded and formed by his experiences, both good and bad.

Well, you asked me what went on in my history class.
Well, gee, I don't know. I mean, I used to like history. I always did good in history. It's neat to learn about things that happened in the past, you know. But lately, I mean with Mr. Martin, it's different. I mean, you know, he has his own way of looking at history and I haven't ever heard of some of the cussing that he's saying. I don't understand. I mean, when I try to make a point or ask why he says some of the things he does, Mr. Martin always says I'm stupid or "...that's the kind of answer I'd expect from a white middle class male." I mean, does he have the right to say things like that? I just don't understand. It's like he's in a different world from the way I learned history. I don't like history anymore. Can I get out of Mr. Martin's class, and maybe take another course?
This is a committee meeting consisting of the history department chair, guidance counselor and assistant principal: All are professionals that dress and act the part. This is a serious meeting. All three are at the end of a table looking at the camera. All are head shots. First group, then focus on each as they speak in turn. Final shot is of the group all looking at the camera.

Assistant Principal: Mr. Nichols starts the conversation.

"Well, I've sat in on one or two of Jack's classes. They were certainly interesting to say the least. He's a new teacher. He's got a lot to learn about getting along with the kids. It's true that he doesn't follow the curriculum. I've talked to him about that once or twice. I've even heard what I thought was swearing from his class room as I walked by once or twice, and some of the kids seemed to be upset and talking about him in the hall, but I haven't had a chance to..."

Mrs. Gibbs interrupts.

"Well, it's just like I told you. Jack is big trouble. I don't know what you're going to do about him but I've done everything I can do. Jack just doesn't want to change. He doesn't fit in and he just doesn't care. I mean....."

Mr. Green the guidance counselor interrupts:

"She's right. I've already had five requests from students and parents to transfer their kids to other history classes. I can't tell you how many calls I've had from parents concerning Jack's classes. It's like he just doesn't fit here."

(All three nod agreement at this and face the camera).
Scene 8

Jack Martin is a rough looking man that dresses as a blue collar worker representing his background. He kind of slouches in the chair and has a chip on his shoulder that he dares anyone to knock off.

This is also a head shot in an office with Jack slouching in a chair at the end of a table.

Scene ends with Jack leaning forward toward the camera in a questioning manner.

Jack speaks:

Yea, well I kinda figured you'd call me in sooner or later. I mean, I know I'm not the most popular teacher, but I don't care. I mean I'm my own man. I didn't have it easy like these kids do. I had to work for a living since I was 9. My parents were migrants. I didn't grow up in the suburbs. I'm a city kid and I know where my roots are. And I'm proud of my ethnic origins. Hey man, I had to work hard to get to college. I'm the only one in my family to go to college. And I'm damn proud of it. These kids in this school don't know how well they have it, you know? I'm going to teach them that there were a lot of things going on in history besides what's in those books and that stupid curriculum! I mean who wrote that stuff anyway? It's not representative of what really happened and I'm going to get it changed. I'm going to make sure that the kids in my class get their eyes and ears full, you know what I mean? Yea, I'm going to change things around here. These kids are going to learn some history that their parents don't even know.

And about yelling at the kids? Yea, well maybe I do get loud and yell at them. But, hey, they've got to
grow up sometime. I don't mean anything by it. But you know, if their little egos get bruised, well too bad. It's not my job to baby sit them or be nice to their parents. They got to grow up sometime. They all got it alot easier than I ever did, so what's the problem?
Scene 9

Principal decides to reprimand Jack.

Scene is in principal's office with Jack standing at end of the table looking at the camera. Jack is his disheveled usual self with a bigger chip than usual.

Scene ends with Jack glowering at the camera after being told he's got to change. His last expression is one of "Well, I figured this was coming. I've seen worse times, I'll get by, somehow."

Jack Speaks:

Yea, you just don't have any stomach for the truth. I knew the deck was stacked against me from the beginning. I knew it when I walked in to this school. This isn't the place for me. I've tried to be true to my heritage and my own beliefs. You're ruining my career just because you don't want to know the truth. These aren't kids: they're young adults and what they don't know is going to hurt them. Just you wait and see. And don't do me any favors. I don't need anything from you or anybody else, see?
Jack speaks:

Well, maybe I do yell at the kids too much, but, you know they’re not children, they’re young adults. And if you think I’m bad, wait ‘til these kids get into the real world. They’re too protected here in this school, you know? They’ll never make it unless somebody like me tells them how the real world really is. I mean, I had to come up the hard way. It didn’t hurt me and it won’t hurt them despite what their parents say. So what if some of the parents are upset. Let them get mad. Maybe they’ll get off their butts and do something to get us some decent books instead of this tripe that passes for a curriculum.

You sat in on one or two of my classes. Yea, ok, I’ll tone dohn the noise. But I want you to know I intend to keep challenging the kids and make them think. I mean it’s time someone got these kids to think for themselves, right? Ok, I’ll try to follow the curriculum too. But geez, we’ve got to change that thing. It’s ridiculous.

Well, if that’s all you wanted I’ve to get to my next class. Got a lot of things to straighten out in those kids’ minds. Geeez, I don’t know how I’m going to do it, they’re so protected they wouldn’t know reality if it hit them square in the face, you know?
Scene 11

Dismiss Jack

Scene is in Principal’s office with speaker leaning over desk in a menacing manner. Speaker is well dressed representing his important position as the union representative.

Union Rep speaks:

What do you mean you’ve decided to fire Jack Martin!? You can’t do that! You haven’t counseled him or tried to even help him. We’ll see you in court!
Scene 12

Superintendent

Scene is in Superintendent's office with sign indicating office and position. Superintendent is dressed befitting his position, and he is MAD!

Scene ends when dialog ends.

Superintendent Speaks

What do you mean sending this case to me to handle? Can't you do this yourself? What do you think I hired you for? If you can't take of this, then, maybe, I need to find someone that can!
Scene 13

Expert panel review of decision

Scene is of a panel of two experts, one dressed in coat and tie and one wearing a dress sitting at a table. This is a head shot.

(First panel member speaks.)

In reviewing the case of Jack Martin you should have considered the following facts that were presented in the scenario.

First, Mr. Martin has been counseled by his department chair and the assistant principal on several occasions, but evidently to no avail. Your school policy on working with beginning teachers may have specific actions that are to be taken before termination. You should consult these policies and talk to the Personnel Office at the district to make sure that you comply with their directives.

(Second expert speaks.)

Normally, the following procedure should be followed in handling beginning teachers that are having difficulties. These steps can be remembered using this acronym: NEATT.

Notice, give notice that describes the problem(s) and the specific situations that need to be fixed, along with a course of action and a time frame for change.

Evaluate, review the results of the planned change(s) at regular intervals.

Assistance, you should provide help to the teacher
to make the changes that you have outlined. Refer the teacher for professional help if needed.

**Time to improve.** Provide adequate time for the teacher to make the improvements desired.

**Terminate,** Fire the teacher if progress hasn't been made. Use the correct procedures stipulated in your policy manual.

(First expert speaks.)

Before you decide to give Jack a written reprimand, you should have considered the following facts and alternatives.
The facts indicate that the real problem is that Jack is an inflexible teacher that disregards the curriculum and doesn't want to change his teaching style.

Secondary problems include Jack's status as a first year teacher, his appearance, his feeling of alienation and the problems with the parents and students in his class.

(Second expert speaks.)

Some alternatives that you should have considered include the following:

1. Continue trying to work with Jack, encouraging him to develop alternative teaching methods.
2. Enlist Mrs. Gibbs' help in socializing Jack to observe the mores of the community.

3. Delay the decision while assessing the extent and degree of dissension with Jack's teaching, and

4. Develop a specific plan for remediation and get Jack to agree to it.

You should have evaluated each of these alternatives and any others that you thought of during this exercise. The evaluation should have included the pros and cons of each alternative. Consider the impact on the students, the school, Jack, your career, and the neighborhood.
Mona Gibbs is a classic professional teacher. She is technically competent, up to date in the latest teaching methods and has excellent rapport with teachers and students. As principal, you have had several opportunities to meet with Mona and are impressed with her subject knowledge and her leadership abilities. She is the kind of teacher principals dream of working with. She has been a teacher for over 10 years in this school and has rapidly progressed up the ladder. You were impressed with her professionalism and her ability to handle difficult situations.

Sherri is a bubbly, outgoing teenager. She is in 10th grade and has been at Westridge High School since 9th grade. She is a below average student that is more interested in the current fashions and parties than in school. Her grade report for the current semester is in the Policies and Records file folder. Sherri has been summoned to the principal's office at your request to get her perspective of the situation. She hasn't been in the principal's office before, nor has she been in trouble while at school. Being a new principal and not familiar with the student body, you simply selected Sherri at random.

Mr. Jones is a professional teacher that has been at Westridge High School for the last 5 years. He isn't a very strong teacher, but he is competent and tries hard. Since your arrival two months ago you have had only one or two opportunities to meet with him privately.
He appears to be about average in ability and motivation.

MRS. KELLY

(irate parent)

Mrs. Kelly's son, Jerry, is upset with Mr. Martin's teaching. He has told his mother that he wants out of Mr. Martin's class and that you won't let him transfer. You have never met Mrs. Kelly, and know nothing about what she or her husband do for a living. She dresses as a professional of some kind.

JERRY KELLY

(upset student)

You called Jerry Kelly in to get his impression of what is going on in the classroom. You have never met Jerry before this incident. He appears to be an easy going student that thinks a lot, but gets along with everyone.

MR. GREEN

(assistant principal)

Mr. Green has been assistant principal at Westridge for the last two years. You have talked with him several times about many subjects concerning discipline, teacher morale, curriculum, budgets, physical plant and the myriad problems that assistant principals and principals discuss. Since he has been at Westridge for over 5 years, he is your corporate knowledge for the climate and issues that confront the school. He is an easy going guy that you suspect may be too entrenched, and too politically aware to make tough decisions that may be required. He heads your beginning teacher program and chairs the beginning teacher committee meetings.

MR. GORDON

(guidance counselor)

You have met with Mr. Gordon several times over the last two months that you have been at Westridge. Mr. Gordon is a professional that knows his job and does it well. He enjoys working with the kids and
the kids respond to him. He knows many of the parents in the community. He has been at Westridge for the last 8 years. He has been the guidance counselor for the last three years. You have learned to respect and trust his opinion about issues in his area of responsibility. He is a member of the new teacher committee and attends all meetings regularly. He is also responsible for class assignments and transfers between classes.

MR. JACK MARTIN
(first year history teacher)

You have seen Mr. Martin in the hall, at faculty meetings and sat in on parts of one or two of his classes. You sense that there is something not quite right about him, but you're not sure what it is. His teacher record is in the Policy and Procedures file folder.
APPENDIX G
PRINCIPAL'S QUESTIONNAIRE
Dear:

Thank you for taking my call on Monday the 30th of November and agreeing to answer the enclosed survey. As I mentioned, for my doctoral dissertation I am developing a computer assisted decision making simulation. Your response will be used with the responses of other high school principals to provide the script for an expert panel to use in this simulation.

After reading the enclosed scenario, please provide your response to the survey and return it in the enclosed envelope by the 15th of December. Should you have any questions please call me. Your assistance in this effort is appreciated.

Sincerely,

Rob Wright
You are the new principal of a large suburban high school. You have met your faculty but don't really know them. You have heard complaints from parents about one beginning teacher using vulgarity and shouting at students. Your history department chair has told you that the new teacher doesn't follow the prescribed curriculum. You sat in on one or two of his classes and found him to be knowledgeable about the subject. Discussions with other teachers confirm that the new teacher has his own agenda and that students come out of his class angry and frustrated.

You have counseled the new teacher one time. Your department chair is demanding that you do something to get the new teacher straightened out.

Question: What do you do now? Briefly indicate what actions you would take to solve the problem. List any documents you might reference, or people (by position rather than name) that you would discuss the situation with to get more information. Also, list any organizations, agencies or offices that you would call, and indicate if there is sufficient information to decide on a course of action.
APPENDIX H

PRINCIPAL DECISION-MAKING DISKETTE AND VIDEODISC
REFERENCES


Heinlein, A. C. (1973). Decision sciences in academic administration conference. Paper presented at a Decision Models in Academic Administration Conference, Kent State University, Columbus, OH.


